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## COSTS AND RETURNS OF YAM/MAIZE PRODUCTION IN BOSSO LOCAL GOVERNMENT, NIGER STATE, NIGERIA

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### ABSTRACT

*In Nigeria, yam is the most important staple food crop while maize is the third most important cereal crop. However, small scale farmers do not always realize appreciable net returns from their combined production. Therefore, this study examined the costs and returns of yam/maize (mixed cropping) production in Bosso Local Government Area, Niger State. Primary data were obtained by multistage sampling techniques from the small scale farmers using structured questionnaires administered to eighty farmers. Descriptive statistic and gross margin analysis were used to analyse the data. The result showed that yam/maize farmers were of the active age of 43 years, majority were literate and experienced with average family size of 12 persons. Further findings showed that a typical yam/maize farmer incurred a total cost of ₦34,333.41/ha, realized a gross income of ₦234,582.50/ha and a profit of ₦200,249.09/ha in the production year. This implies that yam/maize cropping enterprise is a viable venture since the profit value is positive and large in magnitude. Cost of fertilizer constitutes about 42% of total variable cost. It was recommended that inputs especially fertilizer need to be made available to farmers at a reduced cost.*

**Key words:** yam/maize, costs and returns, gross margin

### INTRODUCTION

Yam (*Dioscorea spp*) is a monocot (Onwueme and Sinha, 1991). It is a large genus of over 600 species with subterranean tubers or rhizomes and it belongs to the family *Dioscoreaceae*. *Dioscorea* include many species in the sub tropical countries of the world. Yam is ranked second to cassava as the most important tuber crop in Africa. In turn, Africa account for nearly 98% of world yam production. Yam is an important food crop especially in the yam zone of West Africa, comprising Cameroon, Nigeria, Benin, Togo, Ghana and Cote d'Ivoire. This zone produces more than 90% of the total world production, estimated at 20 – 25million tons per year. Nigeria alone produces above 70% of the world total (FAO 2000 ). There are also growing interest in yam production in other African countries (Hahn, 1995). Available data also shows that yam is one of Nigeria's leading root crops, both in terms of land under cultivation, the volume and value of production (F.A.O 1999). Maize (*Zea mays L.*) originated in Mexico in Central America. It is the most important cereal crop in the world after wheat

and rice (AID, 1974) and in Nigeria the third most important cereal crop after sorghum and millet (Ojo, 2004). In Nigeria, the traditional farmer finds it more satisfactory to plant diversity of crops than planting sole. In crop mixture co-operation is more apparent than competition. Yam intercrop with maize is productive and competitive. Yam intercrop with maize is productive and compatible because maize is a short season crop while yams are long duration (7-12months) crops (Ibeawuchi, 2004).

Yams are usually intercropped with maize, and vegetables such as cucurbits, pumpkins, pepper and Okra (Daisy, 1987). However, in yam producing area of Nigeria, mixed cropping with maize and cassava or sorghum is prevalent. Kurt (1984) reported that yam is normally planted after bush clearance. Early and late yam (*D. rotundata* and *D. alata*) are usually planted in the same field, either mixed or sole and interplanted with cowpea or low population of maize, cassava, vegetable and plantain. In the subsequent year, maize and rice are planted also as intercrop with various minor crops while groundnut and cowpea are the main

legumes intercropped with yam. Okigbo and Greenland (1976) reported that over 59% of yam and 75% of maize grown in Nigeria are intercropped. Yam/maize/melon and yam/maize/cassava are the most dominant yam based crop combination in the acid soils of the rain forest zone of Nigeria (Agboola, 1979; Ezeilo *et al.*, 1975). In most traditional yam based farming systems, yam is usually the first or one of the first crops to be planted after the land is cleared from bush fallow (Onwueme and Sintia 1991; Degras 1993). While farmers have different reasons for the cropping systems adopted and enterprises combined, two major reasons are most outstanding, that of net income stabilization and maximization. Income maximization entails comparison of costs and returns from the different enterprises combined. Intercropping/mixed system of farming is a common feature among small scale farmers in Nigeria (Ibeawuchi, 2007). However, small scale farmers do not always realize appreciable net returns from their production. Against this backdrop this study is aimed at answering the following questions:

- 1) What are the socioeconomic characteristics of farmers in the study area?
- 2) What are the cost and /returns from yam/maize production to farmers in the study area?

The broad objective of this study therefore is to ascertain the profitability or otherwise of yam/maize crop production enterprise in Niger State. The specific objectives are to examine the socio-economic characteristics of yam/maize farmers and determine the costs and returns of yam / maize enterprise production in the study area.

## MATERIALS AND METHODS

### Description of the Study Area

Bosso Local Government Area has a population of 147,359 (National Population Commission, 2007) while its position on the latitude and longitude is 9° 41'N and 6° 33'E respectively. The Local Government Area has a land mass which have boundary with Chanchaga local government and bordered to the North and North East by Shiroro local government and the south East by Paikoro local government area while Gbako local government area is bordered to the south.

The vegetation is that principally shrubs, grass land to wood land with pockets of trees. The topography is predominantly plain lands with interrupted undulations, the soil ranges from sandy loam to clay loam. The climate of the study area is a resemblance of the

guinea savanna or ecological region of Nigeria. The raining season last between 190-200 days (6-7 months) with October recording the highest of 300mm (11.7 inches). Means monthly, temperature is highest in March at 35°C (88°F) and lowest in August at 25°C (75°F). Bosso Local Government has a fertile land for the cultivation of crops like yam, cassava, guinea corn, rice, millet, sweet potatoes and maize e.t.c.(NSADP, 2005).

### Sampling Procedure

The study employed a multistage sampling technique. Firstly Bosso local government was purposely selected because it revealed a high practice of yam/maize intercrop combination. Secondly, four villages namely: Maikunkele, Garatu, Shatta and Beji were purposively selected; twenty farmers from each village given a total of 80 yam/maize farmers were randomly selected.

### Data Collection

A well structured questionnaire was administered with the assistance of ADP (Agricultural Development Project) extension agents as well as well trained enumerators in each of the locations. A list of yam/maize intercrop was obtained from these districts which served as the sampling frame. Random sampling technique was adopted to select twenty farmers from each of the districts, making a total of eighty respondents.

Descriptive statistics was used to examine the socio-economic characteristics of yam/maize producers while gross margin was used to examine profitability, resource use efficiency and factors affecting yam/maize intercrop were estimated using production function analysis.

**Gross Margin:** Examines the difference between the total value of production (gross income) and total variable cost. It is used to determine the return to each enterprise with regards to its total variable costs. It is a very useful tool in instances where fixed cost is negligible as in the case of small scale farmers. (Olukosi *et al.*, 1988).

$$GM = GFI - TVC \dots\dots\dots (1)$$

Where

GM = Gross margin

GFI= Gross farm Income

TVC= Total variable cost.

$$Net\ Income = TR - TC \dots\dots\dots(2)$$

Where

TR = Total Revenue

TC = Total Cost ( TVC + FC)

FC = Fixed Cost Costs of inputs like labour, seeds, herbicide, fertilizer, insecticides etc. make up the

total variable costs and the inputs like hoes, useful in assessing the profit made in terms of resources committed to the production activities.

## RESULTS AND DISCUSSION

### Age of Respondents

The age of the respondent play important role in the farm operation, because the older the person becomes the less active his performance. Table 1 showed that majority of yam/maize producers fall between the age range of 31-40 and 41-50 years. The mean age is 43 this implies that yam/maize production enterprise in Bosso Local Government area is dominated by middle-age farmers who are still active in terms of agricultural production and constitute the working force of the populace (31-50years) to accomplish the tedious task of farm operations required as corroborated by Ogundari and Ojo (2005).

### Educational Status of the Respondents

Education is the planned process of bringing desirable changes in the behaviour, skills, attitude and knowledge. In crop production; education helps in efficient use of the limited resources which results in high yield (Ogundari and Ojo, 2005).

Table 1 shows that more than 40.0% of the yam/maize producers have no formal education; 30.0% had primary education; 7.5% had secondary education, while 2.50% had adult education.

### Farming experience of the Respondents

Experience on the production and management of yam/maize enterprise is very important because it affects yield significantly. Table 1 showed that a sizeable proportion 37.5% of the farmers have between 6-10 years of experience. This is followed by 28.8% which is from 11-15 years of experience. This result implies that majority of the farmers had acquired good production skills which will indirectly increase their income and productivity.

### Household Size

Table 1 shows the family size distribution of the respondents in the study area. The farmers with family size of between 6-10 persons constitute 37.5% and those with 11-15 persons

cutlasses, axes make up the fixed items account for 33.8%. The average household size was 12 persons. The implication is that if majority of the households' members are in their productive age, the farmers will have a pool of family labour.

### Farm Size of Respondents

A significant proportion of the farmers 57.5% had farm sizes between 1-2 hectares, this is in line with IFPRI (2007), which reported that farmers from rural areas hold small farm sizes and could translate to low outputs and consequently low returns.

### Extension Contacts

Majority of the respondents (8.75%) revealed that they were not visited by extension agents.. This can only mean that respondents in this study area are not properly informed and therefore, are unable to take proper production decisions in light of the current happenings in yam/maize enterprise production.

### Cost and Returns Analysis

The cost and returns associated with yam/maize cropping enterprise was investigated to ascertain the viability of the various cost components, namely, the variable and fixed cost items identified. The results in Table 2 indicate that the cost of fertilizer constitute about 41.70% of the total variable cost and ranked the highest. This was followed by expenses on herbicide accounting for 27.40% of the total expenditure on variable cost item. Others are, cost of tractor hiring 16.20% cost of seed 7.86%, maintenance 5.16%, insecticide 1.07% and hired labour 0.63%. Payment on the acquisition of farm tools such as hoe, cutlasses, knapsack sprayer etc constituted 47.9% of the total expenditure on fixed cost items. The result also showed that a typical yam/maize farmer incurred a total cost of ₦34,333.41/ha, realized a gross income of ₦234,582.50/ha and a profit of ₦200,249.09/ha. This implies that yam/maize cropping enterprise is a viable venture since the profit value is positive and large in magnitude

**Table 1: Socio-economic Characteristics of Respondents (n=80)**

| Variables                 | Frequency | Percentage (%) |
|---------------------------|-----------|----------------|
| <b>Age</b>                |           |                |
| 21-30                     | 17        | 21.3           |
| 31-40                     | 19        | 23.8           |
| 41-50                     | 26        | 32.5           |
| 51-60                     | 60        | 20.0           |
| >60                       | 2         | 2.50           |
| <b>Educational Level</b>  |           |                |
| Primary                   | 24        | 30.0           |
| Secondary                 | 14        | 17.5           |
| Tertiary                  | 8         | 0.0            |
| Adult education           | 2         | 2.5            |
| Non-formal education      | 32        | 40.0           |
| <b>Farming Experience</b> |           |                |
| 1-5                       | 15        | 18.8           |
| 6-10                      | 30        | 37.5           |
| 11-15                     | 23        | 28.8           |
| 16-20                     | 10        | 12.5           |
| >20                       | 2         | 2.5            |
| <b>Household Size</b>     |           |                |
| 1-5                       | 7         | 8.80           |
| 6-10                      | 30        | 37.5           |
| 11-15                     | 27        | 33.8           |
| 16-20                     | 11        | 13.5           |
| >20                       | 5         | 6.5            |
| <b>Farm Size (ha's)</b>   |           |                |
| < 1                       | 9         | 11.25          |
| 1-2                       | 46        | 57.5           |
| >2                        | 25        | 31.25          |
| <b>Extension Contacts</b> |           |                |
| Monthly                   | 10        | 12.5           |
| Quarterly                 | 15        | 18.75          |
| No visits at all          | 55        | 68.75          |

**Table 2: Cost and Returns in Yam/Maize Production in Bosso LGA of Niger State**

| Cost Items/Revenue          | Total Average Amount (₦) | Amount (₦)              | % of Total           | Total cost/ha cost      |
|-----------------------------|--------------------------|-------------------------|----------------------|-------------------------|
| <b>Variable Cost</b>        |                          |                         |                      |                         |
| Hired labour Cost           | 13,950                   | 174.40                  | 0.63                 | 221.43                  |
| Fertilizer Cost             | 929,900                  | 11,623.75               | 41.70                | 14,760.30               |
| Seed Cost                   | 175,280                  | 2,191.00                | 7.86                 | 2,782.20                |
| Insecticide                 | 23,900                   | 298.90                  | 1.06                 | 379.37                  |
| Herbicide                   | 610,300                  | 7,628.75                | 27.40                | 9,687.30                |
| Maintenance                 | 114,950                  | 4,519.00                | 5.15                 | 1,824.60                |
| Cost of hiring tractor      | <u>361,500</u>           | <u>1,436.90</u>         | <u>16.20</u>         | <u>5,738.10</u>         |
| <b>Total Variable Cost</b>  | <b><u>2,229,780</u></b>  | <b><u>27,872.60</u></b> | <b><u>100.00</u></b> | <b><u>35,393.30</u></b> |
| <b>Fixed Cost</b>           |                          |                         |                      |                         |
| Rentage of land             | 131,600                  | 1,645                   | 25.5                 | 2,088.90                |
| Farm tools (Depreciation)   | 247,343                  | 3,092                   | 47.9                 | 3,926.10                |
| Interest rate               | <u>137,950</u>           | <u>1,724</u>            | <u>26.6</u>          | <u>2,189.70</u>         |
| <b>Total Fixed Cost</b>     | <b><u>516,893</u></b>    | <b><u>6,461</u></b>     | <b><u>100.00</u></b> | <b><u>8,204.70</u></b>  |
| <b>Total Cost</b>           | <b>2,746,673</b>         |                         |                      |                         |
| <b>Average Total Cost</b>   | <b>34,333.41</b>         |                         |                      |                         |
| <b>Gross Income/Revenue</b> | <b>18,766,600</b>        |                         |                      |                         |
| <b>Average Gross Income</b> | <b>234,582.50</b>        |                         |                      |                         |
| <b>Gross Margin</b>         | <b>16,536,820</b>        |                         |                      |                         |
| <b>Profit</b>               | <b>16,019,927</b>        |                         |                      |                         |
| <b>Average profit</b>       | <b>200,249.09</b>        |                         |                      |                         |

Computation from Field Survey, 2009

## CONCLUSION AND RECOMMENDATIONS

Majority of respondents were literate and experienced with an average profit of ₦200,249.09 per hectare in the production year. Fertilizer was a major item of cost in yam/maize production. Findings from the study also showed that farmers had relatively small farm sizes of between 1-2 ha's, and very poor extension contacts. Nevertheless, in the light of these findings it can be concluded that yam/maize combined enterprise production is profitable in the study area giving the average profit realized per hectare.

Based on these findings the following recommendations were made:

1. Inputs like fertilizer, improved seed varieties and farm machineries should be readily available to farmers at affordable rate and on time.
2. Farmers should maximize their return from yam/maize intercropping enterprise, by increasing their farm sizes; larger farm sizes coupled with good management practices should translate into improve output. Extension should be given a serious attention so that farmers can be furnished with information on how to efficiently put their resources to profitable use.

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