ADOPTION OF IMPROVED TRIFOLIATE YAM (*Dioscoreadumetorum*) PRODUCTION TECHNOLOGIES AMONG RURAL FARMERS IN IMO STATE, NIGERIA.

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ABSTRACT
Trifoliate yam serves as famine food crop coupled with its enormous health and medicinal benefits yet bitter yam production has very little attention given to it. The study set out to analyze the adoption of improved production technologies among trifoliate yam farmers in Imo State, Nigeria. The specific objectives of the study include to describe the socio-economic characteristics of rural farmers, identify the various improved production technologies, examined sources of information on production technologies, and identified the constraints to adoption of improved production technologies by farmers. The population of the study consisted of all trifoliate yam farmers on study area.The instrument for data collection was a structured questionnaire administered to 120 farmers. Multistage random and purposive sampling technologies were used in the selection of 120 respondents. Data obtained were analyzed using descriptive and inferenbal statistics. Result revealed that most socio economic characteristics significantly influenced the adoption of improved production technologies.Results also showed that effect of adoption of improved production technologies were tremendous. The major constaints to adoption were high cost of technologies ($\bar{x}$=2.9), lack of collaboration between farmers and extension agents ($\bar{x}$ = 2.9) result of the multiple regression analysis revealed that coefficient of multiple determination (R^2) of 0.7628. significantly influence adoption levels. Result also showed that radio-programmes ,news letter, mobile phone and fellow farmers were important sources of information and significantly influenced adoption level of improved production technologies by farmers. The study concluded that adoption of improved production technologies by three leafed yam farmers in Imo State was generally low and therefore recommends that extension service should step-up the tempo by creating awareness on the importance of trifoliate yam and the need adopt the production technologies geared toward enhanced food production.
Key words: Adoption, Production, Technologies, Trifoliate, Yam.

INTRODUCTION

Yams (*Dioscorea)* are the most important staple food crops in West Africa except for cereals. Yams also form an important staple food source in tropic countries including the Caribbean, South America, India and Southeast Asia. Nevertheless, West Africa remains most important Yam producing region of the World (Iwuchukwu and Okwor, 2017). Considering its past significance in rural economies, the present decline in the cultivation of Yams in Nigeria is worrisome. Studies indicate that parts if the forest zone in 1850s observed that yams were one of the main articles of food. Among the cultivated species of yam, three leaved yam (*Dioscoreadumentorum*) is considered to be indigenous to West Africa. (*Dioscoreadumentorum*) otherwise called bitter yam, cluster yam or three leaved yam is a specie of yam in the genus *Dioscorea*, which belong to the family *Dioscorea* cease that is found in Africa, *Dioscoreadumentorum* is mainly cultivated in the light of Biafra region of inland Central Africa. The wild yam is highly toxic because its high content of dihydioscorine used in mainly arrows toxins. In order to remove the toxics it is leached in water for days and thoroughly cooked. *Dioscoreadumentorum*(three leaved yam) has different vernacular names which include, *Ona*inigbo language anem in Ibibio, esuru in Yoruba language, mma in Bayelsa and inimbe in Tiv language. *Dioscoreadumentorum*is gowned and consumed in southeast Nigeria, it is the most nutritious, and cultivated but its cultivation is still restricted. The tubers are rich in protein, fairly balanced in essential amino acids and its starch is easily digestible. *Dioscoreadumentorum*is a famine food and can be used for Pharmacia purposes. It is useful in the cure of blood pressure. Agronomical, is a high yielding crop. The trifoliate yam (*Dioscoreadumentorum*) is the most nutritious species of the eight (8) yam species commonly grown and consumed in West Africa (Akin *et al,* 2019). Its species is high yielding and require little staking, thus labor saving.

Today knowledge or technologies are the key driving force in social and economic progress of any nation, while in the past, economic growth was under pinned by traditional factors of production such as land, labor and capital. The critical drivers of global economic trends. (Forster and Rosenweig, 2010). According to Njoku (2016) these critical drivers of economy growth are technologies and information known. Research is needed to generate new improved technologies that can be disseminated for social and economic progress. Adoption of improved agricultural technologies are functions of good economic returns. Mgbada (2010 emphasized that the ultimate reason for adoption of agricultural technology is to increase agricultural returns as well as to improve the social standard of the

rural farmers. Agricultural technologies embrace all farm management practices in place such as processes and methods used in conversion of input to output and distribution of output to reach the consumer (Mgbada, 2010). Technology transfer refers to the dissemination of agricultural technologies to the farmers in a modified and understandable message through appropriate channel (Njoku, 2016). Studies showed that adoption rate of technologies were still below that farmers showed only partial adoption. Among the reasons put forward by the farmers for low adoption is that the norms, culture and perception, social and economic factors are the underlying issues for low adoption. Adoption of agricultural technologies is a decision to make use of agricultural technologies as the best available option. Adoption of technologies mean acceptance and utilization of technology (Ifenkwe, 2013).

Onuoha and Nnadi (2015) noted that the decision to accept or reject an innovation emerges gradually after several mental steps been undertaken.

Yam (*Dioscoreaspp*) is an annual tuber and monocotyledonous crop. The plant genus comprises of over 715 species with only ten (10) species producing edible tuber, six(6) of these edible species are cultivated in Africa and only three (3) of them, are available in Nigeria (Nwankwo, 2015). Nigeria tribes often play key role in religious ceremonies due to importance attached to yam communities in Nigeria who celebrate the new yam festival. Yam (*Dioscoreaspp*) is a food with economic and socio-cultural importance in many tropical countries. Bitter yam (*Dioscoreadumentorum*) belongs to the genus *Dioscorea*and family *Dioscoreaceae*. Other common names of bitter yam include Africa bitter yam, wild yellow yam, trifoliate (three-leaved yam) and cluster yam. Bitter yam is known as "Esuru" in Sothern Nigeria and it is regarded as food for adult. It is used as herbs to treat different ailments such as; diabetics, and malaria. The constraints of inadequate food supply in Nigeria and malnutrition problem calls for the need to investigate less and underutilized food sources. The problem facing yam production especially three leaved yam is low yield per hectare, long growing season, low yield and low demand as a result of its taste and functions. Low income and low adoption of improved technologies are considered to be the major problem of farmers in the community, the cost of production are high and this made three leaved yam losing ground to cassava. Due to this, majority of farmers tend to other yam species as a result of low patronage. *Dioscoreadumentorum*(trifoliate yam) is the most nutritious species of the eight (8) yam species commonly grown and consumed in West Africa, Imo State inclusive, its tubers are rich in protein, fairly balance in essential amino acids and its starch is easily digestible. *Dioscoreadumentorum*is highly yielding, labour saving and little staking unlike other yams, (Essa*et al*, 2015). Cultivated three leaved yam consist largely of landraces disseminated from location to location by human agents. Deliberate development of new varieties through conventional genetic improvement methods has yielded very little result because certain internal factors limit the utilization of crops. Yams are important staple food crops in West Africa, they form an important staple food source in Tropical countries including Nigeria. However, South East Nigeria remains the most important yam producing regions of the world (Akinoso and Olatoye, 2016). Among the cultivated species of yam, three leaved yam (*Dioscoreadumentorum*) is considered to be a woman crop and also food for the poor (Nwankwo, 2015). The cultural, traditional and consumption of *Dioscoreadumentorum*in some parts of South east Nigeria is very high, but its production is very low. (Iwuchukwu and Okwor, 2017).

Agronomically, it is high yield quality, labour saving and little staking and above all the preference of trifoliate yam (*Dioscoreadumentorum*) to other types of yams is unshakeable in this study area, but the level of adoption of production technologies of three leaved yam recorded in this regard appears not very clear it is therefore needful to document the pertinent adoption of trifoliate yam production technologies among farmers in Imo State , Nigeria. Empirical evidence indicate that change in output over change in input of yam between 2011 to 2019 showed that food crop farmer yield per hectare of land over the year remained on the decrease over a given period of time indicating poor yield. In Imo State, adoption level of these technologies by three leaved yam farmers is low. The low level of adoption of these technology disseminated was due to complexity of improved technology used by most farmers. *Dioscoreadumentorum*(trifoliate yam) is a monocotyledous flowering plant with about 715 known species of nine(9). Out of these none (9) only three (3) are found in Nigeria, four (4) varieties of bitter yam or cluster yam are only yellow variety is most proffered of the two edible varieties. The other two are toxic to animals alone and the white variety is toxic to both man and animal (Ojo and Ojo, 2009).

Production technologies associated with *Dioscoreadumentorum* (three leaved yam) include: good quality planting materials for cultivation of seed yam production only the minsett techniques is currently used at farmers level although on a limited scale. Tissue and organ culture techniques are the most rapid method of multiplying diseases free propagates, although their limitation include high cost, need for skilled personnel and specialized equipments. The aeroponics and temporary immersion bioreactor methods of producing seed yam are relatively new and still need more research. Traditional system of production involves; Selection of good small whole tubers, Stimulate production of seed tubers by milking ware tubers while the leaves of the plant are still green, cut ware tubers into sets. New methods have been in place but it is not yet applied.

Farmers continue with use of traditional method and save seed from various harm.

Three types of planting system practiced include the setts plants on flat and moulds. Improved production technologies disseminated to three leaf yam farmers can be categorized into cultural operation technologies such as fertilizer use, manure application, crop varieties, proper preparation of yam setts, seed yam setts treatment, soil conservation practice, yam minisett production techniques, weed control practice, three leaf yam staking and vine trimming. The broad objectives of the study is to analyze the adoption of improved three leaf yam production technologies among rural farmers in Abia State, Nigeria. The specific objectives are as follows:-

i. describe the socio-economic characteristic of the rural farmers in the study area.
ii. identify the various type of three leaved yam production technologies disseminated for adoption by farmers
iii. determine the leave of adoption improved three leaved yam production technologies disseminated
iv. identify the constraints to adoption of three leaved yam production technologies disseminated to rural farmers.

METHODOLOGY

The study was conducted in Imo State, Nigeria. It lies within latitude 4^0 45'N and 7^0 15'N and longitude 6^0 50'E and 7^0 25'E. Imo State has 27 LGA and Owerri as its capital other major towns are Okigwe, Orlu, Mbaise, Oguta and Mbano, Ideato amongst approximate others. The State occupies a land mass of 5.530km with a population of 4.5 million persons and the population density of 230-1400 persons per square kilometer (Mbah and Njoku, 2021). The main rivers in the state are Imo Rivers, Otamiri and Njaba River. The major lakes are in Oguta and Abadaba Lake in Obowo. (Okezie and Okpokiri, 2021). It is boarded by Abia State on the east, River Niger, and Delta State to the West, Anambra State to the North and Rivers State to the south. The main occupation of the people is predominantly farming. The rainy season begins in April and last until October with annual rainfall ranging from 1500mm to 2200mm, annual temperature above 20^0C creates an annual relative humidity of 75% with humidity reaching 90% in rainy season. The people speak Igbo language and are predominantly Christians.The population for the study consists of all poultry farmers in Imo State. The sample frame consist of 800 broiler poultry farmers registered with the Poultry Association of Nigeria, Imo State chapter (PAN, 2021). Multi-stage sampling procedure were used to selected extension blocks circles, sub-circles and broiler farmers. In the first stage, one (1) extension block was purposively selected from each of three agricultural zones in the State based on the high concentration of broiler poultry farmers in the areas. The extension blocks were EzinihitteMbaise, Orlu and Obowo. This gave a total of three (3) extension blocks. In the second stage two (2) circles were purposively selected based on high concentration of poultry farmers The circles were, Choko and Obizi in EzinihitteMbaise for Owerri Zone, Alike and Umunogho, in Obowo for Okigwe agricultural zone, Amifeke and OwerriEbiri in Orlu from Orlu agricultural zone.Thirdly, 20 broiler farmers were randomly selected based on the list of sample frame and registered members of the Poultry Association in Imo State. This gave a total of 120 broiler farmers that formed the sample size of the respondents. The instrument used for data collection was Interview Schedule. The instrument made use of pilot testing conducted with 12 copies of the Interview Schedules. Farmers were selected outside but near to the study area. After computing the scores from test-retest method using moment of correction coefficient, a reliability coefficient value of 0.75 was obtained.Data collected were analyzed using descriptive statistics like percentage, frequency counts and means. Objective I which dealt with selected socio-economic profile was analyzed using frequency count, percentage and mean. Objective iii which is broiler farmers' level of adoption of broiler technologies was realized using a 4-point Likiert type scale of always adopted (A) = 4, sometimes, adopted (SA) = 3 Rarely adopted (RA) = 2 and never adopted = 1. The mean score was calculated by add the nominal values of each response category. Thus: 4+3+2+1=10/4=2.5. giving the mean value of 2.5 Any item with 2.5 and above was regarded as being adopted while any mean score less than 2.5 was regarded as not adopted.

RESULTS AND DISCUSSION

Table 1. Distribution of respondents based on the selected socio economic factor of three leaf yam farmers (n=120)

Variables	**Frequency**	**Percentage**	**Mean (**X)
Age (years)			
	3	2.5	
20-29	7	5.8	
50-39	11	9.2	46-0 years
40-49	59	49.2	
50-59	24	20.0	
60 and above	16	13.3	

Sex			
Male	25	20.8	
Female	95	79.2	
Marital status			
Married	101	84.2	
Single	7	5.8	
Separated	3	2.5	
Widowed	9	7.5	
Household size			
1-4 (persons)	14	11.7	
5-8	68	56.6	
9-12	23	19.2	8 persons
13 and above	15	12.5	
Level of Education (years)			
0 (no formal education)	6	5.0	
1-6	27	22.5	
7-12	73	60.8	
13 and above	14	11.7	
Farming Experience			
1-5	12	10.0	
6-10	34	28.3	11.6 years
11-15	53	44.2	
16 and above	21	17.5	
Farm size (hectare)			
0-5-1.0	35	29.2	
11-1.6	65	54.2	
1.7-2.2	13	10.8	1.3 hectares
2.3-2.8	4	3.3	
2.9-3.4	3	2.5	
Social Organization Membership			
Cooperation	36	30.0	
Farmers Association	106	88.3	Multi responses
Women Association	19	15.8	
Age grade	49	40.8	
None	31	25.8	
Annual farm income (q)			
≤ ₦50, 000	2	1.7	
₦51,000 – 100,000	11	9.2	₦161,623.00
₦101,000 – ₦150,000	19	15.8	
₦151,000 – ₦200,000	88	73.3	
Sources of funds			
Personal savings	105	87.5	
Relatives/friends	63	52.5	Multiple responses
Micro finance bank	23	19.2	
Commercial bank	8	6.7	
Extension contact			
0 (no visit)	64	53.3	
1-2	38	31.7	
3-4	14	11.7	
5 and above	4	3.3	

Source: Field Survey, 2021.

Socio Economic Factors of the Bitter Yam Farmers.

The socio-economic factors of natural farmers considered are age, gender, marital status, household size, level of education farming experience, farm size, membership of social organization, annual farm income, source of funds, extension contact, and primary occupation.

The distribution of rural farmers based on age is presented in Table 4.1. Data in the table shows that 49.7% of the respondents belonged to the age bracket of 40-49 years, while 9.2% and 20% of them belonged to the age groups of 30-39 years and 50-59 years respectively. Only 2.5% of the respondents were below 20 years old. The mean age of the farmers was 46.0 years. This implies that the farmers were at the active stage of life and have the advantage of increased investment and improved technology utilization and hence innovativeness.

The finding on mean age of the farmers agreed with those of Njoku, 2016 and those of Mbah and Njoku (2021) that most farmers in Imo State are at the active stage of life and not relatively old. This result differed from those of Akinola (2003) and Iwuchukwu (2017) that there was a relatively high proport on of old farmers in Enugu State, Nigeria.

The distribution of rural farmers by sex as presented in table 4.1, shows that most of the three leaf yam farmers (79.2% were female while 20.8% of them were males. This implies that three leaf yam farmers was dominated by female farmers. This findings agrees with a prior expectation and opposed earlier findings (Akintayo 2011, Otitoju and Arene, 2010). Which indicated that Nigerian Agriculture is still male dominated. This dominance by the female farmers could be that female farmers have easier and favored socio cultural acceptance to three leaf yam farming than their male counterparts. This is in support with Mgbada (2018) which showed that women dominated stape crop production enterprise in Enugu State but lamented that poor access to land hampere the adoption of innovation expected to increase their agricultural productivity and income.

Also on the marital status, majority of the farmers were married, while only 75%, 5.8% and 2.5% of them were widowed, single and separated respectively. This implies that most of the farmers have more family responsibilities and therefore would be eager to adopt recent technologies that would improve their farm income and increase sources of food supply. This increase responsibility would be as a result of increase number of children to gather for their needs. This finding ealier support that of Njoku (2016) that married farmers are more responsive to adoption of new innovations that will be useful to their farm performance. On the household size, data in the table shows that most of the farmers (56.6%) had 5-8 persons while 19.2% band 11.7% of them had 9-12 persons and 1-4 persons in their households respectively. The mean household size was 8 persons. This implication of this finding is that more family labour would be available since relatively large household size is an obvious advantage with respect to farm labour supply. On the level of education, the table shows that most (60.8%) of the farmers spent 7-12 years in school, while 22.5% and 11.7% of them spent 1-6 years and 13 and above years in school respectively. The mean level of education was 8.5 years this implies that most of the farmers were literate and this is an advantage to adoption and utilization of agricultural technologies as education has shown to be a prime factor in the adoption of high yielding modern farm practices (Njoku, 2016). On the farming experience, data in table 1 shows that 44.7% of the farmers had 11-15 years of farming experience, while 28.3% and 10.0% of them had 6-10 years respectively. The mean farming experience was 11.6 years. This is long enough for mastering of most farm operations. This long farMing experience is an advantage for increased agricultural production since it would encourage rapid adoption of improved technologies (Akinbo et al 2019).

The distribution of farmers based on farm size shows that more (54.4%) cultivated. 1.1-1.6 hectare of farm land, while 29.2% and 10.8% of them had farm sizes of 0.5-1.0 hectares and 1.7-2.2 hectares respectively. The mean farm size was 1.3 hectare this finding implies that three leaf yam farmers in the study area comprised small scale farmers. This finding is consistent with that of (Singhaetal, 2016) the majority of rice farmers in North Eastern region of India are small holder that cultivated small areas of farm land.

On the social organization membership, the table shows that majority (88.3%) of the respondent belonged to farmers association while 46.7%, 40.6%, 25.8% and 30.0% of them belonged age grade, none and cooperative society respectively. This high level association membership could entail high innovativeness among the three leaf yam farmers due to the presence of group dynamic effect. This finding agrees with Aighewietal (2015), that social organization is an avenue where experience and information are shared among members.

On the annual farm income, the table indicates that 73.3% of the respondents had annual farm income of ₦151,000 – ₦200,000, while 15.8% and 9.2% of them earned annual farm income of ₦201,000 and above and ₦101,000 – ₦150,000 respectively. The mean annual farm income was although operating on small scale earned reason farm income after taking care of most of their family food consumption needs. The distribution of farmers on extension contact indicate that most (53.3%) of the farmers had 1-2 extension visits, while 31.7% and 11.4% of them had no extension visit and 3-4 extension contact was 1.4 visits. This mean extension contact was 1.4 visits. This implies how extension contact and this low extension visit does not anger well for technology adoption. The implication of this finding is that could mean that extension services are not discharging their functions

well in promoting trifolilale yam production in the study area.

On the source of fund result shows that majority (87.5%) of the respondents raised their fund through personal savings while 52.5% of them sourced their funds through microfinance banks, money lenders and commercial banks respectively. This implies that farmers in the study area had various sources of funds by the informal source was more prominent in the study area.

Table 2: Trifoliate yam Production technologies Disseminated to farmers

Production technologies	**Farmers**		**Responses**					
Disseminated	Highly (3) Disseminated		Moderately (2) Disseminated		Not at all (1) Disseminated		Mean	STDV
	Freq	(%)	Freq	(%)	Freq	(%)	$\bar{X}$	S
Prosper land preparation	1.05	87.5	14	11.7	1	0.8	2.80	0.36
Planning at the right season	86	71.7	24	20.0	10	8.3	2.6	0.63
Varieties	90	75.0	17	14.2	13	10.8	2.6	0.63
Tissue and organ culture	63	52.5	24	20.0	33	27.5	2.3	0.84
Soil conservation method	95)	(79.2)	18	15.0	7	5.8	2.7	0.56
Milking ware tube	63	(52.5)	32	(26.7)	25	(20.8)	2.3	0.83
Aeroponic technique	101	(84.2)	16	(13.3)	3	(2.5)	2.8	0.35
System proper staking vine trimming	93	(77.5)	15	(12.5)	12	(10.0)	2.7	0.56
Manure application	91	75.8	17	(14.2)	12	(10.0)	2.7	0.56
Seed treatment	85	70.8	27	(22.5)	8	(6.7)	2.6	0.69
Stimulating production system practice	77	(64.2)	33	(27.5)	10	(8.3)	2.6	0.69
Grand mean (X=2.7) bench maey (X=2.00)								

Source: field survey 2021.

The distribution of trifoliate yam farmers by production technologies disseminated is presented in table 4.2. the data in the table shows that all the technologies had mean scores of 2.0 and above, this implied that all the technologies investigated were disseminated to the farmers. The table shows that three leaf yam farmers had a total of 11 (eleven) technologies transferred to them for adoption. They include, proper land preparation (X = 2.9), aeroponic technique (X= 2.7), manure application (12X =2.7), soil conservation methods (X=2.7), planning at the right time (=2.6), improved varieties (X=2.6), stimulating production practice (X=2.6) seed treatment (X=2.6), milking ware tubers (X=2.3), and tissue and organ culture (X=2.3).

The implication of this finding is that proper land preparation had the highest mean of (X=2.9) while tissue and organ culture had the least mean of (X=2.3). the technologies that was moderated disseminated stimulating production practice (X=2.6) and on table 4.2 Distribution of three leaf yam farmers by production technologies disseminated for adoption.

Disseminated was tissue and organ culture and milking ware tuber. The reason could be that these technologies involved practical demonstration and farmers place least infer on the awareness and acceptability of three leaf yam as a basis for typing out these technologies. (IwuChukwu and Okwo, 2017).

Result shows that the standard deviation were closely packed and small which implies that the data were highly reliable and uniform. The grand mean of 2.7 indicate that technologies with X=2.7 are moderately disseminated while the technologies above X=2.7 were highly disseminated and less than (X=2.7) were lowly disseminated.

This finding agreed with that of maroya, et al, (2020) that farmers are ready to adopt the technologies based on the economic return of the technology to be transferred to them.

The distribution of Trifoliate yam farmers by sources of information on production technologies is presented in table 4.3. the table shows that fellow farmers (87.5%), neigbours (81.7%), folks (76.7%), village meetings (70.8%), social organization (60.0%), and friends (56.7%) were the major sources of information to the farmers in the study area while town crecers ('37.5%), radio programme (40.0%), and extention agents (41.7%)were the least sources of information on trifoliate yam to farmers in the study area.

Table 3: Distribution of farmers by source on trifoliate yam production technologies

Variable sources of information	Frequency	Percentage
ADP. Extention Agents	50	41.7
Programme	47	39.2
Friends	68	56.7
Co-farmers	105	87.5
Neigbors	98	81.7
Television programme	48	40.0
Town crcers	45	37.5
Village meetings	85	70.8
Organization	72	60.0
Total	92	76.7

Source: Field Survey, 2021.

The findings revealed that trifoliate yam farmers use more of interpersonal information sources. The finding is in consonance with that of Adebayo etal (2015) and Nwochukwu and Orji (2013) that affirmed that radio and television are major sources of information to farmers on technologies adoption. The implication of these findings support the assertion that these information sources utilized by the farmers should be readily promoted by the relevant stakeholders and encourage the farmers to explore the use of other information sources which are more economical, effective and efficient with greater consideration to the farmers socio economic statuses.

Level of adoption of the trifoliate yam farmers' production technologies disseminated. The different stages of adoption of trifoliate yam production technologies disseminated are presented in table 4.4. data in the table show that soil conservation practice had the highest level of adoption (X=5.7). The mean adoption score of this production technology implied that the farmers adopted stage of soil conservation practice. This technology was followed by improved varieties (X=5.1), seed treatment (X=4.8), staking and trining (X=4.6), tissue and organ culture (X=4.3) and acropon technique (X=4.2).

The mean adoption scores of these production technologies indicated that the farmers were at the trial stage of the disseminated technologies adoption process. The high adoption score of these technologies could be because they are euthen famine food crops in the study area or the maintenance practices for the food crops.

Table 4: Distribution of respondents by Adoption level of improved technologies of trifoliates yam
Source: field survey 2021.

Trifoliate yam production technologies	Not aware (1) freq %	Aware (2) Freq. %	Interest (3) Freq. %	Evaluation (4) Freq. %	Trial (5) Freq. %	Adoption (6) Freq. %	Mean X	Standard deviation
Use of improved planting materials	0.(00)	15(12.5)	16(13.3)	17(14.2)	18(15.0)	54(45)	4.6	1.47
Improved varieties	21.7	6(5.0)	10(8.3)	14 (11.7)	20(16.7)	68(56	5.1	1.30
Tissue and organ culture	1(0.8)	10(8.3)	9(7.5)	53(14.2)	21(17.5)	23(19.2)	4.3	1.4
Soil conservation properties.	0(0)	2(1.7)	4(3.3)	4(4.4)	10(8.3)	99(82.5)	5.7	0.81
Staking and minning	3(2.5)	11(9.2)	14(11.7)	21(17.5)	15(12.5)	57(47.3)	4.7	1.98
Manure application	1(0.8)	8(6.7)	17(14.2)	54(45.0)	24(20.0)	1613.3)	47	1.06
Stimulating production techniques	3(2.5)	7(5.8)	14(11.7)	23(19.2)	29(24.2)	44(36.7)	4.7	1.26
Seed treatment	3(2.5)	9(7.5)	11(9.2)	14(11.7)	29(24.2)	54(45.0)	4.8	1.4
Aeroponic techniques	1(0.8)	8(6.7)	17(14.2)	54(45.0)	24(20.0)	16(13.3)	4.2	1.06

Milking ware tuber	5(4.2)	8(6.7)	17(14.2)	16(13.3)	27(22.5)	47(39.2)	4.6	1.50
Grand mean	1.9	7.5	10.8	18.3	19.6	2.1	4.7	

Which are cultivated by farming household in the state (Emodi, 2016, Ojo and Ojo, 2009 and Amaoetal, 2017).

The table also showed that issue and organ cultivate had adoption score of (x=43) which soil conservation method had adoption.(x=57) which indicated that the farmer were at the evaluation stage of the production technologies in the adoption process.

This result implied that the level of adoption of these technologies by farmers was low. This might be explained by the fact that trifoliate yam production had various scio-cultural limitations such as taboo traditional belief and stigmatization. This could be because of the inability of extension agent to disseminate the technologies of trifoliate yam production regularly or not at all.

Result showed that on level of adoption, only the out of ten (10) trifoliate yam production technologies disseminated had been adopted and was eased by the farmers. This implies that the level of adoption of the production technologies was generally low among the rural farmers in the study area and suggested in adequate exposure of farmers to trifoliate yam production technologies.

Result of mean percentage respond indicated that moderate proportion (42.1) of the respondent were using trifoliate yam technologies 19.6% of them were at trial stage in adoption process also 18.3% and 108% of the respondent were at the evaluation and interest stages respectively. The result also showed that 7.3% of the respondent were at the awareness stage and 1.9% of them were unaware of the production technologies dissemination in the study area .Nwaobiala, 2018 and Owusu, (2021) observe that farmers response to adoption of new variety of crop was generally low because they were unaware of the new varieties. The result showed that the standard deviation were closely packed and small. The implication of this finding was that the data had high degree of uniformity and reliability of the result / this is in line the finding of Onuh and Lgwemma(2018)that explained that the smaller the standard deviation on the higher the degree of reliability of the estimates.

Effect of the adoption of trifoliate yam production technologies by farmers. The distribution and farmers based perceived effect of adoption of production technologies is presented in table 4.5. data obtained showed that adoption of production technologies had the following effects, better farm management practice (X 3.60), with standard deviation X0.49), increased productivity (X=3.40 SD=0.50), early maturity (X=3.61, SD = 49), increase income (X=3.57: SD=0.50), increased productivity =3 (2, SD=0.49), improved soil conservation (X=3.27; SD=0.80) provision of employment (X=3.67, SD=0.83), provision of food security (X=3.67; SD = 0.82). Request further show a grand mean of X = 3.54. These result indicate that adoption of trifoliate yam production technologies had high effect on the farmers. The implication was with adoption of improved technologies increase in production and technical efficiency was guaranteed.

The findings agrees with Oyeyinkaetal (2011) and Hellen (2014) that adoption of agricultural technologies had significant effect on the farmers productivities and hrehhoods lack of collaboration between farmers and extension agents (X=2.9), high cost of inputs (X=2.9), disparity between gender and age (X=2.8), high level of illiteracy (X=2.8) low patronage/demand (X= 2.7), low yield (X=2.7), long maturity season (X= 2.7) availability of quality planting material (X = 2.6), and inappropriate of technologies/lack of specialized equipments (X =2.0), while the ones considered not serious were, lack of awareness of the production technologies (X=1.2), lack of specialized skilled personnel (X=1.2) and low income. These finding indicats that these constrant frustrated the farmers interest and consequently lead to low adopted of improved production technologies disserminated to them.

Table 5 Distribution of farmers constraints to adoption of production technologies disserminated.

Constraints to adoption of production technologies.	Not serious (1) Freq. %	Serious (2) Freq. %	Very serious (3) Freq.%	Mean (X)	Standard Dev.
Lack of awareness of new technology	104(86.7)	14(11.7)	2(1.7)	1.2	04.1
Low yield	10(8.3)	21(7.5)	89(74.2)	2.7	0.64
High level of illiteracy	5(4.2)	9(7.5)	106(88.3)	2.8	0.46
Long growen/maturity season	11(9.2)	16(13.3)	94(78.3)	2.7	0.65
Pest and disease pathogens	98 (81.2)	17(14.2)	5(4.2)	1.2	0.45
Low demand/low patronage	9(7.5)	15(12.5)	96(80.0)	2.7	0.60
Low income	94(78.3)	2(17.5)	5(4.2)		
High cost of inputs	4(3.3)	9(7.5)	107(89.2)	2.9	0.44
Lack of skilled personnel	96(80.0)	21(17.5)	3(2.5)	1.2	0.47

Lack of collaboration between farmers and extension agents	4(3.3)	9.(7.5)	107(89.2)	2.9	0.45
Inapporiate of the technologies and lack specialized and equipment	40(33.3)	37(30.8)	43(35.8)	2.0	0.50
Disparity between gender and age.	5(4.2)	44(0.2)	105(87.5)	2.8	0.47
Availability of quality planting material	14(11.7)	23(19.2)	83(69.2)	2.6	0.70
Grand mean	2.3	Benchmar 2.0			

Source Field Survey, 2021.

Perceived confraints to adoption of trifoliate yam production technologies by farmers.

The distribution of trifoliate yam farmers perceived congraints to adoption of yam production technologies disseminated are presented in table 4.6. The table shows that out of nnnjjji possible constrant investigated in this study, 9 were considered to be serousjj constraints to adoption of production technologies disseminated to the farmers. These serroushn constraints included of maroyaetal (2020) that gender disparity and age hinders the production of trifoliate yam. The table further reveal a grand mean constraint of 2.3, the result showed that the standard deviation were closely packed and small. This implies that the dath had high degree of uniformity and reliability of result. This is in line with that of Onuh and Igwenma, (2018) that explained that the smaller the standard deviation the higher the degree of reliability of the estimates.

CONCLUSION AND RECOMMENDATIONS.

The study analyzed adoption of improved production technologies by three leaf yam farmers in Abia State, Nigeria. Result revealed that Socio-economic characteristics influence adoption of production technologies. Result further show that adoption of improved production technologies have significant positive effects although high cost of technologies and lack of collaboration between farmers and extension agents leading to low adoption of technologies and consequently low production of three leafed yam.A number of policy implications emerged from the findings of this study on the basis of which these recommendations were made;Farmers should form radio- farmer listeners group and arrange to listen to the radio and television programmes together in other to avail themselves the opportunity to interact and discuss the contents f the broadcast. Since Socio-economic characteristics of the farmers influence adoption of improved technologies government should therefore consider the Socio-economic characteristics of the rural farmers when designing future technologies and adoption policies and ensure its proper implementations

REFERENCES

Aighew.I, B.A, Asiedu .R, Maroya, N, Balogun, M. (2015) improved propagative methods to raise the productivity of yam (food Sec (2015)) (823-834. Open access online at springerlink.com.

Amao, S.A, Adebayo T.A ,Omotoso B.A, Adebayo .O, Adebayo, A.O, Oyeleye AA and Adisa J.O (2017) preference of three leaf yam Dioscoreadumenforum) to other types of yam among farmers in ibrapa central L.G.A of Oyo State. International Journal for research in agriculture and food Science. Vol 3(12).

Emodi, A.I (2016), Awareness and utilization of three leaf yam, among selected farmers in Oru, West L.G.A of Imo State.

Iwuchukwu J.C Okwor K.C (2017) Agronomic practices and cause of decline in trifoliate yam (Dioscoreadumentorum) Kunith K.C production in Enugu State. African Journal of Agriculture Research Agric Res

Nwaobiala C.U (Factors Influence Farmers output in the International Fund for Agricultural Development Community. Based project in Abia and Cross River States, Nigeria Http.//dx.dol.org.10.4314/joal.v.2/i/.,,.

Ojo. I.O and Ojo. J.O (2009). A compura owe study of effect of storage on based nutritional composition of two major edible, DioscoreaDumentorum varieties, Global Journal of pure and Applied Sciences 15(3x4) 353-355.

Owusu, B, Asante, J. Osei –Adu .K.O, Ama, S.E (2021) Awareness and Adoption of Positive Select on Technology among Yam Frmers in West Africa International Journal of Social Economics.