DETERMINANTS OF ADOPTION OF IMPROVED YAM PRODUCTION TECHNOLOGIES AMONG FARMERS IN OKPOKWU LOCAL GOVERNMENT AREA OF BENUE STATE, NIGERIA

[1]Omale, I. P., [2]Tor, L. G. and[1]Ameh, M. E.

[1]Department of Agricultural Extension and Communication, Federal University of Agriculture Makurdi, Benue State- Nigeria.

[2]Department of Agricultural Technology, Forestry Research Institute of Nigeria Ibadan City.

luvlypat83@yahoo.com

Abstract

The study was carried out in Okpokwu Local Government Area of Benue State, Nigeria to ascertain the determinants of Adoption of Improved Yam Production Technologies Adoption among Farmers. Simple Random Sampling Technique was employed to select 120 respondents while data was collected using structured questionnaire and oral interview schedule. Statistical tools such as frequency distribution, percentages, mean, ranks and logit regression were used for data analysis. Results show that 72.50% of the respondents were male with mean age of 43.86 years, 16.6 years farming experience and 5.10 hectare farm size. Relatives/Friends, Radio and Mobile phone ranked 1st, 2nd and 3rd among their major channels for sourcing Agricultural Information while internet, magazine, newspaper and agricultural bulletin ranked least. Herbicide usage, mixed cropping and yam minisett ranked 1st, 2nd& 3[rd]among improved yam production technologies adopted by the farmers while yam minitube, tissue culture and temporary immersion rank least among adopted improved technologies by the farmers in yam production.Result of determinants of improved yam production technologies adoption revealed that socio-economic variables such as age (P=0.045), farm size (P=0.004) and household size (0.026) had significant effects on the farmers adoption of improved yam production technologies in the study area.It is therefore recommended that agricultural extension agencies should set up toll free call centre to provide farmers avenues to seek credibleagriculturalinformation from extension outfit since mobile phone services have become an easy channel of information exchange among all categories ofthe farmers so as to improve yam production.

Keywords: Determinants, Improved, Yam, Production, Technology and Adoption.

Introduction:

Yam (*Discorea spp*) is an important tuber crop in West Africaand Nigeriawith over 600 known species worldwide and the most popular edible species being *Discorea rotundata* (white yam), *Discorea alata* (water yam), *Discorea cayenensis* (yellow yam), *Discorea dumetorum* (bitter yam), *Discorea esculenta* (Chinese yam), and *Discorea bulbifera* (aerial yam) (Aighewi, Asiedu, Maroyo & Balogun,2015). It is regarded as a socio-cultural cropwith high market demandin Nigeria due toincreasing demand from local and foreign markets.It has beenreported that Nigeria is the largest producer of yam world-wide with annual production estimated at 26.587 million metric tons (Food and Agricultural Organization (FAO), 2006) with States in middle-belt such as Benue, Nassarawa, Taraba, Abuja and Niger contributing significantly to the volume.

The choice of yam as a favorable tubercrop among Nigerians has been forits rich starch and flavor qualitiesthough it is a crop highlysortedafter in the food and drug industry for its immense potential as functional foods and nutraceutical ingredients in disease risk reduction and wellness (Anoma and Thamilini, 2016). Yam export is now raking in foreign exchange across West Africa bringing aboutincreased revenue to the farmers with a new need to step up production to meet the new demand (Vanessa, 2019). This has made itnecessary for farmers to employ the use of improved production technologies that will bring about efficiency, reduce cost, increase output and higher returns to investment for the farmers.

Agricultural technologies are innovations, ideas, techniques or devices which when employed in farm production improves the operation process and give better result. According to Abdul,Luan, Rafia and Imran(2016) beyond new seeds and crop protection techniques new technologies are enabling farm owners to increase their productivity in ways like irrigation practices, crop management products, mobile information gathering, nutrient supply,deployment of mechanized equipment and ICT software for accurate diagnosis and precise problem solving.

Several efforts have been made in the past through research towards improving technologies in yam production with major breakthrough in yam seed multiplication; weed control etc (Frimpong, Ennin, Owusu, and Aidoo,2016). However adoption of some

of these innovations among farmers have been reported to be low (Ogunlana, 2004; Agbarevo, 2014; Aighewi, Asiedu, Maroyo, andBalogun,2015; Asante, 2018). This was attributed to poor awareness about innovation, complexity of innovations, high cost of innovations etc.

According to Usman, Salihu and Musa (2015), high cost of inputs and poor access to capital areconstraints militating against yam production in North East Nigeria which has significantly lowered yam production in the region.The farmers who still engage in yam production in the region heavily rely heavily on family labour especially for weed control as a leverage to sustain their production. This is a pointer to why there commended increased extension contact for yam farmers in the region. Iwuchukwu and Okwor (2016)observed that farmers made more use of local production technologies in yam farming which is attributed to poor extension contact. Thompson, Amos and Omolola (2019) in their study however identified farmer's educational level, farm size, years of farming experience and yam seed cost as major factors affecting yam production even though the research revealed that yam production in the study area have an appreciable gross margin. It is therefore evident that several challenges bedevil the profitable production of yam across various regions of Nigeria even though the nation's general climatic condition gives the farmers a more comparative advantage to produce the crop in large scale.

With the increased revenue from yam export it has become important to clearly identify the production challenges bringing about continuous decline experienced for the crop. This is most so because not much is documented on available improved yam production technologies and reported determinants faced by farmers in North Central Nigeria especially Benue State where yam production strive against all odds. This study therefore aim to provide some of the missing links and add to the body of knowledge already in existence on improved yam production technology in use by farmers in the study area hence the study provided answers to the following research questions; what is the socio-economic characteristics of yam farmers in the study area? What are the channels they access agricultural information? What are the improved yam production technologies adopted by the farmers? What are the determinants of yam technology adoption in the study area? The main objectives were to: describe the socio-economic characteristics of yam farmers in the study area, identify the channels used by the farmers to access agricultural information, ascertain the improved yam production technologies adopted by

the farmers and to determine the determinants of improved yam production technology adoption in the study area.

Methodology

The research was carried out in Okpokwu Local Government Area (LGA) of Benue State Nigeria. The LGA was created from the former Idoma Native Authority in 1976. The LGA derived its name from the river Okpokwu and have given birth to two other LGAs which include Ado and Ogbadibo. The study area is located about 170 kilometers southwest of Makurdi the state capital and shares land borders with Ohimini LGA on the North, Ogbadibo LGA on its Western end, Ado and Otukpo LGAs on the East and Isiuzo LGA of Kogi State on the North West. The inhabitants are predominantly farmers of crops such as yam, maize, cassava, groundnut, sorghum etc while others are traders, teachers and civil servants.

The population for the study consists of all yam farmers but for ease of the work simple random sampling was adopted to select 120 yam farmers across six districts of the LGA with 20 questionnaire randomly administered in each.The data for this study was collected from primary sources through the use of a well-structured questionnaire/interview schedule. The instrument for data collection was validated by experts to ensure it possessed both face and content validity while data for the study were analyzed using descriptive statistics like frequency distribution, percentage, mean, ranks andlogit regression.

Results and Discussion

Socio-economic characteristics of respondents

The result from table 1 shows that majority (72.50%) of the farmers were male with mean age of 43.86 years, married (78.33%) with 58.33% having formal education, mean farm experience of 16.6 years, mean farm size of 5.10 hectares, household size of 6 persons and annual income of ₦214,650. The dominance of male farmers does not necessarily reflect lower women participation in yam production but a reflection of lower interest of women in rural communities to talk about the household without the men permission. This is in collaboration with other reports such as Ogunlana (2003) who reported that yam production was primarily carried out by women within rural households.The younger ages of respondents is an indication of the increasing interest of youths in Agriculture with the

increasing unemployment in other sectors of the economy. The farm size is an indication that yam production is predominantly carried out on subsistence level which is consistent with findings of Ganiyu *et. al.* (2018) highlighting the importance of small holder farmers contribution in yam production. The householdsize implies the farm size of yam farmers in the region will be dependent on thelabour type adopted which in Nigeriais mostly family labour as revealed by Aniedu (2016).The farmers income implies they are less financially endowed and not earning commiserate to their farm operation. This could be attributed to the predominately poor farm technology employed by these farmers occasioned by poor financially capacity to adopt improved innovations.

Table 1: Distribution of Respondents Based on Socio-economic Characteristics (n=120)

Variables	Frequency	Percentage	Mean
Sex			
Male	87	72.50	
Female	33	27.50	
Age (Years)			
19-27	19	15.83	
28-36	27	22.50	43.86
37-45	19	15.83	
>45	55	45.83	
Maritalstatus			
Single	26	21.67	
Married	94	78.33	
Educational level			
Formal	70	58.33	
Non formal	50	41.67	
Farm experience (years)			
<5	18	15	
6-16	52	43.33	
17-27	26	21.67	16.6
28-38	19	15.83	
39-49	4	3.33	
>50	1	0.83	
Farm size (hectares)			
1-6	91	75.83	
7-12	25	20.83	5.10
13-18	4	3.33	
Household size number			
1-6	74	61.67	
7-12	33	27.50	6.9
13-18	7	5.83	
>18	6	5.0	
Annual income (Naira)			
? 0-50000	13	10.83	
? 50001-150000	61	50.83	
? 150001-250000	21	17.50	214650
? 250001-350000	12	10.00	
? 350001-450000	3	2.50	
? 450001-550000	3	2.50	
>? 550000	7	5.83	

Source: Field Survey, 2019.

Sources of information used

Result in table 2 shows channels of agricultural information mostly used by the farmers with friends/relatives ranking 1st followed by radio (2nd), mobile phone(3rd), television (4th), yam farmers association (5th), Extension agent (6th), internet (7th), magazine (8th) with newspaper and circulars being least (9th) used. The top ranking of friends/relatives (opinion leaders) before the radio (mass media) for agricultural information by yam farmers is consistent with the two step flow theoryof mass media explained by Anonguku, Naswem and Obinne (2013) where information is gotten directly by a few opinion leaders from mass media sources and passed down to the larger followers who are greatly influenced by the opinion leader source. Also, the ranking of mobile phones among the top three sources shows the penetration of telecommunication in the rural areas for utilization by the farmers. This conforms to findings of Odefedeha *et. al.* (2019) thereby presenting an opportunity for the extension agencies to easily keep in touch with the farmers. Print media sources such as magazine, newspaper and circular which are least used by the farmers implies that agricultural information put forward through listening channels are more likely to be received by the rural folks than those put through the reading channels conforming with findings of Adeniran *et. al.* (2019).

Table 2: Distribution of Respondents Based onSources of Information used (n=120)

Variables	Frequency*	Percentage	Rank
Friends/Relatives	120	100	1
Radio	107	89.17	2
Mobile Phones	85	70.83	3
Television	76	63.33	4
Yam Farmer's Association	56	46.67	5
Extension Agent	43	35.83	6
Internet	29	24.17	7
Magazine	28	23.33	8
Newspapers	27	22.50	9
Circulars	27	22.50	9

Source: Field Survey, 2019.

*Multiple responses recorded

Adoption of improved yam production technologies

Table 3 shows the adoption of improved yam production technologies used by the farmers in the study area, having use of herbicide for weeding ranking top (1st) followed by mixed cropping (2nd), yam minisetts (3rd), seed dressing (4th), micro sett & tubers (5th) and yam minitube seed (6th), yam tissue and organ culture(7th). The top ranking of herbicides and yam minisetts shows their importance in yam production which conforms with findings of Alabi *et. al.* (2018) who noted the two as major inputs in yam production. Yam minitube, tissue culture and temporary immersion being least adopted technologies implies the farmers have poor awareness about the technologies.

Table 3: Distribution of Respondents Based on Adoption of Improved Yam Production Technologies (n=120)

Technologies	ADOPTION RATING		
	*Frequency	Percentage	Rank
Weeding using herbicides	120	100	1
Crop mixture in yam	112	93.33	2
Yam minisetts	96	80	3
Seed dressing	81	67.5	4
Production using micro sett andmicro tubers	69	57.50	5
Yam minitube seed	19	15.83	6
Tissue and organ culture	3	2.50	7
Temporary immersion bioreactor and aeroponics	0	0	-

Source: Field Survey, 2019.
* Multiple responses recorded

Determinants of improved yam technologies adoption among farmers

Result of table 4 shows the logit regression estimates of determinants of improved yam production technologies adoption among the farmer which identified age (0.045), farm size (0.004) and household size (0.026) as significant determinants ($P \geq 0.05$) among other tested factors. This implies that as the age and farm size of the farmer increase they are more likely to adopt improved yam production technologies which is in conformity with reports of Agwu *et. al.* (2008) and Ironkwe *et. al.* (2017) on factors affecting adoption. Also, household size is a significant factor because it is directly linked to availability of

family labour for farm activities which conform to other findings on adoption (Olugbire *et. al.* 2018; Turaki *et. al.* 2018).

Table 4: Logit Regression Analysis of Determinants ofImproved Yam Technologies Adoption among Farmers

Variables	Coefficient	Standard error	P>/Z/
Age	0.033559[xx]	0.265787	0.045[xx]
Farm size	0.8008557	0.2756817	0.004[x]
Household size	-0.24857	0.10835	0.026[xx]
Income	-4.58	2.90	0.874
Farming Experience	-0.0436593	0.0392527	0.266
Source of Information	0.0631283	0.752706	0.933
Extension Contact	0.1608519	0.813531	0.843
Cost of Innovation	0.0906117	0.6471742	0.889
Complexity of Innovation	-0.2786346	0.5622505	0.620
Compatibility	0.6062909	1.340203	0.651
Climatic Factors	-0.7260821	1.426065	0.611
Observation = 120			
Log likelihood = -46.0057			
Chi-square = 28.09			
Prob>Chi^2 = 0.0031			
Pseudo R^2 = 0.2339			

Source: Field Survey, 2019   [***]Significant at 1%, and 5% level

Conclusion and Recommendations

This study indicated that male gender still dominant farm decision making in the country even with the active participation of younger and educated farmers. Also, that opinion leadership plays a more important role in dissemination of agricultural information while mobile phone has penetrated the rural area becoming an important source of agricultural information channel. It is equally worthy of note that herbicide innovation is the top sorted after improved farm technology by rural farmers in the sub region. Lastly, adoption of improved yam production technologies in Nigeria is influenced by the age, farm size and household size of the famers.

Based on the above findings on farmers access to telecommunication services is it recommended that extension agencies partner with local and international agricultural

agencies to provide toll free agricultural extension call centres for all farmers so they can have direct links to extension agents to provide them useful farm information.

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