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FERTILIZER USE AND COCOA PRODUCTION IN CROSS RIVER STATE, NIGERIA

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ABSTRACT

Fertilizer usage is a desirable step towards boosting cocoa production. This is because the nutrients that are being lost from the soil due to continuous usage of the soil are being replenished by fertilizer application. However, out of ignorance or otherwise, some farmers are not using this important farm input and this has resulted to the declining crop yield. This study therefore investigated the usage of fertilizer for cocoa production in the study area. Purposive random sampling technique was used to select three cocoa producing Local Government Areas (LGAs) in Cross River State. Simple random sampling technique was used to select 107 respondents from the three LGAs in the state. Information was collected from the respondents with the aid of structured questionnaire and the data generated from the information collected were analysed using descriptive statistics and multivariate logit model. Results showed that 98.13% of the respondents were not using fertilizer for cocoa production. Also farmer's level of education ($p<0.01$), cocoa farm size ($p<0.01$), association membership of farmers ($p<0.1$) and cocoa output ($p<0.01$) are significant factors determining the probability of a farmer to use fertilizer for cocoa production. The study concluded that majority of cocoa farmers in the study area do not use fertilizer for cocoa production and it is therefore recommended that farmers should be enlightened on the need to use fertilizer (when required) to enhance their production.

Keywords: cocoa farms, cocoa production, fertilizer, descriptive statistics.

INTRODUCTION

Due to constantly increasing pressure on available land as a result of high population densities, fallow periods have significantly reduced, and at present rarely exceed six years (Onyabinama, 2006). As a general rule, fallow shorter than ten years will not allow the soil to recover adequately and the quality of the soil decreases with more frequent exploitation (Ewes, 1978). As a result of the diminishing fertility status of the soil due to shorter fallow periods, smallholder farmers no longer produce a surplus sufficient food to feed the ever-increasing population. It should be observed that this practice does not affect food crops alone. In the same vein, the soil nutrients in cocoa plantation are being mined annually via cocoa harvest (Ogunlade *et al.,* 2009). Wessel (1971) reported that there is a steady decline in almost all the nutrients with length of cultivation. Omotoso (1975) showed that a crop of 1000kg dry cocoa beans remove about 20KgN, 4kgP and 10kg K and where the method of harvesting (as in Nigeria) involves the removal of pod husks from the field, the amount of potassium removed increased more than five folds. Ogunlade and Aikokpodion (2006) reported that phosphorus is grossly inadequate for optimum cocoa yield in cocoa ecologies of Nigeria. Application of fertilizer is inevitable for the replacement of soil nutrients that are being mined through cocoa pod harvest annually. Adequate use of fertilizer has been found to increase agricultural output (Ogunlade *et al.*, 2009). According to Olson (1970), fertilizer could increase food production by at least 50%. Opeyemi *et al,* (2005) reported that an effective use of fertilizer on cocoa would help not only to improve yield but also has the advantages of profitability, product quality and environmental protection. This therefore implies that fertilizer usage should be considered as a key factor in maximizing cocoa production; this study was therefore conducted to assess fertilizer usage for cocoa production in the study area.

METHODOLOGY

This study was carried out in Cross River State, Nigeria in November, 2008. Three high cocoa producing Local Government Areas (LGAs) were purposively selected in the study area for the study. The selected LGAs were Boki, Ikom and Etung. Simple random sampling technique was used to select one hundred and seven respondents with the aid of structured questionnaire. The data collected were analysed with the use of descriptive statistics as well as multivariate logit model. Descriptive statistics was used to describe the socio-economic characteristics of the respondents and the status of fertilizer usage for cocoa production in the study area. Multivariate logit model was used to assess the determinants of the usage of fertilizer for cocoa production in the study area.

The logistic (logit) probability function is represented as

$$Pi = 1/1+e^{-Z}_i = f(Z_i)$$

$$\text{Log } (P/1-P) = f(z_i)$$

$$\text{But } Z_i = \beta X_i$$

$$\text{Therefore, log } (P/1-P) = (\beta X_i - U_i)$$

Log (P/1-P) = 1, if fertilizer is used (adopted) while
Log (P/1-P) = 0 if otherwise.
Implicitly, the model is stated as

$$Y = \beta_0 + \beta_1 \text{ AGE} + \beta_2 \text{EDU} + \beta_3 \text{ HHZ} + \beta_4 \text{ FMZ} + \beta_5 \text{ ASS} + \beta_6 \text{ OUT} + U_i$$

Where

Y = Usage of fertilizer for cocoa production
(1 if fertilizer is used; 0 if otherwise).
AGE = Age of farmer (years)
EDU = Level of education of farmer
(1 = No formal education; 2 = Primary education;
3 = Secondary education; 4 = Tertiary education)
HHZ = Household size
FMZ = Cocoa farm size (hectares)
ASS = Association membership of farmers
OUT = Cocoa output (tons)

RESULTS AND DISCUSSIONS

The results of socio-economic analysis of the respondents is shown in Table-1. It shows that majority of the respondents (89.72%) were males while the proportion of the females was 10.28%. This shows that males were more involved in the ownership of cocoa farms than females in the study area. Table-1 also shows that 87.85% of the total respondents were married while just 11.21% were single. Since majority of the respondents were married, this signifies the possibility of more availability of family labour for farming activities. About 35% of the farmers (respondents) were 40 years old and below while 83.09% of the respondents were 60 years of age and below. Meanwhile, the mean age of the respondents in the study area was 46 years. Hence, on the average, the age of cocoa farmers in the study area was 46 years. This is a positive development as many energetic young farmers are involved in cocoa production in the study area. It could also be observed in Table-1 that 39.25% of the total respondents had more than 8 persons per household. The mean household size was 8 persons per household. This is a positive indication that there would be more availability of family labour for farm work. Furthermore the result shows that about 90% of the respondents had formal education while only 10% had no formal education. Hence, this indicates a high level of literacy among the respondents. A high level of literacy will positively influence the farm business. High literacy level will enable farmers to understand the intricacies of factor and product markets and also predispose them to adopt and use improved farm practices (Oluyole, 2005). About 87.82% of the total respondents did not have more than 10 hectares of cocoa farm while just 12.18% had more than 10 hectares. The results showed that majority of the respondents are either small or medium scale farmers. This is very similar to the result obtained by Ogunlade *et al*, (2009) which reported that 75.5% of the cocoa farmers in Nigeria were either small or medium scale farmers. It could also be observed in Table-1 that majority of the respondents (80.37%) had sole variety of *Amazon* on their farms while just 6.54% had sole *Amelonado* variety of cocoa. However, about 13% of the respondents had the combination of both *Amelonado* and *Amazon* varieties on their farms. This therefore, indicates that most of the respondents are responding well to modern technologies in cocoa production.

Table-2 shows the use of fertilizer for cocoa production. From the table, it could be observed that majority of the respondents (98.13%) did not use fertilizer for cocoa production while just 1.87% of the respondents indicated that they are using fertilizer for cocoa production in the study area. The result is in line with Ogunlade *et al*, (2009) which reported that 78.2% of cocoa farmers in Nigeria were not using fertilizer for cocoa production. Meanwhile, different reasons were given for the non-usage of fertilizer on cocoa farms. About 39% of the farmers felt that their soil was very fertile and hence fertilizer was not necessary on their farms. Some of the respondents (25.23%) claimed that they are not using fertilizer because the commodity is not always available. 16.82% of the farmers said that fertilizer is too costly for them. Furthermore, 15.89% and 0.93% of the respondents were of the opinion that they did not have enough money to buy the commodity and that they normally get fertilizer too late respectively. However 96.26% of the respondents indicated that if a type of fertilizer (cocoa pod husk fertilizer) is introduced, they are ready to use it. Results also showed that 23.36% of the respondents were using fertilizer on arables while 76.64% did not. However, 75% of the inorganic fertilizer used was NPK fertilizer while 25% was single super phosphate (SSP). Also, 50% of the organic fertilizer used was cow-dung while 25% was poultry droppings.

Table-3 shows the determinants of the usage of fertilizer for cocoa production. The results show that farmer's level of education ($p<0.01$), cocoa farm size ($p<0.01$), association membership of cocoa farmers ($p<0.1$) and cocoa output ($p<0.01$) determine the probability of using fertilizers for cocoa production.

Level of education of farmers: A unit increase in the level of education of farmers increases the probability of a farmer to use fertilizer for cocoa production by 0.018. Hence, increase in the level of education would lead to an increase in the use of fertilizer for cocoa production.

Cocoa farm size: A unit increase in cocoa farm size increases the probability of a farmer to use fertilizer for cocoa production by 0.002. Therefore, increase in cocoa farm size would lead to an increase in the use of fertilizer.

Association membership of cocoa farmers: A unit increase in the association membership of cocoa farmers increases the probability of using fertilizer for cocoa production by 0.01. Increase in the level of association membership therefore increases the use of fertilizer for cocoa production.

Cocoa output: A unit increase in cocoa output increases the probability of a farmer to use fertilizer for cocoa production by 0.001. Hence, increase in cocoa output increases the use of fertilizer for cocoa production.

Table-1. Socio-economic characteristics of the respondents.

Variable	Frequency	Percentage	Mean
Gender			
Male	96	89.72	
Female	11	10.28	
Total	107	100.00	
Age (years)			46.9
≤30	10	9.33	
31-40	28	26.16	
41-50	35	32.70	
51-60	16	14.90	
61-70	15	14.01	
>70	3	2.90	
Total	107	100.00	
Educational level			
No formal Education	11	10.28	
Primary education	38	35.51	
Secondary education	42	39.25	
Tertiary education	16	14.95	
Total	107	100.00	
Marital status			
Single	12	11.21	
Married	94	87.85	
Total	107	100.00	
Household size			8.0
1-4	23	21.5	
5-8	42	39.25	
9-12	28	26.17	
13-16	10	9.35	
17-20	3	2.80	
>20	1	0.93	
Total	107	100.00	
Farm size (Hectare)			
≤5	64	59.79	
6-10	30	28.03	
>10	13	12.18	
Total	107	100.00	
Variety of Cocoa planted			
Amelonado	7	6.54	
Amazon	86	80.37	
Amelonado and Amazon	14	13.08	
Total	107	100.00	

Source: Field Survey, 2008.

Table-2. Use of fertilizer for Cocoa production.

Status	Frequency	Percentage
User of fertilizer	2	1.87
Non-user of fertilizer	105	98.13
Total	107	100.00

Table-3. Logit model result on the determinants of fertilizer usage for Cocoa production.

Variables	Coefficient	P-values	Marginal effect
Age	0.0631759	0.369	0.0013
Level of education	0.8977012	0.005***	0.0187
Household size	0.0701031	0.668	0.0015
Cocoa farm size	0.0719999	0.008***	0.0015
Association membership	0.4764512	0.101*	0.0099
Cocoa output	0.0004578	0.012***	0.0009
Constant	7.848681	0.194	
Chi-square	92.54		
Log likelihood	-81.324092		

Source: Field Survey, 2008
*** Significant at 1% level; * Significant at 10% level.

CONCLUSIONS AND RECOMMENDATIONS

Based on the result from the study, it could be concluded that majority of cocoa farmers are not using fertilizer for cocoa production in the study area. They are doing this with the view that their soil is rich enough forgetting that there is a need to replenish the lost nutrients due to pod harvest from time to time.
However, the following recommendations were made:

a) Farmers should be trained on the relevance of soil test to know the fertility status of their cocoa farms. This is very important in view of the fact that some farmers were claiming that their farms were fertile enough and did not require fertilizers application.
b) Government and other stakeholders should encourage the production of cocoa pod husk fertilizer in as much that cocoa farmers are ready to use it to grow their crops. Apart from the fact that the fertilizer will boost cocoa production, it will also reduce the disease infestation that is likely to result due to compilation of cocoa pod husk constituting nuisance on farms.
c) Farmers should be encouraged to improve their level of education. This is quite imperative in as much that level of education was found to have affected the use of fertilizer for cocoa production. Illiterate farmers could be encouraged to undergo adult literacy programme.

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