

An Evaluation of the Level of Fertilizer Utilization for Cocoa Production in Nigeria

M. O. Ogunlade, K. A. Oluyole* and P. O. Aikpokpodion

Cocoa Research Institute of Nigeria, P.M.B. 5244, Idi-Ayunre, Ibadan, Nigeria

KEYWORDS Cocoa Farms. Soil Fertility. Cocoa Production. Descriptive Statistics

ABSTRACT Low soil fertility has been identified as one of the major causes of decline in yield of cocoa. The importance of fertilizer in ameliorating this problem will go a long way to boost cocoa production. This study therefore assessed the level at which fertilizer is being utilized in cocoa production in Nigeria. The study was carried out between May and June 2008 in five cocoa producing states in Nigeria. These were Ondo, Ekiti, Cross Rivers, Osun and Oyo States. Simple random sampling technique was used to select one hundred and ten respondents from the study area and the information was collected from the respondents with the aid of structured questionnaire. The data collected was analyzed with descriptive statistics and ordinary least square regression analysis. The result showed that majority of the respondents (78.2%) did not use fertilizer on their cocoa farms. It was also found that the major factors that determined the quantity of fertilizer used were farm size as well as price of fertilizer ($P < 0.01$). It was therefore recommended that organized efforts should be put in place by the government and other stakeholders to educate, encourage and assist Nigerian cocoa farmers to urgently consider the option of guided fertilizer usage to boost the productivity of cocoa on their farms. Also, government should strive to make fertilizer available as at when due at subsidized rate, this would make it possible for the farmers to have access to the commodity anytime they want to use it.

INTRODUCTION

Most of the cocoa plantations in Nigeria are very old and there is dearth of forestlands for establishment of new cocoa plantation. The soil nutrients in cocoa plantation are being mined annually via cocoa harvest. Wessel (1971) reported steady decline in almost all the nutrients with length of cultivation. Omotoso (1975) showed that a crop of 1000kg dry cocoa beans removed about 20KgN, 4KgP and 10KgK and where the method of harvesting (as in Nigeria) involves the removal of pod husks from the field, the amount of K(potassium) removed is increased more than five folds. Ogunlade and Aikpokpodion (2006) in an assessment of soil nutrient status of cocoa plantation across cocoa ecologies of Nigeria reported that phosphorus is grossly inadequate for optimum cocoa yield. 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. According to Olson (1970), fertilizer could increase food production by at least 50%. In a recent work conducted by Opeyemi et al. (2005) 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. FAO (1987) claimed that tremendous increase in fertilizer use is the most potent factor in raising productivity. This implies that guided fertilizer recommendation and application should be part of the rehabilitation package for optimum cocoa production of the nutrient depleted old cocoa plantations. Considering the role of fertilizer in boosting cocoa production under a nutrient depleted old cocoa plantation, this study was therefore embarked upon to evaluate the level of utilization of fertilizer for cocoa production in the study area.

The objectives of the study were to:

- (i) describe the socio-economic factors that influence the use of fertilizer by cocoa farmers in Nigeria.
- (ii) determine the level of use of fertilizer for cocoa production among farmers,
- (iii) identify the determinants of the quantity of fertilizer used by farmers for cocoa production.

METHODOLOGY

The study was carried out in five major cocoa producing states in Nigeria between May and June 2007. The states were Ondo, Ekiti, Cross Rivers, Osun and Oyo.

*Corresponding Author
E-mail: kayodeoluyole@yahoo.com

Simple random sampling technique was used to select one hundred and ten respondents' from the study area and information was collected from the respondents with the aid of structured questionnaire.

The data collected was analyzed with the use of Descriptive Statistics and Regression Analysis. Descriptive Statistics was used to analyze the socio-economic variables of the respondents as well as the status of fertilizer usage for cocoa production in the study area. Regression analysis was used to assess the determinants of the quantity of fertilizer used for cocoa production. Here, Ordinary Least Square (OLS) Regression model was used and explicitly, the model is stated below:

$$\text{Log } Y = \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + e_i$$

Where:

Y = Quantity of fertilizer used (Kilogramme)

X_1 = Farm size (Hectares);

X_2 = Fertilizer availability (Available = 1, Not available = 0);

X_3 = Rate of fertilizer application;

X_4 = Price of fertilizer (Naira);

e_i = Error term;

β s = Coefficients to be estimated

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Table 1 shows that majority (86.3%) of the respondents were males while the proportion of the female respondents was 13.7%. This showed that males are frequently more involved in the ownership of cocoa farms in the study area. Table 1 also shows that 94.5% of the total respondents were married while 5.5% were widowed and none of the respondents is single. Since majority of the respondents were married, this signifies the possibility of more availability of family labour for farming activities. Most of the respondents (about 68.3%) were of age 51 and above while about 31.7% were between 30 and 50 years of age. This indicates that most of the farmers were elderly and old age implying poor quality labour, which may adversely affect the farm business. Furthermore, Table 1 shows that about 91.8% of the respondents had formal education while just 8.2% of the respondents had no formal education. The result indicates a high level of literacy among

Table 1: Socio-economic characteristics of the respondents

Variable	Frequency	Percentage
<i>Sex</i>		
Male	95	86.3
Female	15	13.7
Total	110	100.0
<i>Marital Status</i>		
Single	0	0
Married	104	94.5
Widow/widower	6	5.5
Total	110	100.0
<i>Age</i>		
30-40	18	16.3
41-50	17	15.4
51-60	36	32.7
61-70	39	35.6
Total	110	100.0
<i>Educational Levels</i>		
No formal education	09	8.2
Primary education	30	27.3
Secondary education	29	26.4
Tertiary education	42	38.2
Total	110	100.0
<i>Farm Size (Hectares)</i>		
<10	83	75.5
10-30	21	19.1
30.1-50	06	5.4
Total	110	100.0
<i>Cocoa Variety</i>		
Amazon	59	53.6
Amelonado	9	8.2
Amazon + Amelonado	42	38.2
Total	110	100.0

Source: Field survey, 2006.

the farmers. A high level of literacy will positively and significantly influence the farm business. High literacy levels 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 75.5% of the total respondents had less than 10 hectares of farm while 19.1% had between 10-30 hectares of land. However, the least proportion of the respondents (5.4%) had between 30.1 and 50 hectares of land. The result however showed that majority of the farmers is either small or medium scale cocoa farmers.

It could also be observed from Table 1 that most of the respondents (53.6%) had sole variety of *Amazon* on their farms while just few (about 8.2%) had sole *Amelonado* variety of cocoa. However, about 38.2% of the total respondents had the combination of both *Amelonado* and *Amazon* Varieties on their farms. This, however, showed that most of the respondents are responding at a faster rate to modern technologies in cocoa production.

Use of Fertilizer for Cocoa Production

Table 2 showed that majority of the respondents (78.2%) indicated that they did not use fertilizer for cocoa production while 21.8% indicated that they are using fertilizer on their cocoa farms. The result implied that majority of cocoa farmers in the study area are not using fertilizer on their cocoa farms.

Table 2: Use of fertilizer for cocoa production

Status	Frequency	Percentage
User of fertilizer	24	21.8
Non-user of fertilizer	86	78.2
Total	110	100.0

Source: Field survey, 2006

This result is in sharp contrast to Chude (1999) who claimed that fertilizer is an agricultural technology that is widely adopted by farmers. Meanwhile, different reasons were however given for their non-usage of fertilizer on their cocoa farms. While 32.7% of the farmers claimed outrightly that fertilizer is not necessary on their farms because their farms are fertile enough, 8.2% of the farmers however claimed that they are not using fertilizer because the commodity is not available to them. 18.2% of the farmers however claimed that fertilizer is too costly for them. Furthermore, 6.4% and 1.8% of the respondents claimed that they did not have enough money to buy the commodity and that they normally get fertilizer too late respectively. However 22.7% of the respondents did not give any reason for their non-usage of fertilizer on their cocoa farms

The result also showed that all the farmers that applied fertilizer (21.8%) used NPK fertilizer as the only inorganic fertilizer used. However, very few of the farmers (about 2.7%) in each case used cow dung and poultry droppings as the

organic fertilizer. Meanwhile, 16.4% of the farmers that applied fertilizer on their farms agreed that there was an increase in output on the plots where fertilizer was applied. However, none of the farmers that used fertilizer followed any fertilizer recommendation. The fertilizers were applied blanketly.

Determinants of the Quantity of Fertilizer Used for Cocoa Production

This was analysed with the use of OLS Regression Analysis. Out of the three equations pulled together, double log function was chosen as the lead equation based on the significance of the individual coefficients, signs of the coefficients (apriori expectation), the magnitude of the F-value, the standard error and the magnitude of the coefficient of multiple determination (R^2). The result of the analysis is presented in Table 3.

The R^2 of 0.613 shows that 61.3% of the variations in the quantity of fertilizer used for cocoa production was accounted for by the regressors (X_j). The F-value of 7.107 shows that the overall equation is significant at 1% level. The coefficients of farm size and price of fertilizer are significant ($P < 0.01$) This shows that farm size as well as price of fertilizer are much more critical in determining the quantity of fertilizer to be used. Meanwhile, the signs of the coefficients of the two variables complied with apriori expectations. However, it should be noted that the coefficient of fertilizer availability as well as that of rate of fertilizer application is insignificant ($P > 0.05$).

CONCLUSION AND RECOMMENDATION

The study showed that majority (86.3%) respondents were males showing that males are

Table 3: Result of regression analysis

Variable	β_s	Std. Error	t	Prob (P)
(Constant)	2.731	0.331	8.256	0.001
Farm size	0.191	0.066	2.891	0.005*
Fertilizer availability	7.530E-02	0.195	-0.385	0.701
Price of fertilizer	-0.437	0.091	-4.794	0.002*
Rate of fertilizer application	-5.87E-02	0.141	-0.416	0.679
R^2	0.615			
Adjusted R^2	0.597			
F value	7.107			
Standard error	0.25755			
D.W.	2.323			

Source: SPSS computer Analysis Print Out

* Significant at 1% level ($P < 0.01$)

frequently more involved in the ownership of cocoa farms in the study area. Also, 91.8% of the respondents had formal education while most (68.3%) of the respondents were elderly and old. Majority (78.2%) of the respondents did not use fertilizer for cocoa production while just 21.8% of the respondents indicated that they were using fertilizer for cocoa production. The study however concluded that most of the farmers in the study area do not use fertilizer for cocoa production and the few of them that use fertilizer predominantly use NPK fertilizer. Also farm size as well as price of fertilizer are the crucial determinants of the quantity of fertilizer used for cocoa production in the study area.

The study recommended that organized efforts should be put in place by the government and other stakeholders to educate, encourage and assist Nigerian cocoa farmers to urgently consider the option of guided fertilizer usage to boost cocoa production. 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 fertilizer application. Government should strive to make fertilizer available as at when due at subsidized rate. This would make it possible for the farmers to have access to the commodity anytime they want to use it. More youths should be encouraged into cocoa farming. This is quite imperative as substantial proportion of cocoa farmers now are old and hence would need replacement. The encouragement could be inform

of granting young school leavers credit facilities that would enable them to take up cocoa farming business.

REFERENCES

- Chude VO 1999. Perspectives of fertilizer Use in the 21st Century. In: O Babalola, U Omoti, AI Isenmilla (Eds.): *Management of Soil Resources of Nigeria for Sustainable Agricultural Production in the 21st Century. Proceedings of the 25th Annual Conference of the Soil Science Society of Nigeria*.
- Food and Agriculture Organization (FAO) 1987. *Agriculture: Towards 2000. Economic and Social Development Series*. Rome, Italy: FAO.
- Ogunlade MO, Aikpokpodion PO 2006. Available Phosphorus and some micro-nutrient contents of cocoa soils in three cocoa growing ecological zones of Nigeria. *Proceedings of 15th International Cocoa Research Conference 2006. Costa Rica*. (in press)
- Olson RA 1970. The Fertilizer Programme of the Freedom from Hunger Campaign. In: AH Bunting (Ed.): *Change in Agriculture*. London: Duckworth and Co. Ltd., pp. 599-605.
- Oluyole KA 2005. Evaluation of the Economics of Post-Harvest Processing of Cocoa in Cross Rivers State, Nigeria. *Journal of Agriculture, Forestry and the Social Sciences*, 3(2): 58-64.
- Omotoso, TI 1975. Amounts of Nutrients removed from the soil in harvested Amelonado and F₃ Amazon Cacao during a year. *Turrialba*, 235: 425-428.
- Opeyemi AA., Fidelis OA., Ademola B, Philip O 2005. Quality Management Practices in Cocoa Production in South-Western Nigeria. *Conference on International Research on Food Security, Natural Resource Management and Rural Development*.
- Wessel M 1971. *Fertilizer requirements of Cacao (Theobroma Cacao L.) in South-Western Nigeria. Communication 61*. Department of Agriculture and Natural Resources, Royal Trop. Inst.