ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.,* 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots.. 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

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RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	**Strongly Disagree 1**	**Disagree 2**	**Indecisive 3**	**Agree 4**	**Strongly Agree 5**	**∑fx**	**Mean**	**Remarks**
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \; 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{\sqrt{n\sum xy-(\sum x)\,(\sum y)}}{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{'}$Nand longitudes $7^{0}30^{'}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

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n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.
Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal}>t_{tab}(P\leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	**Strongly Disagree 1**	**Disagree 2**	**Indecisive 3**	**Agree 4**	**Strongly Agree 5**	**∑fx**	**Mean**	**Remarks**
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
∑ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
∑x = sum of famer's perceived relevance of improved yam practices.
∑y = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$ ($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	x̄	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: x̄ ≤ 3.0 represents "Low Use" while x̄ ≥3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement (x̄ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
∑ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
∑x = sum of famer's perceived relevance of improved yam practices.
∑y = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al.*, 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT

Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al.*, 2014; Nweke *et al.*, 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al.*, 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al*. (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at $P < 0.05$ level (2-tailed). The t-critical value was at $P < 0.05$ level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40'$Nand longitudes $7^{0}30'$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \text{……………….. 1.0}$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \text{…………… 1.1}$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$ ($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.
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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \; 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$ ($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{\sqrt{n\sum xy-(\sum x)(\sum y)}}{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
∑ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
∑x = sum of famer's perceived relevance of improved yam practices.
∑y = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION
Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
∑ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
∑x = sum of famer's perceived relevance of improved yam practices.
∑y = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \qquad \ldots\ldots\ldots\ldots\ 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$ ($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al*. (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al*. (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

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The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

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Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
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Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
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Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
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Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

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n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
∑ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
∑x = sum of famer's perceived relevance of improved yam practices.
∑y = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal}>t_{tab}(P\leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \text{………………. 1.0}$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \text{…………… 1.1}$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at $P < 0.05$ level (2-tailed). The t-critical value was at $P < 0.05$ level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\; 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.,* 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots .. 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{\sqrt{n\sum xy-(\sum x)(\sum y)}}{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^{!}$Nand longitudes $7^0 30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\, 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \text{………………. 1.0}$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \text{…………… 1.1}$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots.\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \ldots\ldots\ldots\ldots\ldots\ 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$ ($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al.*, 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \text{………………. 1.0}$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \text{…………… 1.1}$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al*. (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.
Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al*. (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income	- 3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT

Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.
Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	**Strongly Disagree 1**	**Disagree 2**	**Indecisive 3**	**Agree 4**	**Strongly Agree 5**	**∑fx**	**Mean**	**Remarks**
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \text{………………. 1.0}$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \text{…………… 1.1}$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \; 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$ $(P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al.*, 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	**Strongly Disagree 1**	**Disagree 2**	**Indecisive 3**	**Agree 4**	**Strongly Agree 5**	**∑fx**	**Mean**	**Remarks**
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots \; 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
∑ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
∑x = sum of famer's perceived relevance of improved yam practices.
∑y = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT

Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .
The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.
The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq$ 3.0 represents "Low Use" while $\bar{x} \geq$3.05 represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.
Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq$ 3.0 represents "Perceived Negative" while $\bar{x} \geq$ 3.05 represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at $P<0.05$ level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1.0$$

Where:

r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
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$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
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n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ 1.1$$

Where:

t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.
ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^{0}40^{!}$Nand longitudes $7^{0}30^{!}$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy-(\sum x)(\sum y)}{\sqrt{n(\sum x^2)-(\sum x)^2 . n(\sum y^2)-(\sum y)^2}} \quad \text{.................. } 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

$\sum$ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

$\sum x$ = sum of famer's perceived relevance of improved yam practices.

$\sum y$ = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1-r^2} \quad \text{..............} \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al*. (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al*. (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
Accessible and encourages savings	8	16	30	41	25	419	**3.5**	**Positive**
Grand Mean							**3.7**	**Positive**

Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

The result of Pearson's Product Moment Correlation (PPMC) analysis used to test the hypothesis that there is no significant relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area is presented in Table 3.

The result of the Pearson's Product Moment Correlation (PPMC) analysis showed a significant and positive relationship between level of use of improved yam production practices and perceived relevance of the practices in the study area at $P < 0.05$ level of probability. This was confirmed by the t-test of significance of the correlation coefficient which had a computed value of 5.484 and was higher than the critical value 1.96 at $P < 0.05$ level of probability. This result agrees with the views of Hart (2001) and Sarah *et al.* (2015), who noted that sustainability of any production practice ensures the satisfaction of the present environment and society as a whole without compromising the future. Thus the level of use of improved practices is influenced by the perceived relevance of the practices. The finding of the study also agrees with Rivera-Ferre*et al.* (2015) which indicated that adoptable technologies are those perceived to be relevant to the farmer at any given point in time and that the extent of use of any

given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

Given that the computed t-value (5.484) was higher than the tabulated t-value 1.96, therefore, the null hypothesis is rejected, and the alternative hypothesis accepted. We therefore conclude that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.

Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots.. 1.0$$

Where:

r = correlation coefficient

x = Farmers' perceived relevance of improved yam practices (mean scores)

y = Level of use of improved yam production practices (mean scores)

∑ = Summation

xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.

∑x = sum of famer's perceived relevance of improved yam practices.

∑y = sum of extent of use of improved yam practices.

$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.

$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.

n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \ldots\ldots\ldots\ldots\ldots \quad 1.1$$

Where:

t = t-test of significance

r = correlation coefficient

n = sample size

Decision rule: if $t_{cal} > t_{tab} (P \leq 0.05)$ we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

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Source: Field survey, 2018.Note: $\bar{x} \leq 3.0$ represents "Perceived Negative" while $\bar{x} \geq 3.05$ represents "Perceived Positive"

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given technology is synergic with its economic, socio-cultural, environmental and agronomic relevance to farmers.

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Table 3. Relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area

Parameter	Correlation coefficient	T-value	T-critical
Use of improved yam production practices and perceived relevance of the practices	0.451	5.484	1.96
Number of respondents	120		
P-value	0.000	0.000	

Source: Field Survey, 2018. Note: **Correlation is significant at P < 0.05 level (2-tailed). The t-critical value was at P < 0.05 level of probability.

CONCLUSION AND RECOMMENDATIONS

From findings of the study, it was concluded that level of use of improved yam production practices among rural farmers was affirmed to be high and the perceived relevance was also found strong and positive. It was also revealed that there is a significant and positive relationship between extent of use of improved yam production practices and perceived relevance of the practices in the study area.Based on the findings of the study, the following recommendations were made:

i. The farmers in the rural areas should be encouraged by the extension agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheaper rates.

ii. The extension agents should be well trained and motivated with logistics support to enable them create effective awareness, enlighten and train the yam farmers on how to have more access timely to improved practices confirmed more sustainable in yam production.

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ASSESSMENT OF USE OF IMPROVED YAM PRODUCTION PRACTICES AMONG FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT
Despite the development and dissemination of improved yam production practices, the degree of use remains apparently unknown. The study assessed the level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. Multi-stage random sampling technique wasemployed for selecting 120 rural farmers who served as respondents for the study. The data were collected through the use of questionnaire and analyzed using both descriptive (mean score rating) and inferential (Pearson Product Moment Correlation (PPMC)) statistics. The findings showed high level of use of improved production practices such asstorage in barns ($\bar{x}$ = 4.6); harvesting within 7-12months after planting ($\bar{x}$ = 4.5); staking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1)and weeding 2-3 times ($\bar{x}$ = 4.0). The overall grand mean score ($\bar{x}$ =3.3) being higher than the benchmark affirmed that there was high level of use of the improved yam production practices among the farmers. Results showed that the rural yam farmers, variables were majorly affirmed to be positively relevant;food security improvement ($\bar{x}$ = 4.3) was perceived to be positive followed by yields improvement, income enhancement; and farming skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0) and early maturity ($\bar{x}$ = 3.9).There was a significant and positive relationship between extent of use of improved yam production practices and perceived relevancein the study area at P<0.05 level of probability. The study concludes that there is high extent of use and positive perceived relevance of improved yam production practices among rural farmers in Ebonyi State, Nigeria.It recommended thatfarmers in the rural areas should be encouraged by the ADP agents to join related cooperative societies or organizations as this would make them have more access to some innovative practices at relatively cheap rates.

Key words: Extent of use**,** improved practices,rural farmers, yam production

INTRODUCTION

Great number of field challengesthreaten the ability of agriculture to fulfill human needs now and in the future, such as climate change; a high rate of biodiversity loss; land degradation through soil erosion, compaction, salinization and pollution; depletion and pollution of water resources; rising production costs; an ever decreasing number of farms and linked with that, poverty and poor practices (Nwaiwu*et al.*, 2010 and Eze*et al.*,2008).Ekwe *et al.* (2011) asserted that the emergence of the oil boom of the seventies increased the incidence and severity of poverty in Nigeria as a result of declining performance of the agricultural sector where majority of the poor and rural dwellers were employed.Transformation of agriculture to meet the growing demand for food provides opportunities to build synergies and manage trade-offs across the multiple objectives of food and nutrition security, and climate change adaptation and mitigation (Sarah*et al*., 2015).

Improved yam production practices are the technologically advanced system of farming yam in the world. They make use of scientific researches and mechanized farm implements are majorly used for the farming activities(Rivera-Ferre*et al*., 2015). The equipment involved call for minimum human labour for even the most detailed job. Associated with it is the scientific methodology applied to such processes as land preparation, planting, spacing, fertilizer application, weeds control, pest control, harvest and storage practices (Ekong, 2010). It involves very intensive farming (lots of input per unit land), large capital investment, employment of people with specialized skills and great amount of managerial ability. Improved production practices are said to be modernized, hybridized and full of scientific knowledge. They are generated by universities, government research centers and private industry.

Yam is the common name for some plant species in the genus *Dioscorea* (family *Dioscoreaceae*) that form edible tubers. Yams are perennial herbaceous vines cultivated for the consumption of their starchy tubers in Asia, Africa, Central and South America, and Oceania. The tubers themselves are also called "yams" (Akoroda, 2009; Ironkwe, 2011; Encyclopaedia, 2009).

In Ebonyi State Nigeria, improved yam production practices have been transferred to farmers by agricultural extension agents but the farmers' level of use of the practices has not been established. A study was thus conducted to assess the level of use of the improved yam production practices among farmers in Ebonyi State. This paper therefore, seeks to x-ray the extent of use of the improved yam production practices among farmers in Ebonyi State with the following specific objectives:

i. assess the extent of use of improved yam production practices among rural farmersand
ii. examine the perceived relevance of improved yam production practices of farmersin the study area.
iii. determine relationship between extent of use of improved yam production practices and the perceived relevance of the practices among rural farmers in the study area.

METHODOLOGY

The study was conducted in Ebonyi State of Nigeria. Ebonyi State is located in the South-Eastern geographical zone of Nigeria with her headquarters situated in Abakaliki. It lies approximately on latitude $5^0 40^!$Nand longitudes $7^0 30^!$E.Ebonyi State has a land mass of approximately 5,932 square kilometreswith projected population estimate of over 4 million people based on the average growth rate of 3.28%(NPC,2018)The States that share boundary with Ebonyi include: Benue State to the North, Abia to the South, Cross River State to the East and Enugu to the West (National Population Commission; NPC,2006).

Multi-stage random sampling technique was used to select two agricultural zones namely; Ebonyi North and Ebonyi Central. Simple random sampling technique was used to select three extension blocks from the two agricultural zones. giving a total of six extension blocks. Two cells from each of the six blocks selectedgiving a total of twelve cells. Tenfarmers were randomlyselected from each of the twelve cells using random samplingtechnique giving atotal of 120 respondents. Objectives i and ii were realized using descriptive (mean score ratings). The degree of association between the level of use of improved yam production practices and the perceived relevance of the practices in the study area was implicitly ascertained using Pearson Product Moment Correlation (PPMC) model.

Pearson Product Moment Correlation coefficient model is given as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2 . n(\sum y^2) - (\sum y)^2}} \quad \text{……………….. 1.0}$$

Where:
r = correlation coefficient
x = Farmers' perceived relevance of improved yam practices (mean scores)
y = Level of use of improved yam production practices (mean scores)
$\sum$ = Summation
xy = sum of the product response of respondents on perceived relevance of improved yam practices and extent of use of improved practices.
$\sum x$ = sum of famer's perceived relevance of improved yam practices.
$\sum y$ = sum of extent of use of improved yam practices.
$\sum x^2$ = sum of squared of the famers' perceived relevance of improved yam practices.
$\sum y^2$ = sum of squared of the extent of use of improved yam production practices.
n = number of respondents

It was further subjected to t-test of significance on the correlation coefficient carried out using the model given as;

$$t = \frac{r \times \sqrt{n-2}}{1 - r^2} \quad \text{…………… 1.1}$$

Where:
t = t-test of significance
r = correlation coefficient
n = sample size

Decision rule: if $t_{cal} > t_{tab}$ ($P \leq 0.05$) we reject the null hypothesis.

RESULT AND DISCUSSIONS

Use of Improved Yam Production Practices Among Farmers in Rural Areas of Ebonyi State

Table 1 shows the mean score distribution of level of use of improved yam production practices among farmers in Ebonyi State, Nigeria. The results revealed high level of use of improved yam production practices such asstaking ($\bar{x}$ = 4.4); use of NPK chemical fertilizer 12:12:17 ($\bar{x}$ = 4.2); yam-cassava relay intercropping ($\bar{x}$ = 4.1); weeding 2-3 times ($\bar{x}$ = 4.0); yam-vegetables intercropping ($\bar{x}$ = 4.0); yam-melon intercropping ($\bar{x}$ = 3.5); yam-cowpea-maize intercropping ($\bar{x}$ =3.5); band placement of fertilizer ($\bar{x}$ = 3.5);harvesting within 7-12months after planting ($\bar{x}$ = 4.5); as well as storage in barns ($\bar{x}$ = 4.6).The overall grand mean score of 3.3 affirmed the level of use of the improved practices to be high. The implication remains that the improved yam production practices diffused to the rural farmers were used in varying degrees as indicated by the mean scores. The findings agree with the view of Akinbile*et al*. (2014), that awareness of innovations gives high probability of their extent of use thereby improving users' standard of living. In the same vein, the success of agricultural development in developing countries like Nigeria largely depends on the nature, extent of use of technologies and mobilization of people for awareness (Adekoya and Tologbonse, 2005).The results disagreed with that of Okoro (2008) and

Lawal *et al.* (2014), who posited that since the introduction of yam minisett technology in 1982 though developed in the late 1970s by International Institute Tropical Agriculture (IITA) and NRCRI, Umudike, its rate and level of adoption by traditional farmers has been extremely low as a commercial production practice for seed yam.

Table 1. Distribution of respondents according tolevel of Use of Improved Yam Production Practices in the study area.

Variables	Never Used 1	Rarely Used 2	Sometimes Used 3	Often Used 4	Always Used 5	∑fx	$\bar{x}$	Remarks
Mechanised land clearing and cultivation	53	24	24	14	5	254	**2.1**	**Low**
Intensive tillage	31	15	17	18	39	379	**3.2**	**High**
Treatment of seed/setts	68	5	16	18	13	263	**2.3**	**Low**
Lime application on acidic soil	49	33	25	10	3	245	**2.0**	**Low**
Weeding (2-3 times)	2	4	19	59	36	483	**4.0**	**High**
Use of NPK 12:12:17	2	6	6	60	46	502	**4.2**	**High**
Intensive ridge making and planting	19	16	31	31	23	383	**3.2**	**High**
1m × 30cm spacing (minisett)	43	29	22	19	7	278	**2.3**	**Low**
1m × 1m spacing (wareyam)	39	35	21	17	8	280	**2.3**	**Low**
Minisett sole cropping	38	26	28	24	4	290	**2.4**	**Low**
Wareyam sole cropping	39	19	28	28	6	303	**2.5**	**Low**
Yam-Maize intercropping	7	9	41	55	8	408	**3.4**	**High**
Yam-Melon intercropping	10	7	26	64	13	423	**3.5**	**High**
Yam-Maize-Melon intercropping	13	10	35	44	18	404	**3.4**	**High**
Yam-Cassava relay intercropping	1	6	19	45	49	495	**4.1**	**High**
Yam-Cowpea-Maize intercropping	9	10	37	46	18	414	**3.5**	**High**
Yam-Vegetables intercropping	2	7	13	60	38	485	**4.0**	**High**
Band placement of Fertilizer	14	12	22	47	25	417	**3.5**	**High**
Staking	2	2	9	38	69	530	**4.4**	**High**
Harvesting in 7-12 Months	-	-	10	43	67	537	**4.5**	**High**
Storage in barns	-	-	6	33	81	555	**4.6**	**High**
Storage in cold or Ventilated room	34	13	31	21	21	342	**2.9**	**Low**
Grand Mean							**3.3**	**High**

Source: Field survey, 2018. Note: $\bar{x} \leq 3.0$ represents "Low Use" while $\bar{x} \geq 3.05$ represents "High Use"

Rural Farmers' Perceived Relevance of Improved Yam Production Practices in Ebonyi State

Table 2 reveals the perceived relevance of the improved yam production practices of the respondents in the study area. The most relevant as perceived by the rural yam farmers was food security improvement ($\bar{x}$ = 4.3) followed by yields improvement, income enhancement; and farming

skills and experiences improvement ($\bar{x}$ = 4.2), satisfaction derived from using them and adoption of innovation improvement ($\bar{x}$ = 4.0), early maturity ($\bar{x}$ = 3.9), desirable and reliable ($\bar{x}$ = 3.8), proper crop geometry ($\bar{x}$ = 3.6), accessible and encourages saving ($\bar{x}$ = 3.5), affordability, soil structure and climate stability; and extension delivery regularity promotion ($\bar{x}$ = 3.4), cost of labour reduction ($\bar{x}$ = 3.2) and easy to carry out ($\bar{x}$ = 3.1) while do not pollute the environment gave rise to a mean score,($\bar{x}$ = 2.9) and was below the mean score upper limit $\bar{x}$ = 3.05 .

The implication is that the grand mean of 3.7 affirmed the overall variables to be positive, significant and relevant by the respondents in the study area. The results further implied that any innovation which is capable of improving yields, skills and experiences would in turn improve adoption rate, income, encourage savings, prove more reliable and in the long run, improve food security of farming households.

The findings agreed with that of Ogunbameru (2011), who remarked that any technology designed, tested and disseminated to rural farmers could only be confirmed worthwhile by the farmers' perception and use of such resource. Also,the improved yam production practiceswere developed for producing good quality yams hence, promoting the package is offering opportunity for commercial production of yam with superior outputs and less complications in technique (Lawal *et al*., 2014; Nweke *et al*., 2011).

Table 2. Distribution of Respondents according to theirperception of the relevance of the Improved Yam Production Practices in the study area.

Variables	Strongly Disagree 1	Disagree 2	Indecisive 3	Agree 4	Strongly Agree 5	∑fx	Mean	Remarks
Affordability	10	20	29	40	21	402	**3.4**	**Positive**
Environmental pollution	19	30	20	41	10	353	**2.9**	**Negative**
Improves yield	1	5	5	67	42	504	**4.2**	**Positive**
Enhances income -	3	10	71	36	50	0	**4.2**	**Positive**
Improves farming skill and experience	-	10	1	62	47	506	**4.2**	**Positive**
Reduces cost of labour	6	36	25	31	22	387	**3.2**	**Positive**
Food security	1	5	5	52	57	519	**4.3**	**Positive**
Proper crop geometry	1	9	47	44	19	431	**3.6**	**Positive**
Easy to carry out	9	28	33	37	13	377	**3.1**	**Positive**
Satisfied using improved yam practices	3	6	12	67	32	479	**4.0**	**Positive**
Improves adoption rate	2	5	5	83	25	484	**4.0**	**Positive**
Do not distort soil structure and climate	3	19	46	37	15	402	**3.4**	**Positive**
Enhance early maturity	-	7	28	53	32	470	**3.9**	**Positive**
Promotes Extension Delivery regularity	5	18	42	36	19	406	**3.4**	**Positive**
Desirable and reliable	1	7	35	49	28	456	**3.8**	**Positive**
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