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Socio-economic factors influencing adoption of improved Yam production technologies in Abia state, Nigeria

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ABSTRACT

Improved yam production technologies developed by National Root Crops Research Institute, Umudike have been disseminated to farmers in the south eastern agro-ecological zone of Nigeria. This study was designed to investigate the adoption of the improved yam production technologies by farmers in Abia State during the 2012/2013 cropping season. Mean age of yam farmers' was 48.5years,mean farm size was 1.9hectares, mean years of experience in yam farming was 22.4years, mean number of household available for yam production was 5.1, while the mean annual income of yam farmers' in the study area was N75,800.00. Adoption rate of the improved yam production technologies in Abia State was 37.1%. Multiple regression analysis showed farm size, family labour available and frequency of attendance to farmers meeting to be positively and significantly associated with adoption. In contrast, no clear cut relationship was found to exist between adoption and such factors as age, education, gender, farming experience, income and frequency of extension visits/contacts. The coefficient of determination was 0.786 indicating that the independent variables could explain 78.6% of the variability in adoption of improved yam production technologies. The F-ratio was 17.971 and significant at 1% which indicates goodness of fit of the regression line.

Keywords: Adoption rate, multiple regression, production technologies, multi-stage, extension visits.

INTRODUCTION

Yam (Dioscorea spp) is among the oldest food crops and an indigenous tropical African crop [2]. Yam is a major food crop widely grown and massively consumed in Nigeria [1].

Nigeria is the largest world producer of yam with annual production of about 36.72 million metric tonnes. Nigeria contributes two-thirds of global yam production each year [8]. Yam tubers can be eaten boiled, roasted, fried or pounded and could be chipped, dried and processed into yam flour for the preparation of "Amala".

Yam represents about 20 percent of daily calorie intake of Nigerians living in the forest and savannah regions. Traditionally, yam is a prestigious crop that is viewed and received with high respect, especially during new yam festivals in rural communities of eastern, central and some parts of southwest of Nigeria [7]. [5], posit that yam production in Nigeria has witnessed increased output yet has not been able to meet the demand of the people.

This insufficiency is as a result of an increase in the Nigeria population. The growth rate of the Nigerian population is 3.3 percent as against the agricultural growth rate of 2.3 percent. So the gap between domestic supply and demand is still wide in favour of demand.

Also, [8] stated that yam as a food crop in Nigeria is however, becoming expensive in urban areas as production has not kept pace with the population growth leading to demand exceeding supply. There is equally need to step up the production of yam not only to satisfy domestic need but also export demand to increase foreign exchange earning. However, the general decline in yam production over the years is linked to laborious cultivation methods, the need for staking and the high cost of seed yams, which are also consumed.

The production of yam is constrained majorly by high cost of seed yams [4], high cost of labour and staking materials, inadequate and high cost of agrochemicals [3]. This makes yam more expensive and relatively unaffordable, as production cannot keep pace with population growth. [6], highlighted the following constraints to yam production: high cost of labour, high cost of pesticides, unavailability and high cost of fertilizer, poor access to extension services.

The improved yam production technologies include:
- Yam minisett technique
- Improved yam staking methods
- High yield
- Pest and diseases resistance
- Fertilizer application.

The objective of this paper is to investigate the adoption of improved yam production technologies in Abia State of Nigeria. However, the specific objectives were:
- To determine the socio-economic characteristics of yam farmers in the study area.
- To determine the rate of adoption of improved yam production technologies in the study area.
- To determine factors that influence farmers' adoption of improved yam production technologies in the study area.

- To make recommendation towards stimulating the adoption of improved yam production technologies, and so boosting yam production in Abia State.

MATERIALS AND METHODS

(a) The Data

The data used in this study were primary data collected by means of structured questionnaire from a sample of sixty yam farmers in Abia State during the 2012/2013 cropping season.

Multi-stage random sampling technique was used in selecting a block, a circle, a sub-circle and subsequently a village from each of the three sub-zones in Abia State.

In Umuahia sub-zone, Ikwuano block, Ndoro circle, Ndoro I sub-circle and Ndoro village were randomly selected. 20 yam farmers were randomly selected from the list of farmers.

In Aba sub-zone, Okpu-Umuobo block, Amavo-Ukwu circle, Umuagboghi sub-circle and Umuagboghi-Ukwu village were randomly selected from where 20 yam farmers were randomly selected.

In Ohafia sub-zone, Ohafia-West block, Amaekpu circle, Amaekpu sub-circle and Amaekpu village were randomly selected from where 20 yam farmers were randomly selected. A total of 60 yam farmers were interviewed in this study.

(b) Method of Analysis

The data collected were analyzed with the use of descriptive statistics tool as well as the least square linear multiple regression technique.

The regression function is implicitly specified as follows:
$Y = F (X_1, X_2, X_3 X_4, X_5, X_6, X_7, X_8, X_9)$ ….. (1)

Where
$Y =$ Farm size of improved yam production technology (Hectare)
$X_1 =$ Age (years)
$X_2 =$ Gender (Male =1, Female = 0)
$X_3 =$ Educational level (years)
$X_4 =$ Farm size (Hectare)
$X_5 =$ Farming Experience (years)
$X_6 =$ Family Labour (Number)
$X_7 =$ Frequency of meeting (Number)
$X_8 =$ Income (₦)
$X_9 =$ Frequency of Extension Visits (Number)

The model specified was subjected to four functional forms and the lead equation was selected based on the economic, econometric and statistical criteria. The four functional forms fitted were linear, semi-log, Cobb-Douglas and exponential.

Explicitly, the four functional forms are shown below:

$Y_i = b_0+b_1X_1+b_2X_2$ +- - - - $+b_9X_9+ei$ Linear

$Y_i = logb_0+b_1logX_1+b_2logX_2$ +- - -+ b_9logX_9+ei Semi-log

$logY_i = logb_0+b_1logX_1+b_2logX_2$ +- - -+ b_9logX_9+ei Cobb-Douglas

$logY_i = b_0+b_1X_1+b_2X_2$+ - - - - + b_9X_9+ei Exponential

RESULTS AND DISCUSSION

1. **Socio-Economic Features of the Sampled Yam Farmers**

(a) **Age of Farmers:** The mean age of the sampled 60 yam farmers in the state was 48.5 years. 48% of the farmers were of the 37 – 48 years age bracket, 32% were between 49 and 60 years old, 8% were of the 25 – 36 years age bracket, 7% were between 61 and 72 years old while 5% were of the 73-75 years age bracket.

(b) **Farmers' Level of Education:** Out of the 60 sampled farmers, 13% had no formal education, 55% had attended primary school, 20% had secondary education while only 12% had tertiary education.

(c) **Farm Size:** The mean farm size of the sampled yam farmers was 1.9 hectares. 68% had farms ranging between 1 and 1.9 hectares. 10% had farms less than 1 hectare. 8% had farm size of between 4 hectares and 4.9 hectares. 7% had sizes of between 3 hectares and 3.9 hectares. 5% had farm lands ranging between 2 hectares and 2.9 hectares, while 2% had farm sizes of between 6 hectares and 6.9 hectares.

(d) **Farmers' Farming Experience:** 33% of the farmers had 6-15 years farming experience,30% had between 16 years and 25 years farming experience, 23% had 26 – 35 years' experience, 10% had 36 – 45 years' experience, while 4% had 46 – 50 years farming experience. Their mean years of experience in farming was 22.4 years.

(e) **Family Labour Available:** 52% of the yam farmers sampled had 1-4 members of their family available for yam production, 32% had 5-8 members available, while 16% had 9-12 members available for yam production in the study area. They had a mean of 5.1 members available for yam production.

(f) **Frequency of Attendance to Meetings:** 88% of the yam farmers attended meetings regularly while 12% didn't attend meetings regularly.

(g) **Annual Income of Yam Farmers:** 50% of the yam farmers sampled earned between ₦30,000 and ₦70,000 per annum from the yam business, 45% earned between ₦71,000 and ₦111,000 while 5% earned between ₦194,000 and ₦200,000. Their mean income per annum was ₦75,800.00

(h) **Frequency of Extension Visits :** 85% of the sampled yam farmers received 3 visits per annum from Extension Agents, 10% received 2 visits, while 5% received 4 visits from the Extension Agents in their area.

(i) **Farm Size Devoted to Improved Yam Production Technologies:** 78% of the yam farmers sampled devoted less than one hectare of their land to yam production using improved technologies, 20% devoted 1 hectare to 1.9 hectares, while 2% devoted 2-2.9 hectares to improved yam production.

2. Farmers' Adoption of the Improved Yam Production Technologies.

All the sampled yam farmers adopted the improved yam production technologies.

The adoption index is measured by the intensity of adoption where intensity of adoption is defined as the proportion of a farmer's farm land devoted to the improved yam production technologies.

The total farm size of the sample of 60 yam farmers studied was 118.34 hectares, while the total farm size devoted to the improved yam production technologies was 43.9 hectares.

The intensity of adoption was

$$= \frac{43.9\text{ha}}{118.34\text{ha}} \times \frac{100}{1} = 37.1\%$$

The rate of adoption of improved yam production technologies in Abia State was 37.1%.

3. Regression Results of Factors that Influence Farmers' Adoption of Improved Yam Production Technologies

The result of the linear multiple regression analysis on factors that influence farmer's adoption of improved yam production technologies in Abia State is presented in Table 1.

The coefficient of farm size (X_4) is positive and significant at 1 percent. This is in consonance with our a priori expectation that an increase in farm size will lead to an increase in the intensity of adoption of improved yam production technologies.

The coefficient of the frequency of attendance at farmers meetings (X_7) is positive and significant at 5 percent indicating direct relationship with the adoption of improved yam production technologies. Farmers' meetings are avenues through which information on new farm practices are passed on to farmers. Those farmers that are more regular at these meetings tend to gather more information and are more predisposed to adopt than their less regular counterparts.

The coefficient of family labour availability (X_6) is positive and significant at 10 percent showing a direct relationship with adoption.

This is in consonance with our a priori expectation, that the number of adult agricultural workers in a farmer's household is expected to ease labour constraints, thereby enhancing the adoption process.

Table 1: Regression Results of Factors that Influence Farmers Adoption of Improved Yam Production Technologies in Abia State

S/No	Explanatory Variable	Regression Coefficient	T-Ratio
1	Farmers Age (X_1) Years	0.046	0.423
2	Gender (X_2) Male 1, Female 0	-0.018	-0.181
3	Education (X_3) Years	-0.014	-0.181
4	Farm Size (X_4) Hectare	0.772	0.712***
5	Farming Experience (X_5) Years	0.007	0.066
6	Family labour (X_6) No	0.125	1.835*
7	Frequency of Meetings (X_7) No	0.163	2.246**
8	Income (X_8) N	0.064	0.571
9	Frequency of Extn Visit (X_9) No	0.045	-0.641
	Intercept	0.495	
	R2	0.786	
	F	17.971***	
	Number of observation (n)	60	

Significant at 10%, ** Significant at 5% * Significant at 1%*

In contrast, no significant relationship seemed to exist between the intensity of adoption of improved yam production technologies and such factors as farmers age, level of education, gender, farming experience, income and frequency of extension contacts. The R^2 values of 0.789 indicate that 78.6% variability in intensity of adoption of improved yam production technologies is explained by the independent variables. The F- value of 17.971 was significant at 1% level indicating goodness of fit of the regression line.

CONCLUSION

The main aim of this study was to investigate the adoption of improved yam production technologies by farmers in Abia State during the 2012/2013 cropping season. The results of the study showed that the adoption rate was 37.1%.Mean age of yam farmers' was 48.5years, mean farm size was 1.9 hectares, mean years of experience in yam production was 22.4 years, mean number of household available for yam production was 5.1, while mean annual income of yam farmers' in the study area was N75,800.00.

The results of the multiple regression technique on the determinants of adoption of improved yam production technologies in the state showed farm size, frequency of attendance to farmers meetings and family labour available for yam production to be positively and significantly associated with the adoption of improved yam production technologies. However, no clear cut relationships were found to exist between intensity of adoption and such variables as farmers' age, gender, educational level, farming experience, income and frequency of extension visits/contacts. The coefficient of determination (R^2) was 0.786, while the F-ratio was 17.971 and significant at 1 % indicating goodness of fit of the regression line.

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