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Income Effect and Correlating Factors of Yam Minisett Technology among Extension Contact Farmers in Delta State, Nigeria

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Abstract

This study investigates the income effect and correlating factorsof yam minisett technology among contact farmers in Delta State, Nigeria. A well structured questionnaire and interview schedule were used to collect primary data from randomly selected 81 yam farmers in the study area. Descriptive statistics and Pearson correlation analysis were used to analyze data. It was found that yam minisett production contributed significantly to the income of yam farmers. The results showed that farm size, educational status and age of respondents had significant and positive relationship with income effect (economic benefits). The frequency of extension contact created significant effect ($P<0.05$) on farmers' adoption rate of yam minisett technologies in the study area. About 80.25% of yam minisett farmers adopted supplementary technologies such as fertilizers and planting distance technologies (95.06%). It was recommended that yam minisett technology should be integrated into yam farming system due to its economic benefits to the farmers.

Keywords: Yam, minisett, Technology, contact, Farmers, Extension, income, effect

1. Introduction

There is a widening gap between food production and the rate of growth in population of Nigeria. Food production needs to be stepped up in order to bridge the food security gap. The ultimate goal is to reduce hunger and poverty among the people (Denton, 1999). Notable among crops that need development of their planting materials is yam (*Discorea* species). Yams are more nutritious than cassava or sweet potato because they have greater level of proteins and vitamins (Denton et al., 2002). It contributes more than 200 dietary calories per capital per day for more than 150 million people in West Africa.

Seed yams are the products of yam minisett technology, They are the planting materials used in the field production of were or table yam consumed as food (Oguntade *et al*, 2010). The cost of obtaining seed yam as planting material constitutes about 50% of the total cost of production. The high cost and unavailability of seed yams as planting materials is often a constraint faced by yam producers. According to Okoli, *et al* (1982), up to 33% of table yams are reserved for planting. Minisett technology was consequently developed for the production of seed tubers separated from the production of table yam. The technique utilizes a small (20-50g) part of a whole yam tuber. The Minisett is sown and the resulting tuber is large enough to serve as a seed tuber that is suitable for the production of table tuber.

Agricultural extension services delivery is a veritable instrument for transforming yam production capacity. Agricultural extension is a conduit through which proven technologies are disseminated to farmers (Yazidu, 1978). These improved techniques are recommended for adoption by first contact farmers. First farmers are registered farmers that receive first round extention information on improved practices before it flow to other farmers. Agricultural technologies must be financially feasible and lead to increased output and income. Before now, the income effect of yam minisett technology has not been investigated in Delta State. This study was conducted to quantify the proportion of net farm income generated by yam minisette technology adoption.

Objectives of the Agricultural Extension Services Include:

- To ensure an accelerated agricultural production of agricultural produce through increasing the productivity of the rural small scale farmers.
- To disseminate proven and low cost technology to farmers for mass adoption and to improve their economic wellbeing.(Ofuoku *et al*, 2007)

The effectiveness of agricultural extension services delivery demand empirical investigation in order to obtain baseline data for effective planning of research, extension and training activities in Delta State. The introduction of the United Agricultural Extension System (UAES) brought into focus the dissemination of yam minisett technology. There is the need therefore to obtain empirical data on the income effect of yam minisett technology adoption in Delta State. It has been reviewed that yam yield depends on the planting material used. That is, better yam setts result in better output if other conditions are favourable. The income effect of yam minisett technology adoption is an interesting research puzzle that warrants critical study. Adoption of technology is the best course of action available (Rogers, 1995). According to Van den Ban and Hawkins (1996) technology is an idea, object or method which is regarded as new by an individual, but which may be the result of research. (Adekoya and Tologbonse, 2005). The study is of economic (income) benefits to yam farmers and extension agents especially in Delta State. It would therefore enable them to evaluate their service and improve on their inadequacy. To the yam farmers, the finding of the study is intended to boost their income and improve their welfare, because the study emphasized yam minisett technology transfer and adoption through the activities of agricultural extension personnel. The overall aim is to improve the output, income and welfare of yam farmers in the study area. This study has implication for commercial production of seed yams in Delta State, Nigeria

1.1 Objective of the Study

The broad objective of the study is to determine the income effect correlating factors of yam minisett technology on farmers' income in Delta State Nigeria. The Specific Objectives were to:

i. assess the adoption rate of yam minisett technology among farmers
ii. determine the proportion of farmers income generated from revenue from yam minisett production

1.2 Statistical Hypothesis

The following hypotheses were formulated and tested to provide direction for the study:

Ho_1: the frequency of extension contact does not have a significant effect on adoption rate of yam minisett technology.

Ho_2: there is no significant relationship between farmers' income and rate of adoption of yam minisett technology.

2. Literature Review

The transfer of material technology to farmers for adoption has been described as simple and straight forward. Unlike the transfer of knowledge based technology (Swanson, 1996). Yam minisett technology is one of such material technologies.

In the work done by Ofuoku, *et al*, (2007) it was reported that technology adoption depends on expected increased farm income of the farmer. This indicates that small holders yam farmers indeed display rational economic behaviour when deciding to adopt yam munisette technology. Such decisions are based on the premise of potential economic returns (i.e income effect). Income effect is the direct monetary effect of technology adoption. It is the increase in income of the adopter as a result of technology adoption.

In minisett technique, seed yams are cut into 20-40 small pieces called minisett. With careful treatment, sprouting and planting out in the field; each minisett grows into a seed yam in a few months. As a result, yam minisett technology adoption can translate to poverty reduction and food security. KAU (2002) noted that it takes the minisett 2-3 weeks for sprouting in the nursery seed bed. At this stage, they are transplanted to the field at a spacing of 50cm on ridges taken one meter apart. According to Babaleye (2003), yam minisett production technology is a pragmatic approach to solving the problem of scarcity of planting material militating against yam production. The minisett technique produces healthy good quality mother seed yams. The method is not costly. It rapidly increases the amount of production. It also provides higher economic returns than traditional methods.

The minisett technique is one of the on-farm reliable practicable alternatives to the use of ware or table yams as seed yams. Yam farmers in Nigeria often derive their planting materials from the previous years' harvest. Asumugha, *et al.* (2009) observe that there were no commercial structure for the supply of seed yams. The significant determinants of seed yam supply include the farmers need for disposable income (Oguntade, *et al* 2010).

The level of awareness and adoption as a commercial production practise for seed yam is still low. Okoro (2008) observe that 46.6% of respondents were aware of the technology while 22.4% of the respondents used the technique, 24.2% did not adopt it.

Ezeh,(1994) concluded in his study that yam minisett technology is not profitable. He reported a gross margin of ₦9,472.16/ha. Economic returns of yam minisett increased with increasing minisett size (Emokaro and Law-Ogbomo, 2008).

3. Methodology

3.1 The Study Area

This study was undertaken in Delta State. Majority of them are yam farmers. The service communities in the area include Akwu uku-Igbo, Ebu, Illah, Ugbolu, Okpanam, Ibusa, Atuma, Ukula-Okwule and Ukala-Okpunor. Crops grown include yam, cassava, melon and perennial crops such as oil palm and rubbers. The study area falls within the forest belt and its climate is demarcated by two distinct seasons, the wet and dry seasons. The annual rainfall ranges between 1500mm-2000mm with a mean daily temperature of 29°C.

3.2 Sampling Technique/Sample Size

To avoid selectivity bias, simple random sampling procedure was used for this study. The total number of communities in the study area was nine (9). Six (6) communities were randomly selected. The sample frame consists of 296 registered contact yam farmers (ADP, 2006) and 27 %

of the respondents were randomly selected from the six (6) selected communities. This gave a total of 81 contact yam farmers for the study.

3.3 Methods of Data Collection

Primary data used for this study were collected by the use of structured questionnaire interview schedule personally conducted by the researcher.

3.4 Methods of Data Analysis

Descriptive statistics and correlation analysis were used to analyse collected data. Farm enterprise budget approach was used to analyse farm income derivable from yam minisett technology adoption. Specifically net farm income was obtained using profit function.

Net income (π) = Total Revenue – Total Cost.

The income effect of the technology was captured with the aid of the correlation coefficient of the extra income obtained by the farmer from yam minisett technology adoption.

4. Results and Discussion

4.1 Socio-Economic Characteristics of Respondents

These results showed that all the respondents were within the age bracket defined as economically productive in the population (31-40 years) (table 1). The results revealed that 22-.22% of the respondents were within the age group 21-30, 41-50 and 51-60 years. The respondents above 60 years constitute only (7.41%). Educational qualification of respondents showed that (39.5%) of the respondents attended OND, NCE level, 25 (30.86%) attended primary education level while 15 (18.82%) attended higher institution. Marital status of the respondent were showed in the table below that 45(55.56%) of the respondents were married, 14(17.28%) were single, 9(11.11%) for separated and widow. With this, farmers would not encounter serious problem in making of use of this family labour. Farming experience of respondents in the table below showed that 32 (39.51%) of the respondents had experience less than 5 years, 38(47%) of the respondents had experience between 6-10 years have the highest percentage and the least of the respondents falls within the range of 16-20 years which have a percentage of 4.94%. The result indicates that 34(41.78%) and 30(37.04%) of the respondents had farm sizes that falls within the range of 1.1-1.5 and 1.6-2.0 respectively and the least is 7(8.64%) falls within 2.1-3.0(ha). The result also indicates that 61(75.31%) of the respondents have 1-10 members in their house while 20(24.69%) of the respondents have 11-20 members. Income level distribution of respondent indicates that 30(37.04%) of the respondents falls within the range of ₦1,000-₦2,000, have the highest percentage and the least percentage falls within the range of 4,000 – 5,000 (8.64%).

4.2 Adoption of Yam Minisett Technology

The level of adoption of yam minisett farmers as presented in table 2 and 3 showed that 37(45.67%) of the respondents interviewed adopted the use of equipment hiring, but 44(54.33%) of the respondents did not adopt the technology. In planting distance/time, out of the total number of the respondent, 77(95.06) adopted the technology while (4.94%) were yet to adopt the Pesticide technology. About 39(48.15%) of the respondents adopted the technology while 42 (51.85%) of the respondents rejected the use of the technology. In the use of fertilizer, 65(80.25%) of the respondents accepted the technology while 16(19.75%) did not. Table 4 showed the level of awareness of yam minisett indicated that 38(46.91%), 30(37.04%) of the respondents falls within the range of 5-7 years and above 7 years respectively, while 13(16.06%) of the respondents have 2-4years of awareness. Furthermore 79(23.80%) of the respondents got information through an extension agent. From the 79 respondents, 44 were males while 35 were females. The least number

of respondents in respect to source of information was observed in newspaper source were a total number of 42 (12.65%) was recorded. Also 31(38.27%) of the respondents were visited by the extension agent twice, 17(20.99%) of the respondents were visited thrice and only 15(18.52%) of the respondents were visited by the extension agent more than thrice. This indicates that the frequency of the extension agent is not encouraging. Table 4 shows that 18 (22.22%) of the respondents agreed that the extension service delivery is very effective, 22 (27.16%) said effective while 41(50.62%) of the respondents said not effective. The implication of these findings showed that with the present level of extension service delivery in the study area, the farmers will not have good knowledge of yam minisett technology so as to take advantage of it.

Table 1 Socio-Economic Characteristics of Responds

Variable	% of Respondents	Frequency of Respondents	Mode
Age (Years)			
20 – 30	22.22	18	
31 – 40	25.93	21	
41 – 50	22.22	18	31-.40
51 – 60	22.22	18	
Above 60	7.4	6	
Total	100	81	
Educational qualification			
No formal education	8.64	7	
Below primary education	2.47	2	OND/NCE
PSLC	30.86	25	
OND/NCE	39.51	32	
HND/B.Sc	18.52	15	
Total	100.00	81	
Farming Experience			
Less than 5 years	39.51	32	
6 – 10 years	46.91	38	6-10years
11 – 15 years	8.64	7	
16 – 20 years	4.94	4	
Total	100.00	81	
Farm Size			
Less than 0.5	-	-	
0.6 – 1.0	12.35	10	
1.1 – 1.5	41.98	34	
1.6 – 2.0	37.04	30	1.1-1.5
2.1 – 3.0	8.64	7	
Total	100.00	81	
Household size			
1 – 10	75.31	61	
11 – 20	24.69	20	1-10 persons
Total	100	81	
Level of Income ₦			
500 – 1000	18.52	15	
1000 – 2000	37.04	30	
2000 – 3000	30.86	25	
3000 – 4000	17.28	14	
Above 4000	8.64	7	
Total	100	81	

Source: Field Survey Data, 2008

Table 2 Level of Adoption of Yam Minisett Technology

Technologies	Frequency Adopted	%	Not Adopted	%
Equipment/Tractor hiring	37	45.67	44	54.33
Improved planting material	80	98.77	1	1.23
Planting distance/Time	77	95.06	4	4.94
Use of insecticides	39	48.15	42	51.85
Used of fertilizer	65	80.25	16	19.95

Source: Field Survey Data, 2008

Table 3 Level of Awareness of Respondents

Years Awareness	Frequency	Percentage (%)
Less than 2 years		
2 – 4 years	13	16.05
5 – 7 years	38	46.91
Above 7 years	30	37.04

Source: Field Survey Data, 2008

Table 4 Effectiveness of Extension Service Delivery

Years Awareness	Frequency	Percentage (%)
Level of effectiveness		
Very effective	18	22.22
Effective	22	27.16
Not effective	41	50.62

Source: Field Survey Data, 2008

4.3 Income Effect of Yam Minisett Technology

The income effect of adopting yam minisett technology is presented in Table 5, Table 6 and Table 7. An average of ₦47, 840.00 was generated from yam seed production as presented in summary statistics. Percentage of farm income generated by yam minisett production is 29%, large tuber production contributed 39% to total farm income, while other farm enterprises such as maize, cassava and vegetable production contributed about 32% to total farm income. This result is at variance with the earlier report of (Ezeh, 1994). Commercial production of seed yams through the use of minisett technique must be profitable for it to be widely adopted since it will compete with other farm enterprises in the use of resources. The correlation coefficient of 0.62 indicates that there is significant and positive relationship between incomes earned from yam minisett production and total farm income of the farmer. This shows that yam minisett technology has significant positive effect ($P<0.05$) on producers farm income. With this result, the null hypothesis (Ho_2) was rejected and alternative which states that there is significant relationship between farmers' income and yam minisett technology adoption was upheld. Contact yam farmers who adopted yam minisett technology earned more money than their counter parts who did not. The economic benefits of yam minisett technology are not yet widespread among yam producers in the study area. Extension agents should step up their technology transfer drive especially, with respect to yam minisett production.

Table 5 Correlation Matrix

	No of time extension agent provided	**No of time had contact with other farmers**	**No of time attended meetings**	**Adoption of equipment/tractor hiring**	**Adoption of planting distance/time**	**Adoption of use of pesticide**	**Income generated**	**Adoption of yam minisette**
No of time extension agent provided information	1.00							
No of time had contact with other farmers	.212	1.00						
No of time attended meetings	-0.60	.008	1.000					
Adoption of equipment /tractor hiring	-381**	-.373**	.002	1.000				
Adoption of planting distance/time	.061	-.251*	-.015	.209	1.000			
Adoption of use of pesticide	-.155	-.166	-005	-158	-.008	1.000		
Adoption of farm minisett	-.155	-.166	-005	-158	-.008	1.000	0.62	1.00

Source: Field Survey Data, 2008

Table 6 Average Farm Income from Yam Minisett Production

S/No	Activities	Mean Amount (₦)	Percentage of total Income (%)
1	Large Tuber production	60,550.00	39.00
2	Yam Minisette Production	47,840.00	29.00
3	Other farm activities	52,250.00	32.00
	Total	160,640.00	100

Table 7 Summary Statistics of Income from Yam Minisett Technology

Summary Statistics	Amount (₦)
Minimum	19,320
Maximum	76,360
Mean	47, 840

5. Conclusion and Recommendations

The income effect and correlating factors of yam minisett technology among smallholder farmers were investigated in this study. The study established relationship between yam minisett technology adoption and some factors such as expected income, frequency of extension contact and contact through networking with other farmers who have enjoyed the economic benefits of yam minisett technology adoption in the study area. The result of the study revealed that 48.15 of the respondents adopted yam minisett technology in the study area. The result of the study also shows that yam minisett technology has positive correlation with net farm income. It has the capacity to contribute 29% of net farm income of smallholder farmers. Within the context of this study, it was evident that the frequency of extension contact did not play significant role in the adoption of the yam minisett technology. This finding falls short of expectation concerning agricultural service delivery in the study area. The study provide insight to extension service with respect to yam minisett technology dissemination It was therefore recommended that

(1) The activities of the extension officers should be intensified in the area of study to increase yam minisett production. This will enable more farm household to benefit from the income effect of the technology in the study area.

(2) The extent of availability of technical guidance to effect extension service delivery significantly affect adoption. The present number of extension workers is inadequate for needed contact with the yam minisett farmers. Therefore, there is need to increase the number of the extension workers in Delta State, Nigeria.

(3) Some of the technologies that were not adopted by the farmers are of more value than those which were adopted by the farmers. In the light of this, the extension service should geared their extension toward these innovations since it made a positive significant adoption.

(4) However, adoption is not always permanent, there is need to re-enforce the acceptance influence for continuous yam minisett adoption.

References

[1] Adekoya, A. E., & Tologbonse, E. B. (2005). Adoption and Diffusion of Innovations. In Agricultural Extension in Nigeria edited by S. F. Adedoyin. *Agricultural Extension Society of Nigeria*, 9, 28-37.

[2] Asumugha, G. N., Njoku, M. E., Okoye, B. C., Aruedu, O. C., Ogbonna, M .C., Anyaegbunam, H. N., Akinpelu, O. A., Ibeagi, O., & Amaefula, A. (2009). An Analysis of the Supply for Seed Yam in Nigeria. *African Journal of Business Management*, 3(1), 028-031.

[3] Babaleye, T. (2003). West Africa: Improving Yam Production Technology. ABN-BIA *Supplement Issues/Edition*, Nr463, 56-59.

[4] Denton, L. (1999). Genetics and breeding of leafy vegetables: Consideration for the new Millennium. *Genetics Society of Nigeria*, 21, 91-98.

[5] Denton, L., Morse, S., & Asiabaka, L. C. (2002). *Accessing the Research and Development Needs for Yam in Nigeria and Ghana*. BSPP presidential meeting, 2002.

[6] Emokaro, C. O., & Law-Ogbomo, K. E. (2008). The Influence of Minisette Size on the Profitability of Yam Production in Edo State, Nigeria. *Research Journal of Agriculture and Biological Science*, 4(6), 672-675.

[7] Eze, N. D. A. (1994). Economics of Seed Yam Production from Minisette in Umudike in Southeastern Nigeria: Implications for Commercial Growers. *Acta Hort.* (ISHS), 380, 378-381. http://www.actahort.org/books/380/380_59.htm.

[8] Kerala Agricultural University (KAU) (2002). Package of Practices Recommendations: Crops. *Trichurm*, 12, 278.

[9] National Population Census (NPC) (2006). *National Population Census*. Abuja, Federal Government of Nigeria.

[10] Ofuoku, A. U., Achoja, F. O., & Iwhiwhu, G. A. (2007). Economic Analysis of small scale farmers Decision to Adopt Farm Yard Manure Technology in Deltas State, Nigeria. In S. O. Adepoju, & P. B. Okunaye (Eds.), *proceeding of Farm Management Association of Nigeria* (pp.250-256), 20th Annual conference at Forestry Research Institute of Nigeria, Federal College of Forestry, Plateau State.

[11] Oguntade, A. E., Thompson, O. A., & Ige, T. (2010). Economics of Seed Yam Production Using Minisettes Technology in Oyo State, Nigeria. *Field Actions Science Reports*, (4), 39-62.

[12] Okoli, O. O., Igbokwe, M. C., Ene, L. S. O., & Nwokoye, J. U. (1982). Rapid Multiplication of Yam by Minisette Technique. National Root Crops Research Institute, Umudike, Nigeria. *Research Bulletin*, 2, 1-12.

[13] Okoro, J. K. (2008). Awareness and Use of the Rapid Seed Yam Multiplication Technology by Farmers in Nigeria's Yam Belt. *Production Agriculture and* Technology, 5(1), 22-29.

[14] Rogers, E. M. (1995). *Diffusion of Innovation* (4th ed.). New York: Free Press.

[15] Swanson, B. E. (1996). Strengthening Research-extension-Farmer Linkages. In B. E. Swanson, R. P. Bent, & A. J. Sofranko (Eds.). *Improving Agricultural extension: A Reference Manual Rome* (pp. 165-172). F. A. O.

[16] Van den Ban, A. W., & Hawkins, H. S. (1996). *Agricultural extension* (2nd ed., pp. 96-119). London: Blackwell Science Ltd.

[17] Yazidu, I. (1978). *Role of Extension Service in Nigeria*. Paper Presented at the Annual Livestock and Veteran Conference, Zaria, Ahmadu Bello University.