GENDER ISSUES IN THE USE OF YAM MINISET TECHNOLOGY FOR INCREASED AND SUSTAINABLE SEED YAM PRODUCTION IN SOUTH EASTERN NIGERIA.

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ABSTRACTS
Gender determines roles, priorities, problems, access to, ownership of resources and division of labour among farmers. However reports have shown that failure of most agricultural development projects to consider gender issues has resulted to low adoption and decline in productivity. This is because the ability to utilize agricultural technologies by farmers in developing countries depends mostly on the availability of production resources and is often determined by gender. In line with the foregoing issues, this study was designed to appraise the extent of utilization of yam minisett technology and production factors influencing the output of the gender groups. Multistage sampling technique was employed in selecting 480 yam farmers from five states in Southeastern Nigeria. Interview schedule was used in data collection. Descriptive and inferential statistical tools were used for data analysis. Results showed that the male farmers had higher levels of awareness and utilization of the technology than their female counterparts. Results further revealed that farm size, minisett dust and labour had positive influence on the output of the male farmers. On the other hand, planting materials, fertilizer and other inputs had positive effects on the output of the female farmers. It was recommended that awareness campaign should be increased among female farmers to enhance their utilization. In addition, the Federal and State governments should ensure the availability of those production factors that could enhance the use of yam miniset technology among the gender groups. This will go a long way in enhancing utilization, increasing seed yam production and ensuring its sustainability in the areas.
Key words: gender, seed yam, yam minisett technology, sustainability.

INTRODUCTION

Gender is wider than the promotion of women only, focusing on the relationship between men and women, their roles, access to and control over resources division of labour and needs (Ekop, 2001). Failure of most agricultural development projects to consider gender issues has resulted to low adoption and lack of sustainability of such projects (lwunor, 1999). This is because the ability to utilize appropriate agricultural technologies by farmers in developing countries like Nigeria depends mostly on the availability of production resources and accessibility of such technologies. This is often determined by gender of the clients. Gender issues are vividly seen in agriculture production because men and women are engaged in the process even in production of root and tuber crops in the country specifically in southeastern Nigeria. The activities carried out by these gender groups in production processes are complementary and vary widely depending on the location. But generally, women participate actively and are more involved than the men even in yam production (Ironkwe, (2011); Abiola and Omoabugan, 2001).

Yam is one of the important staple tuber crops grown in the country. Nigeria is the largest world producer of yam with annual production of about 36.72 million metric tones (FAO 2008). The country had a great potential for its production both for local consumption and for export (Asumugha *et aI.*, 2009). This crop occupies a very prominent position in the daily food intake of Nigerians. The importance of yam in the country revolves on its caloric, economic and socio--cultural values (Ironkwe, 2011). Traditionally, farmers use small whole tubers as planting materials for ware yam production. The seed yam used as planting materials constitute the major cost item sometimes up to 40% of the total outlay for the production of ware yam in Nigeria (Okoli and Akoroda, 1995). The quantities of seed yam required are high and costly thereby increasing the total cost of yam production. This high cost of seed yams has caused serious setback in yam production in the past three decades (Ironkwe, 2011; Asumugha and Chinaka, 1998) resulting in a general decline of yam production (Madukwe *et aI.*, 2001). Therefore, shortage of seed yam and its attendant high cost are the major constraints to yam production in Nigeria.

In order to address these constraints, National Root Crops Research Institute (NRCRI), Umudike, in collaboration with the International Institute for Tropical Agriculture (IITA), Ibadan, developed the yam minisett technology. The technology is an improved method of rapid multiplication of clean and healthy seed yams (Otoo *et. aI.*, 2001). It yields a ten-fold increase in the yam multiplication ratio over the traditional method. Infact, the expected yield from minisett according to Igwuilo and Okoli (1988) is between 7.8 and 21.1 tones per hectare depending on the variety and environmental factors. The technology has been promoted and transferred to farmers through various Agricultural Development Programmes in the country. In spite of the advantages of the technology, reports revealed low adoption of the technology among farmers in the zone (Anuebunwa 1999; Odurukwe *et al.*, 2003). Consequently, the problems of scarcity and high cost of seed yam persist.

However, these reports are not gender sensitive as they lack adequate gender disaggregated data which could help in understanding gender differences, contributions and constraints in production process. Such knowledge could be well utilized in planning programmes, taking decisions and making policies geared toward increasing productivity of farmers for sustainable seed yam production in the country. In line with the foregoing issue, this study was thus designed to appraise the extent of adoption of yam minisett technology among farmer groups, identify factors of production influencing their various outputs and make recommendations.

METHODOLOGY

Study area

The study was conducted in the Southeast agro-ecological zone of Nigeria. The zone is located in the rainforest zone of Nigeria. It lies between latitudes 4° 20' and ***t*** 25' N and longitudes 5° 20' and 8° 51' E. (Ekwe, 2004) The zone covers a land area of about 109, 524sq. Km., which is 11.86% of the total area of Nigeria (NPC, 2006). This area lies mainly on plains under 200m above sea level. It is bounded on the South by Bight of Benin, on the East by the Republic of Cameroon, on the West by river Niger and Delta State and on the North by Benue State (FSON, 1998). The zone was chosen for the study based on the fact that it is one of the major yam producing zones in Nigeria. It is also where the National Root Crops Research Institute (NRCRI), Umudike, which developed the minisett technology is located.

The zone is made up of nine states namely Abia, Anambra, Bayelsa, Cross River, Ebonyi, Enugu, Imo and Rivers. It is one of the most thickly populated agricultural zones in Nigeria (Iloka and Anuebunwa, 1998). It has a population of about 18.92 million or 21.48% of the total population of Nigeria with a population density of about 173 persons per square kilometer (NPC, 2006). The rural population accounts for about 60% of the population. The major ethnic groups are the Anangs, Efiks, Ibibios, Ibos, Ijaws and Ogonis (Ekwe, 2004). About 60 - 70% of the inhabitants are engaged in agriculture. They are mainly involved in crop farming except the riverine areas and Ijawswho are primarily fishermen. Livestock farming is a very minor activity in the zone (Unamma *et. al., 1985).*

The total arable land in the zone is about 5.8 million hectares while the total area under cultivation is about 2.8 million hectares. The average farm household size is 7 members with farm size ranging from 1 to 1.5 hectare per farm family. The farm activities provide about 60 - 70% of the family income. The major and immediate sources of farm labour is the family followed by
hired labour with women accounting for 60 -70% of the total labour force. The degree of involvement in farm activities is skewed in favour of the female folks (Anuebunwa and IIoka 1998). Hence gender is a very important issue in agricultural production in the zone.

Sampling and Data Collection

Five out of the nine states (Abia, Anambra, Cross River, Ebonyi and Enugu) in the zone were purposively selected while multi-stage sampling technique was employed in selecting the respondents for the study. The Agricultural Development Programme (ADP) zoning system was used to get at the household which formed the unit for data collection. First stage involved the random selection of two agricultural zones from each of the selected states. The second stage involved random selection of two blocks from each of the selected zones. The selection of two circles from each block formed the third stage. At the fourth stages, twelve yam farmers (6 males and 6 females) were randomly selected from a list of yam farmers obtained from ADP zonal offices. This gave a total of 96 respondents per state and a total of 480 respondents from the five states chosen for the study. The respondents were interviewed with the aid of interview schedule. Data were collected on the socio-economic characteristics, awareness, adoption, sources of information and production resources used as well as the output, expenditure and income from the technology.

Analytic Procedure

Data collected were analysed descriptively using means, frequencies and percentages. Inferential Statistic such as multiple regression analysis was employed in determining the production factors influencing the outputs of the gender groups. The four functional forms were tried and the lead equation was chosen based on statistical and econometric reasons. The model was represented in implicit form as:

$Y = f(X_1\ X_2$ ---------- $Xn, U,)$ *This was expressed as:*

$Y, = b_o + b_1 X_1 + 1b_2X_2 + b_3X_3$~------- $boX. + U_r$--- *(1)*

Where Y, = seedyam output of the I farmer (kg) $X, =$ *farm size (ha)*

X_2 *= quantity of fertilizer (kg)*

$X_3 =$ *quantity of minisett used as planting material (kg)*

$X_4 =$ *quantity of minisett dust used (kg)*

$Xs =$ *Labour input used (Mandays)*

$X_6 =$ *other input (herbicides, stakes, hoes etc in N)*

$b_1 - b_6$. *= parameters to be estimated,* $b0 =$ *intercept, U = error term.*

All the variables were expected to have positive influence on the outputs.

RESULTS AND DISCUSSION

Average statistics of farmer groups

The average statistic of the sampled farmer groups are presented in Table 1. On the average, a typical male farmer is 59.05 years with 8.10 years of education, 30.09 years of farming experience and an average

household size of about 9 persons. The average male farmer cultivated 0.30 hectare of land for yam minisett, spent about N67,798.76 on production, produced an output of 9,029.62kg and realized N164,775.00. On the other hand, the average age of a female farmer is 50.47 years, with 7.33 years of education, 24.22 years of farming experience and with an average household size of about 7 persons. She cultivated 0.17 hectare of land for yam minisett, spent about N29, 594.71, produced 7, 706.24kg of seed yam and realized N96, 773.04 as income.

Table 1: Average statistics of sampled gender Groups.

Variables	Males	Females
Age	59.05 years	50.47 years
Farming experience	30.00 years	24.22years
House held size	9 people	7 people
Education	8.10 years	7.33 years
Farm Size	0.30 hectares	0.17 hectare
Expenditure	₦67,798.76	N29,594.71
Output	9,029.62kg	7,706.24kg
Income	₦164,775.00	₦96,770.00

Source: Field survey 2010/2011

Sources of information, levels of awareness and adoption of the technology

Table 2 shows that 97.50% of males and 75.00% of the females knew about the technology. Greater proportion (93.75%) of the males got their information from the ADPs while 95.42% of the females received theirs from fellow farmers. This implies high awareness of the technology among the farmer groups as they were well trained by the extension agent on how to use the technology. That majority of the females got the message about the technology from fellow farmers could mean that the extension agent were gender specific and must have concentrated efforts on the male farmers in transferring the technology. This resulted to higher awareness level observed among the male farmers. This result agrees with the reports of Masangano and Mile (2004) who observed that male farmers had greater access to information than the females. Furthermore, result in the same table reveals that about 92.50% of the male farmers and 66.67% of females adopted the technology. This means that more of the males than the females are using the technology.

Table 2: Distribution according to sources of information, awareness and adoption of yam minisett technology among gender groups

Variables	Males		Females	
	Frequency	%	Frequency	%
Awareness				
N0	6	2.50	60	25.00
Yes	225	97.50	180	75.00
Total	240	100.00	240	100.00
Sourcesof information				
Research	30	12.50	24	10.00
ADPs	225	93.75	120	50.00
Radio	142	59.17	119	49.58
Fellow farmers	192	80.00	229	95.52
Publication	42	16.67	27	11.25
Television	52	21.67	36	15.00
Field day	84	35.00	63	26.25
Rate of Utilization				
No	18	7.50	80	3.33
Yes	222	92.50	160	66.67
Total	240	100.00	240	100.00

Sources: Field survey, 2010

Production factors that influence the output of the farmer groups

The production factors influencing the outputs from yam minisett technology disaggregated on gender basis were examined using multiple regression analysis and presented on Table 3 and 4. The model was analysed in four functional forms of linear. exponential, semi-log and doublelog for both female and male respondents separately and the lead equation was used for further analysis.

For the female farmers (Table 3), linear functional form was selected as lead equation based on statistical and econometric reasons and was used for the analysis. The f-ratio was 99.67 and statistically significant at I % level. The R^2 was 0.7275 implying that 73% of variations in production of seed yams were determined by the production variables included in the model. All the coefficients of regression had the expected signs (positive) which were consistent with *a priori* expectation. This implied that all of these variables had positive effect on the outputs of the female farmers. Farm size, minisett dust used and labour were all statistically significant at 1% level. The increase in the use of these variables is expected to lead to greater output of seed yam *ceteris paribus.* This result agreed with Ohajianya and Onyenweaku (2001); Nwaru (2007). The impact of fertilizer was not significant. This might be due to the fact that the quantities of fertilizer the female farmers applied per hectare on the average were below the recommended rate because of scarcity and high cost of fertilizer in the study area. Nevertheless, the sign of the coefficient was positive because it was expected that output. should have had direct relationship with the quantity of fertilizer used. The result generally agreed with that of Ajibefun and Aderinola (2003) which stated that farm size and fertilizer, which are production inputs, increase productivity. Therefore, any policy to increase seed yam production of the female farmers by using yam minisett technology should consider all those variables as being important.

Table 3: Multiple regression estimates of the production factors influencing the female farmers' output from yam minisett technology

Variables	linear	Experiential	Semi-log	Double-log
Constant	-107.0057 (-1.06)	6.3762 (60.69)***	-2008.316 (-1.19)	7.6750 (6.85)***
Farm size	1898.808 (5.00)***	0.4728 (1.72)*	563.0312 (2.01)***	0.8049 (4.34)***
Fertilizer	0.0250 (0.14)	-0.0001 (-0.86)	281.3305 (1.99)*	0.2306 (2.46)***
Plant materials	0.0026 (0.48)	0.352e-07 (-0.09)	-5.3686 (-0.06)	0.0154 (0.25)
Mini-set dust	0.0936 (3.23)***	0.0001 (3.10)***	74.0851 (1.65)	0.0177 (0.59)
Labour	48.8255 (10.77)***	0.0286 (8.24)***	936.2693 (2.70)**	0.1120 (0.49)
Other input	0.0002 (0.06)	-7.70e-06 (-2.22)***	-21.5287 (-0.13)	-0.1095 (-1.01)
R^2	0.7275	0.5391	0.7243	0.7631
Adjusted R^2	0.7202	0.5245	0.6829	0.7276
F-Ratio	99.67***	36.84***	17.51***	21.47***

Source: Field Survey 2010.

Note: Figures in parenthesis are t - values
*, **, ***, represents levels of Significance at 10%,5% and 1 % respectively.

For the male farmers, exponential functional form was chosen as lead equation based on statistical and econometric reasons and was used in reporting the results in Table 4. The table reveals that the F-ratio was 60.16 and statistically significant at 1 % level. The coefficient of multiple determination (R^2) was 0.6493 implying that about 65% of the variations in outputs of the male farmers from the technology was determined by the variables in the model. The coefficient of regression had the expected sign (positive) and were consistent with *a priori* expectation except that of fertilizer and other inputs which had negative signs. This implied that those variables that were positively signed had positive effect on output of the male farmers while fertilizer and other inputs, which were negative but significantly signed, had negative effect on their output. This means that an increase in any of these variables would lead to decrease in output. Farm size, minisett dust and labour were the variables which had positive and significant influence on outputs of the male farmers in using the technology. This result was consistent with that of Kebede (2001). Therefore, these production variables should be made available

to the male farmers to enable them increase production of seed yam using the technology. However, the coefficients of fertilizer and other input were negative but significant at 5% each implying that these inputs were used beyond the point where their marginal values product equate their unit prices (Nwaru, 2007). Therefore, an increase in any of them would result to decrease in outputs of seed yam from the technology among male farmers. Hence, the male farmers should be advised to reduce the rate at which they use these inputs to avoid over usage and loses.

Table 4: Multiple regression estimates of the production factors influencing the male farmers' output from yam minisett technology

Variables	Linear	Experiential	Semi-log	Double-log
Constant	97.0853 (0.97)	6.4311 (59.94)***	2656.262 (-1.31)	5.5206 (6.48)***
Farm size	4613.807 (8.02)***	2.3966 (5.87)***	764.5266 (3.44)***	0.7281 (7.80)***
Fertilizer	-0.4470 (-0.14)	-0.0048 (-2.24)	-83.7641 (-0.35)	0.0489 (0.49)
Planting materials	0.0945 (1.89)*	0.0001 (0.52)	262.0055 (-0.35)	0.2283 (2.74)**
Mini-set dust	0.0529 (1.58)	0.0001 (2.65)**	3.9695 (0.06)	0.0049 (0.19)
Labour	21.2549 (3.38)	0.0122 (2.81)**	1116.144 (3.06)***	0.1787 (1.16)
Other Input	-0.0099) (-2.43)***	-9.16E - 06 (-2.94)**	132.953b (0.72)	0.0787 (1.01)
R^2	0.7501	0.6493	0.6531	0.8007
Adjusted R^2	0.7435	0.6385	0.6801	0.7817
F-Ratio	115.04***	60.16***	42.19***	42.19***

Source: Field Survey, 2010

Note: Figures in parentheses are t-values
*, **, *** represent levels of significance at 10%, 5% and 1%

CONCLUSION AND RECOMMENDATIONS

From the study therefore, it could be concluded that yam minisett technology is an important innovation to enhance seed yam production in the study area. This is evidenced by the high adoption, high output and income recorded among the farmer groups. Among the male farmers, the use of the technology was facilitated by farm land, minisett dust and labour while fertilizer and other inputs significantly discouraged it. On the other hand, farm land, minisett, dust, labour, fertilizer and other inputs enhanced its use among the female farmers. However, the potentiality of the technology for increased seed yam production at a short time period should be harnessed by encouraging more farmers especially the female farmers to adopt it. Efforts should also be made by the Government to ensure that the productive resources necessary for adoption of the technology are made readily available more to the female farmers. The male farmers should be advised to reduce the rate at which they use fertilizer and other inputs to reduce cost and maximize profits. In addition, female farmers should be encouraged to form and or join cooperative societies since acquisition of loans, farm inputs, land and agricultural information comes faster through cooperative societies. This will go a long way in enhancing adoption, increasing seed yam production and ensuring its sustainability in the area.

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