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Research Article

Adoption of Oil Palm Production Technologies in Aguata Local Government Area of Anambra State, Nigeria

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Abstract: This study specifically examined level of adoption, determinants and constraints to the adoption of oil palm production technologies by oil palm farmers in Aguata Local Government Area of Anambra State, Nigeria. Purposive and simple random sampling techniques were respectively used to select five communities from the local government area and 50 oil palm farmers from the five selected communities for the study. Copies of structured interview instrument were administered to the respondents for data collection. Descriptive statistics and logistic regression were used in analyzing the data. Highest level of adoption (76%) of the oil palm production technologies was achieved with ring weeding technology, while use of fertilizer scored 62% to become the least adopted production technology. Level of adoption was statistically, significantly and positively determined by membership of social organization, farm size, educational level and annual farm income. The greatest constraints to level of adoption of oil palm production technologies were high cost of the technologies and lack of finance. The provision of subsidies and financial supports, as best suggested solutions to the problems by the farmers, would enable purchase of the technologies and improvement their levels of adoption.

Keywords: Oil palm, Adoption, Technologies, Logistic technique, Anambra state.

INTRODUCTION

One of the major challenges facing developing countries in the tropics is the production of sufficient food for their large population. It is estimated that of the 1.2 billion hungry and poor people of the world, over 800 million suffer from chronic under nourishment. Out of this, 34 million live in Asia while 186 million live in sub-Saharan Africa[1].

In Nigeria, the agricultural sector has failed to perform its assigned roles effectively. This has manifested in reduced agricultural and staple foods for the nation's teeming population. Oil palm is an important cash crop, and Nigeria is the largest producer in Africa and third largest producer in the world. Although the contribution of the oil palm industry to the Gross Domestic Product (GDP) in Nigeria has declined as a result of the emergence of crude oil in the economic scene, the oil palm industry still plays a significant role in the economy of Nigeria[2].

In Nigeria, the oil palm industry provides palm oil for household direct consumption and palm kernels for industrial use. It provides employment for about 4 million people who are in various oil palm related businesses such as palm oil, palm kernel oil production, palm wine tapping and bottling, basket and wholesale/retail trade in the various product of the oil palm[3].

Improved oil palm production technologies that are capable of raising productivity of the farmers include ring weeding, use of extension work seed, pruning, intercropping, fertilizer application, wire collar, disease/pest control methods, use of cover crops, poly bag nursery establishment, harvesting techniques, plantation/field establishment, and so on[4-9]. The role of extension service in getting improved technologies to the farmers cannot be overemphasized. The purpose of training and visit (T&V) system of agricultural extension service is to assist farmers to raise production and increase their income and to provide appropriate support for agricultural development [10]. Extension agents play the role of disseminating these technologies to farmers[11].

Ejembi et al.[12]reported that socio-economic characteristics of farmers such as age, farming experience, educational level, etc affect adoption of technologies. Asiabaka et al.[13] expressed the view that, for farmers of different agricultural zones to adopt a new agricultural technology, they must be aware of the technology, have valid and up-to-date information on the technology, the applicability of the technology to their farming system and receive the technical assistance necessary for application of the technology. This therefore, points to the importance of socio-economic characteristics of farmers in the adoption of improved technologies. Determining the influence of these factors on the adoption of improved oil palm production technologies will be useful in formulating adequate policies that will assist the farmers to improve and sustain production.

Oil palm producers in the study area have adopted various modern production technologies including ring weeding, improved seedlings, pruning, intercropping, alley farming, fertilizer application and so on to raise their productivity, output, income and hence welfare[14,15]. Despite the adoption efforts of the producers, optimal productivity and adoption[15] levels of the technologies are yet to be achieved due to the existence of certain constraints to adoption of technologies such as limited fund, scarcity and high cost of inputs, diseases and pests attacks among others[15], hence this study which aimed at assessing the levels of adoption of improved production technologies among small holder oil palm farmers in the area; determining the influence of socio-economic characteristics of the oil palm farmers on level of adoption of the technologies; and identifying constraints to adoption of the technologies.

MATERIALS AND METHODS

The study was carried out in Aguata Local Government Area (LGA) of Anambra State, South East of Nigeria. The LGA is made up of 14 autonomous communities which include Ekwulobia (headquarter), Uga, Igboukwu, Amesi, Umuchu, Achina, Isuofia, Nkpologwu, Aguluezechukwu, Oraeri, Umuona, Akpo, Ezinifite and Ikenga. It has a population size of 370, 172 persons and lies between longitude ~~of~~ 6^o 01' O" North and latitude 7^o O5'O" East. Average annual rainfall is between 2500mm and 3000mm; temperature ranges between 40^oC and 45^oC. The major crops cultivated in the area are yam, cassava, plantain, maize, oil palm and vegetables.

Two-stage and simple random sampling techniques were used to select respondents for the study. Stage one was the purposive selection of five communities – Ekwulobia, Igboukwu, Achina, Umuchu and Uga. This selection was based on the baseline survey of oil palm producers done by agricultural officers in the area, and which implicated the five selected communities as hosts to the highest numbers of oil palm farmers. The second stage was random selection of 10 oil palm farmers from each of the selected communities to arrive at 50 respondents.

Data were collected through the administration of pre-tested interview instruments. Data were collected on socio-economic characteristics of the respondents, improved oil palm production technologies in the area, and constraints to adoption of the technologies. Data on constraints to adoption of the technologies were collected by means of a 4-point Likert Scale, ranging from 4 = very serious, 3 = serious, 3= moderately serious, and 1 = not serious, with a critical mean of 2.5 (ie 10/4 = 2.5).

Data analyses were facilitated by means of descriptive statistics – mean, frequency distribution and percentage – for level of adoption; mean ranking for constraints to adoption and logistic regression for determinants of level of adoption of the modern production technologies.

The Logistic regression model is represented explicitly by taking Y as a probability, P and making its logarithm to depend linearly on the independent variables. The probability is expressed by Pindyck and Rubinfeld[16] as:

$$\text{Prob}\,(Y_i = 1)\quad f(Z_i) = \frac{1}{i - e^{zi}} = \frac{e^{zi}}{e^{zi} + 1}$$

Where:

Z_i = Theoretical variable (observable variable). To obtain the value of Z_i, the likelihood of

observing the sample needs to be formed by introducing a dichotomous response variable Y_i

such that:

Y_i = (1 if the i^{th} farmer is high adopter of oil palm technologies; 0 if the i^{th} farmer is a low adopter of oil palm technologies).

For this study $Z_i = \beta o + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_8 X_8 + e$

Z_i = Cumulative logistic distribution

X_1 (MSO) = Membership of social organization (dummy: member = 1; otherwise = 0)

X_2 (AGE) = Farmers' age (years)

X_3 (FME) = Farming experience (years)

X_4 (FAS) = Farm size (hectare)

X_5 (EDL) = Educational attainment (years of schooling)

X_6 (CEA) = Contact with extension agent (number of contacts)

X_7 (HOS) = Household size (number in the household)

X_8 (AFI) = Annual farm income (₦)

β_i = regression coefficients

β_0 = Constant term

e = Error term

RESULTS AND DISCUSSIONS

Levels of adoption of the oil palm production technologies: Result of analysis of levels of adoption of the production technologies for oil palm as shown in **Table 1** indicated that ring weeding was the most adopted technology (76%), closely followed by use of poly bag (74%), harvesting knife (70%), sprouted seed (68%), cover crop (64%), and the least, use of fertilizer (62%). Use of fertilizer came last probably due to scarcity and high cost of the input which resulted in inability of the farmers to use adequate quantities that would have enabled enhanced adoption.

Table 1: Levels of adoption of the oil palm production technologies

Technology	Level of adoption	
	Frequency	Percentage
Use of poly bag	37	74
Sprouted seed	35	68
Ring weeding	38	76
Cover crop	33	64
Harvesting knife	34	70
Fertilizer	31	62

Source: Field survey, 2012. Note: Multiple responses recorded

Effects of socio-economic factors of the respondents on level of adoption: The binomial logistic regression was used to ascertain the effects of socio-economic factors of the oil palm producers on level of adoption of the production technologies. Result of the analysis **(Table 2)** showed that out of the eight independent variables namely membership of social organization represented by (MSO), age (AGE), farming experience (FAE), farm size (FAS), educational level (EDL), contact with extension agents (CEA), household size (HOS) and annual farm income (AFI), four (membership of social organization, farm size, educational level and annual farm income) were positive and statistically significant determinants of level of adoption of oil palm production technologies in the area.

The implications of these findings are that as farmers' income increases, likewise their awareness of modern technologies through higher education, more likely their acquisition and utilization of modern production technologies. Again, farmers who own large farms are more likely to belong to cooperative/social organizations so as to grasp any opportunities to acquire new knowledge, skills and modern technologies that would enable them increase their productivity, income and good livelihood.

The chi-squared value of 18.784 was significant at 1% level, an indication of the overall significant and goodness of fit of the model. The significant log likelihood function's value (49.943) also confirmed the goodness of fit of the model and that the independent variables together had statistical and significant influence on level of adoption of oil palm production technologies in the area.

Table 2: Determinants of level of adoption of the oil palm production technologies

Parameter	Coefficient	T-value	Probability
Constant	-5.3798	-1.974	0.075
MSO	0.0069	1.998**	0.034
AGE	0.4634	0.786	0.532
FME	-0.0576	-0.693	0.428
FAS	0.0054	2.124**	0.016
EDL	0.0011	1.932**	0.025
CEA	-0.0263	-0.476	0.662
HOS	0.4336	0.843	0.634
AFI	0.0884	1.876*	0.019

Log likelihood function	47.943
Restricted log likelihood	68.135
Chi-squared	18.784
Degrees of freedom	8

Source: Field survey, 2012. Notes: ** = Significant at 1% level. * = Significant at 5% level of probability.

Constraints to adoption of oil palm production technologies: Table 3 shows result of mean ranking of constraints associated with the use of oil palm production technologies. The study identified high cost of the technologies with a mean score of 2.74 as the most serious constraint to adoption of the technologies by the farmers. This was followed by lack of funds with a mean score of 2.72, scarcity of land (2.42), lack of information on the technologies (2.40), and poor extension visit (2.30). In many circumstances, the development of sustainable productivity requires the purchase of necessary inputs, which on the other hand, requires the availability of funds. Consequently, lack of funds posed major constraint ~~challenge~~ to purchase of the technologies, hence the achievement of their optimal levels of adoption.

Table 3: Constraints to adoption of the oil palm production technologies

Constraint	Mean score	Rank
High cost of technologies	2.74	1st
Lack of funds	2.72	2nd
Scarcity of land	2.42	3rd
Lack of information on the technologies	2.40	4th
Poor extension visits	2.30	5th

Source: Field Survey, 2012.

CONCLUSION AND RECOMMENDATIONS

Oil palm farmers in Aguata LGA of Anambra State, Nigeria have adopted modern production technologies for their operations. The existing adoption gaps for the technologies would be closed if appropriate measures are taken to address the problems of high cost of the technologies and lack of funds found to have seriously militated against the adoption process. Such measures as review of the land use policy in favour of making more farm lands available for the establishment of large scale oil palm plantations; subsidizing farm inputs such as fertilizers and agro-chemicals to reduce cost of the technologies and encourage their adoption; and mounting of awareness campaigns on the advantages of adopting the technologies by expanding extension services and providing logistic supports to extension agents to facilitate their job.

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