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Impact of Cocoa Pod Husk Fertilizer on Cocoa Production in Nigeria

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Abstract: The inherent problems associated with inorganic fertilizer such as scarcity and high cost informed the invention of cocoa pod husk based organic fertilizer. The impact of the fertilizer on cocoa output is hereby investigated in this study. The study was conducted in Cross-River State, Nigeria and purposive random sampling technique was used to select fifty cocoa farmers including the user and non-user of cocoa pod husk fertilizer. Structured questionnaire was used to collect information from the respondents and the data retrieved from the information was analyzed with budgetary analysis and percentages. The study revealed that the percentage of cost of materials to total cost of production per hectare by the user and non-user of cocoa pod husk fertilizer was 20.99% and 23.12% respectively while the percentage of operational costs to total cost was 71.79% and 60.92% for the user and non-user of cocoa pod husk fertilizer respectively. A revenue of ₦178,980 and ₦91,200 per hectare was realized by the user and non-user of cocoa pod husk fertilizer, respectively, while the net revenue per hectare by the user and non-user of cocoa pod husk fertilizer was ₦145,874 and ₦52,840 respectively. The economic efficiency indices show that the user of cocoa pod husk fertilizer has an index of 4.41 while the non-user has an index of 1.38. The study therefore recommended that cocoa pod husk fertilizer technology should be widely introduced among cocoa farmers and that the farmers should be encouraged to adopt it.

Key words: Impact · Cocoa · Fertilizer · Production · Pod husk

INTRODUCTION

Nigeria is the most populous country in Africa [1]. The 1963 population census put the population at 55,670,055 people while the result of 1991 population census was 88,514,501. However, 2006 population census put Nigeria's population at 140,005,542 people which translates to an average density of about 152 person per square kilometer (since the total area of Nigeria is 923,768 square kilometer) and an annual growth rate of 3.2 percent [2]. From the above, it could be observed that there is a persistent increase in population and for this population to be provided for; there should be a corresponding increase in food production. Therefore, frequent usage of land for food production in order to cater for the increasing population has put an increasing pressure on the available land. As a result of this, fallow periods have significantly reduced and at present rarely exceed six years [3]. 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. 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 [4]. Olson [5] reported that there is a steady decline in almost all the nutrients with length of cultivation. Oluyole et al. [6] 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. Omotoso [7] reported that phosphorus is grossly inadequate for optimum cocoa yield in cocoa ecologies of Nigeria. In as much that this is the situation and in order to enhance the sustainability in agricultural production, the lost nutrients from the soil should be replenished and one of the viable ways to do this is by fertilizer application. Fertilizer application is inevitable in agricultural production. Adequate use of fertilizer has been found to increase agricultural output.

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According to Onyebinama [8], fertilizer could increase food production by at least 50%. Opeyemi *et al.* [9] 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 implies that fertilizer usage is a primary factor to be considered in maximizing cocoa production.

However, Ogunlade *et al.* [4] reported that more than 70% of cocoa farmers in Nigeria do not use fertilizer for cocoa production. In a similar survey, Wessel [10] observed that more than 95% of cocoa farmers in Cross-River State, Nigeria do not use fertilizer for cocoa production. One of the major reasons given for the non-utilization of fertilizer was its scarcity and that the commodity is too costly. However, the non-utilization of fertilizer on cocoa by cocoa farmers in spite of the soil nutrient depletion brought about the introduction of cocoa pod husk fertilizer to cocoa farmers in Cross-River State, Nigeria. The technology has been introduced to the farmers for sometime now. This study therefore found it quite imperative to assess the impact of the fertilizer on the output level of cocoa.

MATERIALS AND METHODS

The study was conducted in Cross-River state, Nigeria. The state is one of the highest cocoa producing states in Nigeria. Three cocoa producing Local Government Areas (LGAs) were randomly selected in the state for the study. The selected LGAs were Etung, Boki and Ikom. Cocoa pod husk based compost fertilizer was introduced to farmers in the State. In doing this, one cocoa farmer's farm was chosen in each LGA as demonstration farm where the cocoa farmers in the LGA were gathered together and taught on how to prepare the compost. The prepared fertilizer was later applied to the cocoa trees in the demonstration farm. Information was obtained from the respondents with the aid of structured questionnaires and the questionnaires were administered to two sets of respondents. A set of questionnaire was administered to the farmers who are the owners of the demonstration farms and they were three in number while another set of questionnaire was administered to forty-seven randomly selected cocoa farmers from the three LGAs who have not used cocoa pod husk fertilizer on their farms. The data retrieved from the information collected were analysed using budgetary analysis and percentages. The budgetary analysis is specified below:

$$AGM = ATR - AVC$$
$$ANFI = AGM - AFC$$

Where AGM is the average gross margin, ATR is the average total revenue, AVC is the average variable cost, ANFI is the average net farm income and AFC is the average fixed cost.

The economic efficiency (e) for the farmers is mathematically expressed as $e = ANFI/ATC$ where ATC is the average total cost and ANFI is as previously defined. When $e > 0$, the production of cocoa is economically efficient and when $e < 0$, the cocoa production is economically inefficient. But when $e = 0$, the production of cocoa is said to be at the breakeven point.

RESULTS AND DISCUSSION

Table 1 shows the various items of costs in the production of cocoa when cocoa pod husk fertilizer was used and when cocoa pod husk fertilizer was not used. From Table 1, the percentage of the cost of materials to the total cost of production per hectare by the user and non-user of cocoa pod husk fertilizer were 20.99 and 23.12 percent respectively. The operational costs account for more than half of the total cost of production. While the percentage of operational costs to total cost was 71.79 percent for the user of cocoa pod husk fertilizer, it was 60.92 percent for the non-user of cocoa pod husk fertilizer. The fixed costs of production by the user and non-user of cocoa pod husk fertilizer were 7.22 and 15.95 percent, respectively. Generally, the cost of operation is higher than that of materials for both the user and non-user of cocoa pod husk fertilizer. In addition, the cost of materials is higher for non-user than that of user of the fertilizer.

Table 2 shows the revenue derived from one-hectare farm where cocoa pod husk fertilizer was used and that of farm where no cocoa pod husk fertilizer was used. The table shows that an output of 471kg and 240kg was realized from one hectare of the farm with cocoa pod husk fertilizer as well as the farm without cocoa pod husk fertilizer respectively. Taking into consideration the current cocoa price of ₦380.00 per kilogramme, therefore, a revenue of ₦178,980 and ₦91,200 was derived from one hectare farm with cocoa pod husk fertilizer and one hectare farm with no cocoa pod husk fertilizer.

Table 1: Cost per hectare for both the user and non-user of cocoa pod husk fertilizer

Items of costs	User of cocoa pod husk fertilizer ₦	Non-user of cocoa pod husk fertilizer ₦
Cost of fixed input	2,390 (7.21)	6,120 (15.95)
Cost of materials	6,950 (21.00)	8,870 (23.12)
Labour cost for farm clearing	8,780 (26.52)	6,100 (15.90)
Labour cost for chemical application	2,130 (6.43)	5,090 (13.27)
Labour cost for harvesting	7,055 (21.32)	3,370 (8.79)
Labour cost for on-farm processing	1,840 (5.56)	3,800 (9.91)
Labour cost for cocoa beans drying/packaging	3,100 (9.36)	2,420 (6.31)
Other operational costs	861 (2.60)	2,590 (6.75)
Total cost	33,106 (100)	38,360 (100)

Source: Field survey, 2010

Figures in parentheses are percentages of cost items

Table 2: Revenue per hectare for both the user and non-user of cocoa pod husk fertilizer

Item	Output (kg)	Price/kg (₦)	Revenue (₦)
User of cocoa pod husk fertilizer	471	380	178,980
Non-user of cocoa pod husk fertilizer	240	380	91,200

Source: Field survey, 2010

Table 3: Gross Margin Analysis of Cocoa Farmers (N/ha)

Item	User of cocoa pod husk fertilizer	Non-user of cocoa pod husk fertilizer
Gross Revenue	178,980	91,200
Cost of Material	6,950	8,870
Operational Costs	23,766	23,370
Total Variable Cost	30,716	32,240
Gross Margin	148,264	58,960
Fixed Cost	2,390	6,120
Net Revenue(Profit)	145,874	52,840
Total Cost	33,106	38,360
Economic Efficiency	4.41	1.38

Source: Field survey, 2010

Table 3 shows the profitability analysis in cocoa production. From the table, the net revenue per hectare by the user of cocoa pod husk fertilizer and the non-user of cocoa pod husk fertilizer was ₦145,874 and ₦52,840 respectively. This shows that the farm where cocoa pod husk fertilizer was used is more profitable than the one where cocoa pod husk fertilizer was not used. This is not unconnected with the increase in the output of cocoa as a result of the use of cocoa pod husk fertilizer. This scenario was better revealed by the economic efficiency indices. While the user of cocoa pod husk fertilizer has an index of 4.41, that of non-user of cocoa pod husk fertilizer was 1.38. This means that for every ₦1 spent on the production of cocoa by the user cocoa pod husk fertilizer, ₦4.41 was realized as profit while for the non-user of cocoa pod husk fertilizer, ₦1 spent on the production of cocoa yielded ₦1.38. This shows that cocoa production in the two farms was profitable but the farm where cocoa pod husk fertilizer was used was more profitable.

CONCLUSION AND RECOMMENDATIONS

Based on the findings, the study hereby made the following conclusions.

- There was more net revenue (profit) from the cocoa farm where cocoa pod husk fertilizer was used than the farm where cocoa pod husk was not used.
- The percentage of the cost of materials to the total cost is far lesser than the percentage of the operational cost to the total cost but higher than that of the fixed cost.
- Cocoa production in the study area generally is highly profitable. The economic efficiency indices were very high even in the farms where cocoa pod husk fertilizer was not used.

In the light of the above, it is recommended among others that

- Cocoa pod husk fertilizer technology should be widely introduced into cocoa farmers and the farmers should be encouraged to adopt the use of the fertilizer on their farms for cocoa production rather than looking for inorganic fertilizer that in not always available and that is more costly.
- Government should help reduce the cost of operation by introducing the use of modern methods that will reduce human efforts in the performance of these operations. Wherever mechanization is possible, the farmers should be encouraged to adopt these practices in order that cost might be reduced considerably.

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