Yam minisett innovation utilization for improved livelihood status of farmers in Niger state, Nigeria

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ABSTRACT

This study was conducted to analyze yam mini-sett innovation utilization among farmers in Niger State Nigeria. Multistage sampling procedure was used to select a total of 152 respondents for the study. Interview schedule/ questionnaire were used to elicit information from the respondents. The data were analyzed using descriptive and inferential statistics. The results of the study revealed that the respondents were still in their active and productive age, with mean age of 38 years and large proportion (79.6%) were married with a mean household size of 8 persons. Also, majority (69.1%) had one form of formal education or the other with a mean farming experience of 27years. The major yam minisett innovation practices utilized by the respondents were recommended land preparation (2.48), recommended spacing (2.41), cutting the recommended size (2.40) and treatment of the seed yam (2.43) which ranked 1st, 2nd, 3rd and 4threspectively.The study revealed also that utilization of yam minisett innovation significantly affected farmer's livelihood in the areas of: improvement in family food security status ($\bar{X}$=4.09), increase income ($\bar{X}$=4.03) improve housing and clothing ($\bar{X}$=3.93) which ranked 1st, 2nd and 3rd, respectively. The most important factors affecting the utilization of yam mini-sett innovation which showed a significant relationship were age of the farmer (2.45), household size (2.53), marital status (-3.16), extension contact (1.92), access to training (2.03), access to credit (-1.38) and farm size (4.15), which were statistically related with utilization of yam mini-sett innovation at $p< 0.05$ and $p<0.10$. Constraints to utilization of yam mini-sett innovation practices were inadequate access to credit ($\bar{X}$3.59), poor soil fertility ($\bar{X}$3.51), unfavorable climate condition ($\bar{X}$3.32), inadequate training and extension services ($\bar{X}$3.17) and inadequate knowledge ($\bar{X}$3.17). It is recommended that efforts should be geared towards creating more awareness and training of the farmers on yam mini-sett innovation practices to enhance its utilization for increased productivity and consequently improved livelihood status.

KEYWORDS: Farmer, utilization, Yam minisett, Innovation, Livelihood

INTRODUCTION

Roots and tubers belong to the class of food that basically provides energy in human diet in the form of carbohydrates. Yam (*Dioscorea Spp.*) is an edible tuber of a tropical plant. Yam production is a major agricultural activity in West Africa, this region has contributed more than 90% of the world yam production (Food and Agriculture Organization (FAO), 2010). Nigeria is also known to be the world's largest producer of yam and she produced about 27 million tones which is about 65% of the world's annual yam production (Omotesho *et al.,*

2012). Yam is a major staple food for many people in Nigeria; yam also has potential for livestock feed. It is used in the industrial starch manufacture, yam is a prestigious crop that is

viewed and received with respect during yam festival, wedding ceremony among the rurals in the South-West and the Eastern part of Nigeria. Yams as food for human beings is used in many ways such as roasted or boiled and eaten with oil or stew, yam can be fried, grated and fried into balls, processed into flour, pounded into meal and eaten with soup and so on. Little wonder Oguntade *et al.,* (2010), opines that in many yam-producing areas of Nigeria, yam is food and food is yam.

Yam, which is one of the major staple foods for the majority of people of Nigeria, is declining in production and yield according to the report of the International Institute of Tropical Agriculture (IITA), (2006). Planting materials are scarce, difficult to obtain, expensive; some are of low quality and might be infected by pests and diseases. Balogun *et al.* (2014), opined that the traditional yam seed production system which requires the farmer to reserve up to half of the year's harvest for future planting is inefficient and expensive. Hence there must be immediate need to utilize new measures that will curb or stop these problems of planting materials in developing countries like Nigeria and Niger State in particular.

The Utilization of yam mini-sett innovation is a means of improving farmers' yield and increase in income but farmers especially in Nigeria are slow to adopt the packages and recommendations since it was introduced in 1982 (Agbarevo, 2007: Imo and Essien 2005). Poor adoption of the yam mini-sett innovation could be attributed to farmers' complains that most of the package practices were not compatible with their existing production practice as argued by Bolarinwa and Oladeji (2009).

Augustine *et al.* (2008) argued that considerable research work has been conducted over the years to ascertain the utilization behaviour of farmers in Nigeria in utization improved agricultural innovation. In spite of the availability of these improved agricultural technologies in Nigeria particularly the yam mini-sett technology, Waziri *et al.* (2014) reported that in Niger State, a large proportion (77.6%) of yam farmers are yet to adopt the mini-sett technology. Waziri *et al.* (2014) further stated that the factors affecting the utilization behaviour of yam farmers in Niger State has not been fully investigated in recent time. It is

on this basis that this study attempt to determine adoption level of yam mini-sett technology and the constrains associated with its adoption. The specific objectives of the study are to describe the socio-economic characteristics of the farmers; determine the level of utilization yam mini-sett innovation practices; determine the effects of yam mini-sett innovation utilization of farmers livelihood status, determine the factors affecting the utilization of yam mim-sett innovation among the yam farmers and to examine the constraints faced by yam farmers in utilizing yam minisett innovationpractices by the farmers.

METHODOLOGY

The study was conducted in Niger State, Nigeria. The annual rainfall varies from about 1,600mm in the south to 1,200mm in the north. The duration of the rainy season ranges from 150 to 210 days or more from the north to the south and the mean maximum temperature remains high throughout the year, hovering at about 32°C, particularly in March and June (Yusuf and Nwachukwu, 2015). The mainstay of the economy is agriculture, the major crops grown in the area includes rice, yam and cow pea, animals reared include goat, sheep and cattle.

Primary data was used for this study, it was collected through the administration of questionnaires and structured interview schedule. Multi stage sampling technique was adopted for this study. Zone II of the three Agricultural zones was purposively selected based on its long history of yam production as reported by NSADP (2007). In the second stage, four (4) out of the nine (9) Local Governments in zone II were randomly selected, the third stage involved random selection of four (4) villages from each of the selected Local Government Area to have a total of sixteen sampled villages. 10 respondents were randomly selected from each of the selected villages making a total of 160 respondents, however, a total of 152 valid questionnaires were used for the analysis. Data were analyzed through the use of descriptive Statistics such as frequency counts, percentages and means and Inferential statistics; Poisson regression model was used to determine the factors affecting the adoption of yam mini-sett innovation. The implicit form of the model is as stated below

$Y = f(X_1, X_2, X_3, X_4, \ldots\ldots\ldots\ldots X_9)$
The functional form is expressed in the explicit form as
$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + e$

Y= Adoption of yam minisett technology (number of the components of the innovation utilized by the farmer).
X_1 = Age of farmer (years)
X_2 = Household size (number)
X_3 = Education level (years of schooling)
X_4 = Farming experience (years)
X_5 = Marital status (married = 1, otherwise = 0)
X_6 = Extension contact (number of contacts)
X_7 = Access to training (yes = 1, no = 0)
X_8 = Access to credit (yes = 1, no = 0)
X_9 = Access to farm land (hectares)
β_0 = Constant
β_1-β_9 = Regression coefficients
X_1 –X_9 = Independent variables

A 3-point Likert scale of: Aware = 1, Tried = 2 and Adopted = 3 was used to determine the level of utilization of yam mini-sett innovation practices. The critical mean 2.0 derived from 3-point likert rating scale (3+2+1/3) was used to describe farmers' level of utilization. The utilization score greater than or equal to critical mean of 2.0 depicts high level of utilization while utilization scores less than the critical mean of 2.0 depicts low level of utilization.

Relative Importance Index (RII) was used to analyse the effect of utilization of yam mini-sett innovation on farmers' livelihood, this was used as it revealed the specific area that contribute most to the respondents' livelihood.
RII= Sum of weights (W_1+W_2+W_3+W_4+W_5+W_6+W_7+W_8+W_9+W_{10}) /A X N,
Where W= weight given to each effect which ranges from1-5. 1= highly insignificant, 2= insignificant, 3= neither, 4= significant and 5= highly significant. A=highest weight in this case is 5 and N= total number of respondents.

Similarly, 5-point Likert scale rating of: Not a constraint = 1, Not Severe = 2, Undecided = 3, Severe = 4 and Very Severe = 5was used to examined the constraints faced by yam farmers in adopting the new technology. The critical mean 3.0 derived from 5-point Likert rating scale

(5+4+3+2+1/5) was used to describe farmers' constraints. The constraints score greater than or equal to critical mean of 3.0 depicts severe constraints.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Yam Farmers

Table 1 shows the results of the Socio-economic characteristics of yam farmers. The socio-economic characteristics in include age, marital status, household size, education level and years of farming.

Age: Age variation is significantly associated to farmer's behavior in accepting new techniques. The results in Table 1 revealed that majority (98.5%) of the respondents were between the age ranges of 31-50 years with a mean age was 38.0 years. This implies that the respondents were still in their active and productive years and could easily adopt new innovation such as yam mini-sett technology. This result agrees with the findings of Agbongiarhuoyi *et al.* (2008), who stated that young farmers tend to be more receptive to new innovations than the older farmers.

Marital status: Marital status as indicated in Table 1 shows that majority (76.6%) of the respondents were married, while 16.5%, 3.3%, and 0.7% of the respondents were single, widowed and divorced, respectively. This may increase the number of family labour as well as enhance adoption of innovation such as yam mini-sett innovation. This corroborate the findings of Ayoade *et al.* (2009), who reported that majority of the farmers who lived in agrarian areas are usually married and were ever ready to utilize new innovation.

Household size: The result in Table 1 shows the household size with a mean of 8 people. It indicated that almost half (48.7%) of the respondents had family size of between 6-10 individuals, while 23.7% had family size of 11-15 persons. This implies that most of the respondents had a moderate household size. Moderate household size will help them to save supposedly cost on hired labour and will also assist them in the utilization of mini-sett technology. This is in line with the findings of Oluwatayo (2012), who reported that household size influences farmers' willingness accept and utilize new innovations.

Educational level: Education is very vital in the adoption of new technology and innovation. The result in Table 1 revealed that majority (69.1%) of the respondents had one form of formal education or the other. Also, 30.9% of the respondents had no formal education. This implies that majority the respondents in the study area had one form of education or the other, which can enhance the adoption of yam mini-sett technology. This is in consonance with the finding of Oguniyi *et al.* (2014), that majority of farming families in their study area had one form of formal education.

Farming experience: Farming experience as indicated in Table 1 revealed that 31.6% of the respondents had 10-20 years of experience in yam production while 28.9% had 21-30years of experience in yam production. The mean years of farming experience was 27 years, this implies that majority of the respondents had been producing yam over a long period of time and have a vast knowledge about the venture. This corroborates with the finding of Ayoade *et al.* (2009), who reported that majority of farmers in the study area were familiar with arable and livestock production.

Table 1: **Socioeconomic Characteristics of Yam Farmers (n = 152)**

Variables	Frequency (n = 152)	Percentages	Mean
Age			
≤20	10	6.58	
21-30	27	17.8	
31-40	62	40.8	
41-50	40	26.3	
>50	13	8.6	
Total	152	100.0	38.0
Marital status			
Single	25	16.5	
Married	121	79.6	
Widowed	5	3.3	
Divorced	1	0.7	
Total	152	100.0	
Household size			
1-5	33	21.7	
6-10	74	48.7	
11-15	36	23.7	
>15	9	5.9	
Total	152	100.0	8.0
Education level			
Tertiary	2	1.3	
Secondary	52	34.2	
Primary	51	33.6	
Non formal	47	30.9	
Total	152	100.0	

Farming experience			
<10	19	12.5	
10-20	48	31.6	
21-30	44	28.9	
>30	41	26.9	
Total	152	100.0	26.6

Source: Field Survey, 2018

The entries in Table 2 revealed respondents level of utilization of yam mini-sett innovation practices. The respondents level of utilization were said to be high for the following practices: recommended land preparation (χ =2.48), cutting of recommended size (χ =2.40) and treatment of seed yam (χ =2.34), these practices were said to be more compatible with the small scale farmers cultural and existing practices and it is often believed that farmers readily accept and adopt new innovations that are more compatible with their cultural and existing practices

Table 2 : Level of utilization of Yam mini-sett innovation practices

Source: Field Survey, 2018

Yam mini-sett technology Practices	**Weighted Score**	**Weighted mean (χ)**	**Adoption Level**
Cutting the recommended size	365	2.40**	High
Treatment of the seed yam	355	2.34**	High
Recommended land preparation	377	2.48**	High
Recommended spacing	367	2.41**	High
Timely planting/weeding	338	2.22**	High
Fully mature tuber	298	1.93*	Low
Fertilizer application	252	1.65*	Low
Total (χ)		**15.43**	
Critical meam	**≥ 2.0 = ** < 2.0 = ***		

Table 3 shows the effect of yam mini-sett innovation utilization on the livelihood of the yam farmers. The result showed that the utilization of yam minisett innovation significantly affected farmer's livelihood in the areas of: improvement in family food security status ($\bar{X}$=4.09),

increase income ($\bar{X}$=4.03) improve housing and clothing ($\bar{X}$=3.93) and which ranked 1st, 2nd and 3rd, respectively. This implies that the utilization of yam minisett by the famers had significant and positive effect on their socioeconomic wellbeing. This is in line with the findings of Kadiri and Eze (2015), that rice farmers in Niger Delta of Nigeria claimed to have increase yield, income, and ability to train children in school and easy feeding and clothing as a result of.

Table 3: Effects of yam minisett innovation utilization on livelihood of farmers

Variables	HI	I	N	S	HS	Sum	Mean	Rank	Remark
Increase food security through yam production	6	15	22	26	83	621	4.09	1st	S
Increase income	9	16	22	20	85	612	4.03	2nd	S
Ability to acquire more assets	18	28	38	41	27	487	3.20	5th	S
Access to yam marketing opportunities	22	29	41	32	28	471	3.10	6th	S
Ability to send children to school	14	15	20	23	80	592	3.92	4th	S
Ability to marry more wives	78	22	21	11	20	329	2.16	8th	NS
Improved sanitation	76	23	22	9	22	334	2.20	7th	NS
Improved housing and clothing	9	18	23	26	76	598	3.93	3rd	S
Access to improved health care services	15	18	32	22	65	560	3.68	5th	S

Source: Field Survey, (2017).

Note: HI= Highly Insignificant, Insignificant=I, Neither=N, Significant=S, Highly Significant=HS, NS=Not Significant

Table 4: **Factors affecting the adoption of yam mini-sett technology**

Variable	Coefficient	z-value
Age (years)	-0.0254	-2.45**
Household size (number)	0.0505	2.53**
Educational level (years)	0.1364	1.41
Farming experience (years)	-0.0043	-0.37
Marital status (married = 1, otherwise = 0)	0.6833	3.16***
Access to extension (number)	0.0094	1.92*
Access to training (Yes = 1, No =0)	0.0053	2.03**
Access to credit (Yes = 1, No =0)	-0.2735	-1.38
Average farm size (ha)	0.2391	4.15***
Constant	-1.2995	-1.99**
LR Chi-squared	45.67***	

Log likelihood	-240.1440

Source: Field Survey, 2018

Factors affecting the utilization of Yam minisett innovation among Farmers

Out of nine independent variables as shown in Table 4; age, household size, marital status, access to extension, access to training and farm size were found to be statistically significant and were positively related to utilization in exception of age which was negatively related to adoption, this implies that an increase in age of the respondent will lead to a decrease in adoption rate of the respondents, this is in line with the prior expectation, a unit increase in the age of the farmer will lead to a decrease in the utilization rate of yam mini-sett innovation and reverse is always the case for the variables that were significant and positively related to adoption of the innovation. The model LR chi-square value of 45.67 was statistically significant at 1% level of probability which is an indication that the model is good and implies a significant relationship between the dependent variable (utilization of yam minisett innovation) and the independent variables.

Perceived constraints to the utilization of yam minisett innovation practices

The result in Table 5 revealed that the respondents faced enormous problems in utilization yam mini-sett innovation, among this problems inadequate access to credit (χ=3.59), poor soil fertility (χ=3.51), unfavorable climate (χ=3.32), Inadequate training and extension services (χ=3.17) and inadequate knowledge of the innovation (χ=3.17) ranked high and as such were the most severed constraints faced by the small scale farmers. These major constraints are fundamental and very critical in any innovation dissemination and utilization and these were responsible for the slow diffusion, acceptance and utilization of the innovations in the study area.

Table 5: **Constraints to the adoption of yam mini-sett technology**

Variables	VS	S	UN	NS	NC	Sum	Mean	Remarks
Inadequate access to credit	12 (29.3)	5 (12.0)	21 (51.2)	1 (2.4)	2 (4.9)	147	3.59	SC
Poor soil fertility	5 (12.2)	21 (51.2)	6 (14.6)	8 (19.5)	1 (2.4)	144	3.51	SC
Unfavourable climate	2 (4.5)	21 (51.2)	9 (21.9)	6 (14.6)	3 (7.3)	136	3.32	SC
Inadequate training/ extension services	12 (29.3)	5 (12.2)	6 (14.6)	14 (34.2)	4 (9.7)	130	3.17	SC
Inadequate knowledge	5 (12.2)	7 (17.1)	22 (53.7)	4	3	130	3.17	SC

				(9.7)	(7.3)			
Pest and disease	3 (7.3)	8 (19.5)	6 (14.6)	20 (48.9)	4 (9.8)	109	2.66	NSC
Low awareness	-	9 (21.9)	3 (7.3)	26 (63.4)	3 (7.3)	100	2.44	NSC
Expensiveness of practices	-	2 (4.9)	8 (19.5)	25 (60.9)	6 (14.6)	88	2.15	NSC
High labour requirement	-	1 (2.4)	7 (17.1)	28 (68.3)	5 (12.3)	86	2.09	NSC

Source: Field Survey, 2018

CONCLUSION AND RECOMMENDATIONS

From the study, it can be concluded that the level adoption some of yam mini-sett innovation among farmers were high. However, they still don't have sufficient technical knowledge of the innovation and have not fully utilize it because of the enormous constraints they faced in the utilization process. The farmers therefore need to be given adequate training and education on how best to use innovation by the extension agents and be enlightened about the prospects of the innovation to boost seed yam production. It is recommended that government should collaborate with relevant financial institutions to facilitate the provision of credit facilities to the farmers as this could encourage farmers with low capital base to utilize the innovation.

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