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Full Length Research Paper

Determinants of YMT utilization by farmers in North-Central Nigeria

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Scarcity of seed-yams has drastically reduced yam production in Nigeria. For this reason, Yam Minisett Technology (YMT) was developed and disseminated to farmers. This study investigated the determinants of YMT utilisation by farmers in north-central Nigeria. Multistage sampling procedure was used; Benue, Kogi, Kwara and FCT were randomly selected from north-central Nigeria. Fifty percent of ADP zones, blocks and cells were randomly selected to obtain 220 respondents used for the study. Data was collected using structured interview schedule and analysed using both descriptive and inferential statistics. Respondents' mean age, household size, farming experience and farm size were 47.5±5.7 years, 5.2±1.6, 12.0±6.6 years and 1.4±0.6ha respectively. Majority of the respondents were male (84.1%), married (86.8%), secondary occupation (55.0%), scattered plots (74.1%), no formal education (58.6%), membership of farmers' association (58.4%) and all acquired land through inheritance. Utilisation of YMT was significantly related to respondents' age (r=-0.65), farming experience (r=-0.64), annual income (r=-0.57) and household size (r=-0.41). Utilisation of YMT was significantly increased by formal education (β=0.29) and secondary occupation (β=0.22) but significantly reduced with extension visits (β=-0.25) and age (β=-0.12). There were significant difference in YMT utilisation (F=4.059) across states. Improved extension services and membership of farmers association were recommended.

Keywords: Yam minisett, Technology, Utilisation, Seed-yam, Dissemination.

INTRODUCTION

World yam production in 2013 stood at 60,196,312.37 tonnes, grown on a land area of 5.05 million hectares, Africa's production is put at 57,802,018.54 tonnes, grown on a land area of 4.80 million hectares, that of West Africa stand at 54, 516,965 tonnes, grown on 4.46 million hectares of land area, while Nigeria production is about 38,000,000 tonnes, where yields in hectogram/ha is 131,034 from a harvested land area of 2.9 million hectares (Food and Agriculture Organisation Statistics-FAOSTAT, 2014). By implication, Yam production is mainly confined to Africa, where 80% of its production is from West Africa and the West Africa yam belt produced 95% of World output out of which Nigeria alone produces 75% while the North-Central agricultural zone of Nigeria produced 34% of the 75% world yam grown in Nigeria (Food and Agriculture Organisation-FAO, 2008).

Nigeria, being the largest World yam producer, is also a major consumer of yam (Central Bank of Nigeria-CBN, 2003). Her demand for yam is estimated to be about 40 million metric tonnes per annum and it is still increasing with increase in population. This explains why Nigeria consumes most of what she produced (Ezulike, Udealor, Nwosu and Asumugha, 2006; Chukwuji, 2013). Due to the increasing world population mainly in developing countries of Africa and Nigeria in particular, food crop pro-

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duction is no longer meeting the aggregate demand (Mohammed, Achem, Abdulquadri and Age, 2009; Oluyomi, 2010b). In this case, yam is not an exception. In order to meet annual demand for yam in Nigeria, its production must increase (FAO, 2008).

Attempts at increasing yam production to meet demand in the traditional setting have been faced with a lot of challenges, most especially the scarcity and in some cases high cost of planting materials (Oluyomi, 2010a). This is because yam is grown basically for its edible, swollen underground starchy portion called tuber. This same tuber is also the material for regenerating the crop (FAO, 1994). Thus, under traditional cropping systems in most parts of Nigeria, up to 30% (3.5 t/ha) of the previous harvest, usually small tubers of 250g-1000g, are used as seed-yam to plant new crops leaving farmers with less for consumption (Akoroda and Ngeve, 2001). On the other hand if the farmer decides to consume a greater part of his harvest, he will have very little to plant in subsequent season. In the same vein, the cost of obtaining seed-yams, also reach 40% or more of the total outlay for yam production, which is cost ineffective (Manyong, Asiedu and Olaniyan, 2001).

The Traditional Seed-yam Production Techniques (TSYPTs) used in current yam cultivation include: whole tubers seed-yams selected from previous harvest, irregular-shaped whole tuber seed-yams obtained from milking or second harvest and cutting of big healthy ware tubers into pieces (setts) either horizontally, longitudinally or vertically to produce head, middle and tail setts (Oluyomi, 2002; Ironkwe, 2010). All these traditional techniques were inadequate to cope with the farmers' demand for seed-yams (Aighewi, Akoroda and Asiedu, 2002).

Research has shown that sizable whole tubers selected and separated as seed-yams are the best planting materials than cut setts (IITA, 1996). The realization that small whole tuber ranks as the best planting material for raising ware yams led many generations of farmers to deliberately produce 'whole tuber seed-yams' for sale to other farmers as planting materials. This the farmers did, by planting very small cut pieces of yam, which would at harvest yield whole tuber seed-yam of plantable sizes of between 200 - 500g (Madukwe, Ayichi and Okoli, 2000). However, the procedure suffered considerably from post-planting rotting and deterioration of the cut pieces thus this could still not meet the planting material (seed-yam) need of the farmers and therefore low output of ware tuber persisted (Otoo, Okoli and Ilona, 2001).

The Nigerian Government in its efforts to promote food self-sufficiency encouraged the development of production system superior to traditional ones that are acceptable to and adoptable by the farmers, technically feasible and at the same time providing reasonable economic and financial returns (Asumugha and Obiechina, 2001; Wisegeek, 2012). Such Improved Seed-Yam Production Technologies (ISYPTs) is YMT which was developed by the National Root Crops Research Institute (NRCRI), Umudike, in collaboration with the International Institute of Tropical Agriculture (IITA), Ibadan, to solve the problem of scarcity and high cost of seed-yams in Nigeria (NRCRI, 2005). This technology produced significantly more and healthy seed-yams than the traditional methods and more ware-tubers are left for other uses from previous harvest (Ikeorgu, 2003). YMT was transferred to yam farmers for adoption through the State's Agricultural Development Programmes (ADPs) (Ezulike *et al.,* 2006).

PROBLEM STATEMENT

Attempts at increasing yam production traditionally to meet the geometrically increasing in population have been faced by myriads of challenges, the most serious and devastating challenge being the problem of scarcity of planting materials (seed-yam) because the tuber which is the edible part is also the regenerating portion resulting into serious competition between food security and increasing production which YMT posits to solve. The technology has been disseminated to and used by farmers in the study area for some years now: Therefore, it is important to find out the determinants of its utilisation by the yam farmers in the study area.

Objectives of the study

The general objective of the study is to identify the determinants of YMT utilisation by yam farmers in North-central Nigeria. The specific objectives are to:

(i) describe yam farmers' socio economic characteristics in the study area.

(ii) determine the levels of YMT package utilisation among yam farmers in the study area.

Hypothesis of the study

The hypotheses for the study were formulated in null form as follows:

$H_0$1. There is no significant relationship between yam farmers' personal characteristics and YMT utilisation in the study area.

$H_0$2. There is no significant difference in the level of yam farmers across states in the study area.

RESEARCH METHODOLOGY

Area of the study

The study area is North-central agricultural zone of Nigeria, comprising the Federal Capital Territory (FCT), Benue, Niger, Kwara, Nasarawa, Kogi and Plateau states.

Sampling procedure and sample size

Multistage sampling procedure was used. Benue, Kogi, Kwara and FCT were randomly selected from the seven states in northcentral Nigeria. Fifty percent of ADP zones, blocks and cells were then randomly selected from these states. In all, 175 cells were selected; each cell comprised 10 registered YMT adopters, out of which 12.5% were randomly selected to obtain 220 registered YMT adopters used as respondents for the study.

Data collection and analysis

Structured interview schedule was used to collect data on respondents' personal characteristics, farm enterprise characteristics and level of YMT utilisation (0-20). Data were analysed using weighted score, descriptive and inferential statistics such as; Chi-square, Pearson Product Moment Correlation, t-test, Ordinary Least Square regression model and ANOVA at $\alpha_{0.05}$.

RESULTS AND DISCUSSION

Personal characteristics of yam farmers

Results in Table 1 shows that the mean age of respondents was 47.5±5.7 indicating that 54.9% of the respondents were within the mean age and above. This implies that the farmers were young, still in their active and productive ages, may be willing to take risks of adopting YMT and are more responsive to new agricultural packages when given the right resources because they have the required vigour. This finding is consistent with that of Ironkwe (2010) who reported a mean age of 48.1 years for adopters of rice technologies among rice farmers in Osun state. Majority (84.1%) of respondents were male while 15.9% were female. This implies that yam production is exclusively male enterprise because of the rigour involved in all aspects of its production from land clearing to harvesting. This finding is in consonance with a similar study by Manyong *et al.* (2001) who stated that yam was considered "man's crop" because it is labour intensive and only men are able to provide such and Omotesho, Falola, Muhammad-Lawal and Oyeyemi (2012) who reported that all yam farmers in Kwara state were male and this is most likely to be due to the fact that men are more capable of doing tedious works which are usually associated with farming than the female. Majority (87.0%) of respondents were married while 13.0% were single. This implies that marriage institution is still highly esteemed in our society because it is a pre-requisite for having access to land and land is a fundamental requirement for YMT adoption. This finding is in tandem with Achoja and Uzokwe (2012) who reported that majority 96.5% respectively of adopters of technologies in Nigerian agricultural system were married. Majority (57.0%) of respondents had between 1 and 5 household size and their mean household size was 5.2±1.6. This result depicts a small household size among respondents and a trend of people moving towards smaller household size which is a pointer to the fact that majority are likely to adopt innovation. This finding is consistent with Ironkwe (2010) who reported in a related work that people with small household sizes were more likely to adopt YMT while those with large household size were less likely to adopt because of fear of consequence of failure of such risks. Majority (53.2%) of respondents had no formal education. This finding is in consonance with the findings of by Ojemade (2010) who reported that majority of Nigeria's farmers are non-literates. In the same vein, Okunmadewa (1993) and Okoro (2008) in their findings reported that formal education was a panacea to technology adoption and that lack of formal education accounts for low acceptability and adoption of innovation among Nigerian farmers. Majority (74.5%) of respondents engaged in farming as their primary occupation. This finding is consistent with that of Ogbonna, Korieocha, Onyenobi and Njoku (2011) who found that, agriculture is the primary occupation of the bulk of rural dwellers. Since farming is the primary occupation of majority of the respondents used for this study, it implies that the study area is basically rural and rural dwellers primarily engage in agriculture and are therefore likely to adopt agricultural innovations. Majority (55.0%) of respondents engaged in other livelihood activities such as tailoring, vulcanizing, shoe curbling, barbing and blacksmitting as secondary occupation. This implies that many of the respondents diversified their livelihood activities to get additional sources of income and this may enable them have financial resources to adopt YMT. This is because the accompanying package of the technology required extra capital to enable adopters take full advantage of the inherent benefits in it. This finding is in agreement with that of Olawoye (2000) who stated that many households engage in several income-generating activities in order to meet other household, social and economic needs. Majority (52.7%) of respondents had between 1 and 10 years of farming experience and the mean years of farming experience was 12±6.6. This implies that majority of the respondents had reasonable years of yam farming experience and this will enable them have adequate knowledge of agricultural activities involved in yam production that may enhance YMT use. This is in line with the findings of Ironkwe (2010) in a related research work who reported that, an increase in years of yam farming experience will increase farmers' use of YMT. Higher proportion (41.8%) of respondents had less than one acre of yam farm and the mean of farm size in acres was 1.5±0.8. This implies that yam farm sizes in the study area were small and this is unhealthy for any meaningful adoption of innovation like YMT to take place, since extra

Table 1. Distribution of respondents according to their personal characteristics (n = 220).

Characteristics	Freq	%	Mean
Age (in years)			
> 31	25	11.4	
31 – 40	70	31.8	
41 – 50	85	38.6	47.5±5.7
51 – 60	39	17.7	
> 60	1	0.5	
Sex			
Male	185	84.1	
Female	35	15.9	
Marital status			
Single	29	13.2	
Married	191	86.8	
Household size			
1-5	125	56.8	
6-10	93	42.3	5.2±1.6
>10	2	0.9	
Formal education			
Yes	103	46.8	
No	117	53.2	
Primary occupation			
Farming	164	74.5	
Others	56	25.5	
Secondary occupation			
Yes	121	55.0	
No	99	45.0	
Years of farming experience			
1-10 years	116	52.7	
11-20 years	72	32.7	
21-30 years	26	11.8	12.0±6.6
>30 years	6	2.8	
Farm locations			
One site	57	25.9	
Scattered	163	74.1	
Farm size			
<1 acre	92	41.8	
1-2 acres	80	36.4	1.4±0.6
>2 acres	48	21.8	
System of YMT production			
Sole cropping	94	42.7	
Mixed cropping	126	57.3	
No of YMT cycle			
None	95	43.2	7.3±1.2
1-5	66	30.0	

farmland would be required to increase production. This finding is similar to that of Ogbonna *et al.* (2011) who reported that majority of Nigeria farmers were smallholder farmers with small farm sizes of less than 1 hectare and this situation may bring about the non-adoption of agricultural technologies since adoption is a function of availability of appropriate farm size. In the same vein, Ironkwe (2010) reported that farm size influences adoption of new technology, because owners of large farms usually have more resources than small-scale farmers because adoption of technologies requires relatively large area of land.

Table 1. Cont.

6-10	59	26.8	
Sales outlet			
Non	66	30.0	
In heaps	62	28.2	
Farm gate	57	25.9	
Local market	35	15.9	
Annual income			
Non	62	28.2	
Less than = ₦40,000:00	26	11.8	
₦40,001:00 - ₦50,000:00	62	28.2	43,250±5.0
₦50,001:00 - ₦60,000:00	37	16.8	
₦60,001:00 - ₦70,000:00	21	9.5	
More than ₦70,000:00	12	5.5	
Member of farmer association			
Yes	129	58.6	
No	91	41.4	
Frequency of Extension visit			
Yes	43	19.5	
No	177	80.5	
Access to Production Resources			
Adequate (Yes)	27	12.3	
Inadequate (No)	193	87.7	

Source: Field Survey 2011.

The recommended system of YMT production is sole cropping without intercropping with any other crop. Result here reveals that majority (57.5%) of respondents practised mixed cropping in utilising YMT. Crops intercropped with YMT include; maize, guinea corn, pepper, okro, melon, cowpea, groundnut and ammarantus. This method of intercropping is in line with their traditional practice of maximizing the use of available land and its resources and as a remedial against total crop failure and also to control weeds, pests and disease infestation of the farm. This finding is in consonance with Ikeorgu (2000) who reported that YMT was developed under monoculture but most farmers preferred and practised intercropping. This act is a complete deviation from YMT practice recommendation and this may have negative effect on the level of YMT utilisation and the expected benefits to be derived from the technology. Majority (55.6%) of respondents sold yam to middlemen, in heaps (30.0%) and at farm gate (25.6%) instead of markets. This finding is in consonance with that of Makhura, Kirsten and Delogado (2001) who reported that in developing countries, smallholder farmers find it difficult to participate in markets because of a range of constraints reducing the incentives for participation. Idachaba (2000) noted such constraints in Nigeria as lack of adequate market infrastructure and market information that would have enabled farmers take full advantage of their labour. Similarly, Oluwasola, Idowu and Osuntogun (2008) corroborated by Okoye, Onyenweaku and Ukolia (2010) reported that geographical distance imposed higher transport cost on rural farmers, thereby reducing their ability to sell in better but far-away markets. Thus long distances to selling points or markets predispose farmers to on-farm sales and to reduced transaction cost also referred to as low producer prices paid to farmers and consequently low income which does not encourage farming and even adoption of technologies that may result into increased production. The annual income of majority of respondents are below the mean annual income of ₦43,250±5.0 obtained in this study. This implies that annual income was generally low among respondents in the study area; this will have negative effect on YMT utilisation. This is finding is in line with Ayoola (2012) who reported that majority 55.0% of farmers earned less than ₦100,000:00 annually indicating a very low farm income, with implication for resource-poverty, small scale production and low adoption of new technology. In the same vain Okoye *et al*. (2010) reported that farmers low level of production and lack of producers direct access to markets do not make them always have fair remuneration for their investment and this has been a barrier to adoption of technologies which would have translated into large scale agricultural production and improved income. Majority (58.4%) of respondents were members of yam farmers association while 41.6% were not members. This implies that a good number of respondents were members of yam farmers association; this may enhance their access

to information on YMT and its utilisation. This finding is in consonance with the position of Oguntade, Thompson and Ige (2010) who observed that the social participation of farmers through their involvement in farm organisations will enhance the diffusion of information among them and enhance their access to government assistance in form of loan and other inputs. Similarly, Odurukwe, Mathew, Njoku and Ugochukwu (2003) and Spore (2011) found that the more a farmer belongs to farm organisations, the more likely he will be pre-disposed to adopt new farm practices. In the same vain Omotosho *et al.* (2012) reported farmers association are vital sources of information on agricultural innovations.

Responses to YMT package utilisation by adopters

Table 2 shows the distribution of farmers' response to utilisation of YMT package. The result indicates that 11 out of the 20 YMT package which include; selection of clean healthy yam tubers, selecting tubers that have broken dormancy, sterilising knife before use and intermittently, mulching with dry grasses, Trellis or Pyramidal staking and spread minisett under shade to air-dry, cut minisetts to 2cm thickness, cut minisetts to 25cm length, cut minisetts to between 30-45gms, harvesting when leaves senescence and planting depth of 9cm had scores of mean and above the mean (mean = 0.6±0.4). It can be concluded that, these eleven YMT packages were the most utilised by farmers in the study area instead of the entire package. This shows that farmers in the study area were yet to utilise YMT package in full and therefore may no derive full benefits that are inherent in the technology. This findings is in line with previous studies by Obinne (1992) and Alimi (2002) who reported that, farmers have not been making use of recommended practices to the fullest, especially some of them who had built up ideas and farm practices over the years and found it difficult to change. Ironkwe and Erouziem (2010) also found that, most yam farmers utilised a substantial part of YMT package that was related to their traditional yam production practices, it is therefore important that farmers should be encouraged to use technology package in full, in order to derived full benefits from it. Increased number of technology package utilisation will translate into increased benefits derived and increased benefits derived will encourage increased YMT utilisation (Fasasi, 2006).

Hypothesis Testing

Hypothesis 1: There is no significant relationship between some selected yam farmers' Socio-Economic Characteristics and YMT utilisation in the study area.

The hypothesis tested relationship between some selected yam farmers' Socio-Economic Characteristics and YMT utilisation in the study area. Chi-square (χ^2) was used to test the variables that were measured at nominal level while Pearson Product Moment Correlation (r) was used to test for variables measured at interval level.

The results obtained from this hypothesis are contained in Table 3.1 which shows variables tested with chi-square (χ^2). The result reveals that significant relationships were found between the following variables and YMT utilisation; marital status ($\chi^2 = 0.27$, $p = 0.05$) This finding is in tandem with similar studies which found significant relationship between respondents' marital status and adoption of YMT in Niger state, Nigeria (Waziri, Tsado, Likita and Gana, 2014). Formal education ($\chi^2 = 0.19$, $p = 0.05$) this finding is similar to Kernga (2009) who reported significant relationship between formal education and adoption of innovations in Texas A & M system. Primary occupation ($\chi^2 = 0.16$, $p = 0.05$) this finding is consistent with Chukwuji (2013) who found significant relationship between primary occupation and adoption of improved Technology in the Fadama III approach in Delta State, Nigeria. System of YMT production ($\chi^2 = 0.22$, $p = 0.05$) Significant relationship was reported between respondents' system of YMT production and YMT utilisation in a similar finding by Odurukwe (2003) who reported that variables on farm practices had positive effect on adoption of YMT. Sale outlet ($\chi^2 = 0.15$, $p = 0.05$) this finding is in consonance with Okoye *et al.* (2010) who found that sale outlet had significant relationship with YMT utilisation. However, respondents sex ($\chi^2 = 1.29$, $p = 0.544$), level of education ($\chi^2 = 1.30$, $p = 0.394$) and secondary occupation ($\chi^2 = 11.54$, $p = 0.244$) had no significant relationship with YMT utilization.

Table 3.2 shows variables tested with PPMC and the results indicate that correlation existed between these variables and YMT utilisation; for instance, respondents age ($r = 0.65$, $p = 0.05$) This finding is in agreement with Tsoho (2004) and Ayoola (2012) who reported significant correlation between age of respondents and adoption of tomato-based cropping system in Sokoto state, Nigeria and adoption of YMT in middle-belt region of Nigeria respectively. Household size ($r = 0.41$, $p = 0.05$) this finding is similar to Onumadu and Nwaobiala (2012) who reported a significant correlation between household size and Youths Participation in Yam Minisett Technology in Ivo Local Government Area of Ebonyi State, Nigeria. Years of farming experience ($r = -0.64$, $p = 0.05$) and farm size ($r = 0.67$, $p = 0.05$). these findings were consistent with Ironkwe (2010) who found significant correlation between respondents years of farming experience and farm size with use of YMT among farmers in Southeastern Nigeria. Annual income ($r = -0.57$, $p = 0.05$) this finding is in congruence with Smiles *et al.* (2010) who reported significant correlation between respondents annual income and adoption of cocoyam technologies in Enugu State, Nigeria. Hence the null hypothesis is rejected. However, the number of YMT cycle(s) already undertaken by the respondents at the

Table 2. Distribution of YMT package utilisation by adopters (n = 220).

YMT package utilised	Freq	%	Mean	Rank
1. Select clean healthy yam tubers	220	100	1.1±0.3	1
2. Select tubers that have broken dormancy	177	80.5	0.8±0.6	10
3. Sterilise Knife before use and intermittently	220	100	1.1±0.3	1
4. Cut into minisetts of 30-45gms	183	83.2	0.8±0.4	8
5. Cut minisetts to 25cm Length	184	83.6	0.8±0.5	7
6. Cut minisetts to 2cm thickness	185	84.1	0.8±0.6	6
7. Seed treatment with minisett dust	106	48.2	0.2±0.0	-
8. Spread minisett under shade to air-dry	201	91.4	0.9±0.5	5
9. Pre-sprout minisett in nursery for 3-4wks	139	63.2	0.4±0.5	-
10. Spacing of 25cm intra and 1m inter	151	68.6	0.5±0.4	-
11. Planting date April to 1st week in June	145	65.9	0.4±0.5	-
12. Planting depth of 9cm deep	176	80.0	0.8±0.5	11
13. Transplant with short vines without open leaves	149	67.7	0.4±0.7	-
14. Mulching with dry grasses	220	100	1.1±0.3	1
15. Staking using Trellis or Pyramid	206	93.6	0.9±0.5	4
16. Chemical weed control	107	48.6	0.2±0.0	-
17. Fertilizer application (Compound fertilizer.)	108	49.1	0.2±0.2	-
18. Harvesting when leaves senescence	183	83.2	0.8±0.4	8
19. Open-air storage in shaded barns or racks	159	72.3	0.5±0.5	-
20. Sole cropping	87	39.5	0.2±0.4	-

Mean = 0.6±0.4

Source: Field Survey (2011).

time of this data collection had no significant correlation with YMT utilisation.

Hypothesis 3: There is no significant difference between yam farmers' level of YMT utilisation across states in the study area.

The hypothesis tested difference between yam farmers' level of YMT utilisation across states in the study area. Analysis of Variance (ANOVA) was used to test the hypothesis. Results contained in Table 4 reveals that there was significant difference in the utilisation of YMT package in the four North-central states sampled ($F = 4.059$, $p = 0.000$). This implies that, there were differences in the levels of YMT package utilisation across states. Hence the null hypothesis is rejected. This findings is in line with Alimi (2002) who reported that because of variation in farmers level of access to production resources, they have not been making use of recommended practices to the fullest, especially some of them who had built up ideas and farm practices over the years and found it difficult to change. Farmers should be encouraged through enlightenment programmes, to always endeavour to utilise technology packages to the fullest, in order that they may take full advantage of the inherent benefits in such innovation.

Regression analysis showing determinants of YMT utilisation:- Table 5 shows the distribution of how the various independent variables determined YMT utilisation. The table indicates that R^2 was 0.900 which means that 90.0% of the YMT packages utilised by respondents was accounted for by the variables tested with regression. From the list of the tested variables in the table, the significant variables were those that were determinants of YMT utilisation of the respondents. The significant variables were farm location (β = 0.30), pattern of YMT (β = 0.30), formal education status (β = 0.29), extension visits (β = -0.25) secondary occupation (β = 0.22) and farmers age (β = 0.12) in that order. They are determinants of YMT utilisation because the higher the value of each of them the better determinants they become. Involvement in other livelihood activities as secondary occupation pre-disposes farmers to access to extra finances that will enable the procure inputs which usually accompany new technologies. Farmers with single farm location are likely to utilise innovations than those with scattered farms. Lack of formal education encourages conservatism while acquisition of formal education will enhance acceptance of innovation and will in turn encourage its utilisation. Younger farmers are more flexible to change than older ones and consequently are likely to utilise YMT package to the fullest and take full advantage of the technology.

CONCLUSION

The findings of this study revealed that despite the high potential of YMT to reduce the scarcity, high cost of seed-yam and increase profitability of yam enterprise, the utilisation of YMT though high among a higher proportion of respondents is still low among a considerable number. Vital factors that affected utilisation include, age, high level of illiteracy, secondary occupation and scattered

Table 3.1. Chi-square (χ^2) showing relationship between yam farmers' Socio-Economic Characteristics and YMT utilisation (n = 220).

Variables	Df	χ^2-value	p-value	Decision
Sex	2	1.287	0.544	Not Significant
Marital status	2	0.268*	0.000	Significant
Formal education	2	0.189*	0.000	Significant
Primary occupation	2	0.164*	0.000	Significant
Secondary occupation	8	11.537	0.244	Not Significant
Farm location	2	229.427	0.845	Not Significant
System of YMT production	2	22.820	0.000	Significant
Sale outlets	4	149.195	0.000	Significant
Membership of Yam Farmers Association	2	117.000	0.000	Significant

Df = Degree of freedom, χ^2 = Chi-square, p = Probability level
* Chi-square is significant at p< 0.05, ^Chi-square is not significant at p< 0.05
Source: Field Survey (2011).

Table 3.2. PPMC (r) analysis showing relationship between yam farmers' Socio-Economic Characteristics and YMT utilisation (n = 220)**.**

Variables	r-value	p-value	Decision
Age	-0.650**	0.000	Significant
Household size	0.411**	0.000	Significant
Years of farming experience	0.637**	0.000	Significant
Farm size	0.666**	0.000	Significant
Annual Income	0.573**	0.000	Significant
Number of YMT cycle(s) undertaken	1.1277	0.744	Not Significant

r = Correlation, p = Probability level, ** Correlation is significant at the 0.01 level (2 tailed)
Source: Field Survey (2011).

Table 4. ANOVA showing difference in level of YMT utilisation by farmers across states (n = 220).

Category	Source	SS	Df	MS	F	p-value	Decision
Adopters	Between	46.972	3	15.657			
	Within	4810.205	216	22.269	4.059	0.000	Significant
	Total	4857.177	219				

df = Degree of freedom, SS = Sum of square, MS = Mean square
Source: Field Survey (2011)

farm location. Hence, increased farmers' organizational involvement, improved extension contacts and improved inputs availability, accessibility and affordability especially fertilizer, herbicide, minisett dust and farm credit all of which are likely to promote farmers utilisation of YMT in North-central Nigeria.

RECOMMENDATIONS

Based on the findings of this study and in order to improve farmers' level of YMT utilisation so that they can take full advantage of the technology, the following recommendations are made; Government, non-governmental organizations and agricultural development agencies should commit more funds to improving Agricultural extension services by this more farmers can be reached and trained on the methodologies, uses and importance of YMT. This is in line with the recommendation of Sodiya, Lawal-Adebowale, and Fabusoro (2007) in a similar study on Cassava-Based Technologies in Ogun State, Nigeria. Secondly, farmers should be encouraged to form themselves into agricultural associations and cooperative groups. This corroborates the findings Spore (2011) in a related study on commodity associations. This will enhance training and also facilitate exchange of vital information on agricultural innovations. It will also enable them have access to government assistance such as soft loans,

Table 5. Determinants of independent variables to YMT utilisation.

Source	Df	SS	MS	F	p-value
Between	14264.123	08	839.066	218.208	0.000
Within	1588.095	212	3.845		
Total	15852.218	215			
Independent variables	**Un-standardized coefficient**		**Standardized coefficient**		
	B	**Std. Error**	**B**	**T**	**Significance**
Constant	2.758	2.801		0.985	0.325
1 Age	-0.030	0.018	-0.117	-1.717	0.016
2 Household size	-0.008	0.057	-0.003	-0.147	0.883
3 Formal education status	0.015	0.396	0.292	2.038	0.000
4 Primary occupation	-1.099	0.408	-0.090	-2.696	0.195
5 Secondary occupation	0.331	0.050	0.219	6.680	0.001
6 Years of farming experience	-0.102	0.023	-0.121	-4.342	0.056
7 Farm size	0.000	0.000	0.054	1.855	0.064
8 Farm location	2.133	0.411	0.302	-5.309	0.000
9 Pattern of YMT	2.825	0.295	0.301	9.581	0.015
10 Number of YMT cycle	-0.332	0.087	-0.183	-3.823	0.201
11 Annual income	-5.0E-007	0.000	-0.007	-0.116	0.908
12 Membership of yam farmer association	-1.526	0.353	0.098	-4.320	0.109
13 Extension Visit	-0.042	0.012	-0.248	-0.144	0.000
14 Access to production Resources	-0.242	0.040	-0.124	-4.421	0.012

df = Degree of freedom, SS = Sum of Square, MS = Mean square, R = 0.949, R^2 change = 0.900, Adjusted R^2 = 0.896 Standard Error of the estimate = 1.96093, F change = 218.208, Df 1 = 08, Df 2 = 212, Sig. F change = 0.000
Source: Field Survey (2011)

seeds or seedlings and agro-chemicals subsidies, when such assistance is properly channelled to get to farmers.

REFERENCES

Achoja FO, Uzokwe UN (2012). Income Effect and Correlating Factors of Yam Minisett Technology among Extension Contact Farmers in Delta State, Nigeria. Experimental Agriculture & Horticulture. Submitted on August 28th, 2012. Article ID: 1929-0861-2012. pp. 12-20.

Aighewi BA, Akoroda MO, Asiedu R (2002). Seed Yam Production Storage and Quality in selected Yam zones in Nigeria. Afr. J. Root. Tub. Crp. 5(1): 20-23.

Akoroda MO, Ngeve JM (2001). Root Crops in the 21st Century. Proceedings of the 7th Trunnial symposium of the International society for Tropical Root Crops Africa Branch (ISTRC – AB) Cotonou – Benin. pp .270.

Alimi P (2002). The Effect of Closeness to IITA Demonstration Farm Sites on the Adoption of IITA Technologies by Farmers. An unpublished MSc project in the Department of Agricultural extension and Rural Development, University of Ibadan, Nigeria. pp. 2-5.

Asumugha GN, Obiechina COB (2001). Comparative Economics of Minisett and Traditional Seed-yam Production Technologies at farm level in the Eastern Forest one of Nigeria. Afr. J. Root. Tub. Crp. IITA, Ibadan. 4(2): 9-12.

Ayoola JB (2012). Socio-economic Determinants of the Adoption of Yam Minisett Technology in the Middle Belt Region of Nigeria. Published by Canadian Center of Science and Education. J. Agr. Sci. 4(6): 215-222.

Central Bank of Nigeria (CBN). (2003). Annual Reports and Statement of Accounts.

Chukwuji CO (2013). Increasing Crop Output through Improved Technology Adoption: The Fadama III Approach in Delta State, Nigeria. Afr. J. Agr. Rur. Dev. 3(6): 400-411. Retrieved from journal homepage: http://aessweb.com/journal- detail.php?id=5005.

Ezulike TO, Udealor A, Nwosu KI, Asumugha GN (2006). Rapid Multiplication of Seed-yam by Minisett Technique. Extension Guide No. 15, Extension Service Programme, NRCRI, Umudike. Pp. 1-10.

Food and Agriculture Organization (FAO). (1994). Production Yearbook Vol. 47 Statistics Series No. 125 FAO Rome.

------ (2008). FAO Database. Retrieved on Jan. 12, 2012. 3:05 pm, from http://www.fao.org/

Food and Agriculture Organization Statistics (FAOSTAT). (2014). FAOSTAT Agricultural Database. Retrieved April. 28, 2015. 4:05 pm, from http://www.apps.fao.org/

Fasasi AR (2006). Resource use Efficiency in yam production in Ondo state, Nigeria. Agr. J. 1(2): 36-40.

Idachaba FS (2000). Tropical Issues in Nigerian Agriculture; desirable and workable Agricultural Policies for Nigeria in the first Decade of the 21st century, Ibadan, Ibadan Printing Press. Pp. 18.

International Institute for Tropical Agriculture (IITA). (1996). Project 13, Improvement of Yam based Production System. Annual Report 1996, IITA, Ibadan, Nigeria.

Ikeorgu JEG (2000). Root and Tuber Crops of Nigeria Production, Challenges and Future in Akoroda MO Ed. Agronomy in Nigeria. University of Ibadan, Ibadan. pp. 44-49.

------ (2003). Creating Employment Opportunities in Agro-Allied sub-sector: The case of yam production. Bullion. 27(4):15-22.

Ironkwe AG (2010). Influence of Personal Characteristics of Farmers on the use of Yam Minisett Technology in South-Eastern Nigeria. Proceedings of the 44th Conference of Agricultural Society of Nigeria, "LAUTECH 2009". pp. 7-9.

Ironkwe AG, Erouziem JE (2010). Production Factors and Farmers' output in using YMT in South-East Agricultural Zone, Nigeria. Proceedings of the 44th Conference of Agricultural Society of Nigeria, "LAUTECH 2010". pp.10-12.

Kernga A (2009). Report an Adoption Study Institut d'Economic Rurale. The Agricultural programme, The Texas A &M System. Retrieved Feb. 2011 from http://cnrit.tamu.edu/.

Madukwe MC, Ayichi D, Okoli EC (2000). Issues in Yam Minisett Technology Transfer to Farmers in South-Eastern Nigeria. African Technology Policy Studies Working Paper No. 2. ATPS, Nairobi, Kenya.

Makhura M, Kirsten J, Delogado C (2001). Transaction Costs and Small-Holder Participation in the Maize Market in the Northern province of South-Eastern and Southern African Regional Maize Conference, 11th-13th February 2011. pp. 460-463.

Manyong VM, Asiedu R, Olaniyan J (2001). Farmers Perception and Actions on Resource Management Constraints in the Yam Based System of Western Nigeria in Akoroda MO Ed. Root Crops in the 21st Century. Proceedings of ISTRC-AB IITA, Ibadan. pp. 156-163.

Mohammed BT, Achem BA, Abdulquadri AF, Age KF (2009). Gender Involvement in Agricultural Production in Nigeria, proceedings of 43rd Annual Conference of Agricultural Society of Nigeria (ASN) held at National University Commission and Raw Materials Research and Development Council, Abuja, Nigeria. October 20-23. pp. 682-685.

National Root Crop Research Institute (NRCRI) (2005). Annual Reports 2005, NRCRI, Umudike.

Obinne CPO (1992). The Extension Service Plan for Effective Dissemination of Improved Innovation. J. Rur. Dev. Adm. 24(2): 20-24.

Odurukwe SN, Mathew EC, Njoku A, Ugochukwu AI (2003). Determination of Adoption gaps in Yam Minisett Technique of Women Farmers in River State. Proceeding of the 37th Annual Conference of Agricultural Society of Nigeria (ASN) held at the University of Calabar, Nigeria from 16th-20th November 2003. pp. 36-43.

Ogbonna MC, Korieocha DS, Onyenobi VO, Njoku SC (2011). Profitability of Minituber Seed-Yam Production Technique in South-East Agro-Ecological Zone: evidence from Abia State, Nigeria. J. Agr. Soc. Sc. Res. (JASR). 11(2): 113-118.

Oguntade AE, Thompson OA, Ige T (2010). Economics of Seed Yam Production Using Minisett Technology in Oyo State, Nigeria. Field Actions Science Reports. (4): 39-62.

Ojemade AC (2010). Factors Associated with the Adoption of recommended Oil palm Production Technologies in Ethiope West Local Government Area of Delta State. Proceedings of the 44th Annual Conference of Agricultural Society of Nigeria. "LAUTECH 2010". pp. 327-322

Okoro JK (2008). "Awareness and Use of the Rapid Seed Yam Multiplication Technology by Farmers in Nigeria's Yam Belt" PAT 2008. 5(1): 22-29. Retrieved October 25th, 2012. 7.05pm from www.patnsukjournal.net/currentissue.

Okoye BC, Onyenweaku CE, Ukolia OO (2010). Selling at the Farm Gate or Market by Small-grower Cassava Farmers in South-Eastern Nigeria. Proceedings of the 44th Annual Conference of Agricultural Society of Nigeria "LAUTECH 2010". pp. 118-120.

Okunmadewa F (1993). Agriculture in the Development process of Nigeria in Ayelari EA, Lucas EO, Abatan MO, Akinbode OA Eds. Fundamentals of Agriculture; Afrika-Link Books, Ibadan. pp. 78-80.

Olawoye JE (2000). Third Economy for Sustainable Livelihood paper developed for one day workshop organized by NEST held at NEST house, 24th January.

Oluwasola O, Idowu EO, Osuntogun DA (2008). Increasing Agricultural Household Income through Rural-Urban Linkages in Nigeria. Afr. J. Agr. Res. 3(8): 566-573.

Oluyomi MS (2002). Constraints to Increased Yam Production among Rural- Poor Yam Farmers in Kabba/Bunu Local Government Area of Kogi State. MSc. Project. Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan. pp. 1-40.

----- (2010a). Constraints to Increased Yam Production in Ayetoro-Gbede ADP Zone A in Kogi State. Acad. Sch. J. Enugu State University of Technology, (ESUT) Enugu, 1(1): 116-125.

----- (2010b). Population Growth: Implication of Food Production in Kabba/Bunu Local Government Area in Kogi State. Ng. J. Res. Prod. (NIJOREP), Enugu State

University of Technology, (ESUT) Enugu. 16(1): 174-182.
Omotesho OA, Falola A, Muhammad-Lawal A, Oyeyemi A (2012). Comparative Analysis of the Performances of Adopters and Non-Adopters of Yam Minisett Technology in Kwara State, Nigeria. Int. J. Agr. Rur. Dev. SAAT FUTO 2012. 15(3): 1335-1341.
Onumadu FN, Nwaobiala CU (2012). Assessment of Youths Participation in Yam Minisett Technology in Ivo Local Government Area of Ebonyi State, Nigeria. J. Eco. Sus. Dev. 3(3): 45-51. Retrieved on 3rd November, 2014. 7.20pm from www.iiste.org.
Otoo JA, Okoli OO, Ilona P (2001). Improved Production of Seed Yam. Research Guide 63 IITA, Ibadan.
Sodiya CI, Lawal-Adebowale OA, Fabusoro E (2007). "Effect of Private and Public Extension Services on Adoption of Promoted Cassava-Based Technologies in Ogun State, Nigeria " J. Agr. Fd. Inf. 8(1): 35-47.
Spore K (2011). Commodity Associations: More Competitive Supply Chain. In: Yam A Triumph for Towns No. 152. 20.
Tsoho BA (2004). Economics of Tomato-based cropping systems under small-scale irrigation in Sokoto state Nigeria. MSc project, Department of Agricultural Economics and Farm Management. University of Ilorin, Nigeria. pp. 30-31.
Waziri A, Tsado EK, Likita T, Gana AS (2014). Socio-economic factors influencing adoption of yam Minisett Technology in Niger State of Nigeria. J. Bio. Agr. HC. 4(5): 98-105. Retrieved on 13th November, 2014, from www.iiste.org.
Wisegeek A (2012). What is Technology? Retrieved on 24 April, 2014, 6.05pm. from http://www.wisegeek.org/what-is-agricultural-technology .