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EFFICIENCY OF RESOURCE USE BY SEED YAM PRODUCERS IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

This study was designed to investigate the efficiency of resource use by seed yam producers in Akwa Ibom State of Nigeria. Through a multi-stage sampling technique a sample of 120 yam farmers were selected from three Agricultural zones in the State. Structured questionnaires were used to collect data for the study. Multiple regression models (semi-log, exponential and double log functional forms) were estimated using the Ordinary Least Squares (OLS) technique. The double-log functional form was chosen as the lead equation and used for the discussion. The coefficients of fertilizer, labour, farm size and stakes were positive and significant at one percent. The farmers were operating on the increasing returns to scale region of their production function and were not efficient in their use of labour, land and fertilizer. It was recommended that the farmers should form cooperatives to enable them pool land and other resources to enhance efficient utilization.

KEY WORDS: Efficiency, minisett, resource seed yam.

INTRODUCTION

The long history of African food crises has bothered concerned minds. Okoli and Onwueme (1987) reported that the situation is deteriorating because of the declining rate of per capita food production in most countries of Africa, especially those in the sub-Saharan

region. Even though food crises has a global effect, Charles and Bassey (2003), remarked that the twin phenomena of poverty and malnutrition are global tags of misery that are endemic in African countries. The panacea for malnutrition is the possible elimination of food production constraints in Africa. African Farmer (1988) postulated that increasing rice and maize even though the current production has not completely addressed the food crises in question.

Yam is a major food crop widely grown and massively consumed in Nigeria. It is an important source of carbohydrate in the diet of most Nigerian and contributes about 20 percent of the daily calorie (Iwueke, 1989). With the place of yam in the dietary constitution of many Nigerians, it calls for consistent increase in its production. These have not been the case according to (Onyenweaku and Mbuba, agricultural productivity is one of the greatest challenges facing most African nations. As a result, many nations have responded to this challenge though research efforts with the intent to produce major food staples for her society. In Nigeria, efforts have been made to increase the production of common staples like yam, cassava,

1991). Many constraints on increase in yam production have been identified; to include scarcity and high cost of seed yam, low returns from harvest losses, small scale yam production and incidence of pest and disease. (Ezeh, 1994; Kushwaha *et al.*, 2000; Andreas, 2003; Aderinola *et al.* 2005 and Okoronkwo, 2006). The yam minisett technique was developed to alleviate the problem of scarcity and high cost of seed yam among other advantages (Iwueke *et al*, 1983). To increase output in seed yam

production, farmers are expected to be efficient in their resource use. Studies have shown that farmers generally have low productivity because of inefficiency in resource use (Idiong, 2005; Onyenweaku, 1989). There is a paucity of published information on the resource use efficiency of seed yam producers using the minisett technique generally and in Akwa Ibom State in particular. This study was therefore carried out to provide information on the efficiency of resource utilization by seed yam producers in the State.

MATERIALS AND METHODS

This study was conducted in Akwa Ibom State of Nigeria. The State is located at latitude $4^{o}32^{I}$ and $5^{o}53^{I}$ North of the Equator and longitude $7^{0}25^{I}$ and $8^{0}25^{I}$ East of the Greenwich Meridian. The population of the State is about 3 million (NPC, 1991). This population is distributed into 31 Local Government Areas and 3 senatorial districts of Uyo, Eket and Ikot Ekpene, and 6 Agricultural zones comprising Ikot Ekpene, Uyo, Eket, Abak, Oron and Etinan. The study made use of multi-stage sampling technique. In the first stage, a purposive sampling of 3 Agricultural zone s of Ikot Ekpene, Abak and Etinan was done. This is because these zones have a larger concentration of farmers that grow seed yams by minisett technology than the other zones in the State. In the second stage, 5 Agricultural Development Programme (ADP) blocks were selected. In the third stage, 8 respondents were chosen from each block with at least 1 from each circle of the block selected to capture the target farmers. The over all sample size for the study was 120. The data were collected with the use

of structured questionnaires. The data were analyzed using descriptive statistics such as means, standard deviations and percentages. A multiple regression model was estimated using the Ordinary Least

Squares (OLS) technique to determine the factors that influence output of seed yam in study area. Three functional forms (double-log, semi-log and exponential functional forms) were fitted into the multiple regression equation and the best form based on economic, statistical and econometric criteria was chosen as the lead equation and used in the discussion (Okoronkwo, 2006).

The estimated functional forms are explicitly stated as follows;

$Y=Lnb_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$ ..... (1)

Where, Y= output (kg)

X_1= fertilizer (kg)

X_2= Amount of labour (Man-days)

X_3= Farm size (Ha)

X_4= quantity of minisett planted in the field (kg)

X_5=Cost of stakes (₦)

X_6 =capital input made up of rent, interest and depreciated values of farm tools (₦)

b_0 = Y-intercept and b_1– b_6=Coefficients of independent variables to be estimated and e= Error term.

The depreciation of farm tools was determined using the straight-line method and zero salvage values of inputs, were assumed. This was consistent with the approach of Onyenweaku (1997) and Idiong (2005). The efficiency of resource use was determined by equating the marginal value products of the resources with their respective input prices.

RESULTS AND DISCUSSION

Input and Output variables used in seed yam production in the State:

Table 1 show that output per hectare of seed yam production was 5702.844kg. This was quite low compared to ADP's recommended 16-18 tons per hectare. Per hectare quantity of fertilizer applied was 170.35kg, far below 400kg – 600kg per hectare recommended by ADP. This may explain why the expected, because under dosage application of fertilizer can adversely affect yields. This was the findings of Okusanya et al, (2000).

The labour per hectare employed, by the farmers were 259.37 man-days on the average.

Seed Yam Production Function Estimates:

Table 2 shows the estimates of the functional forms used in the analysis of the data.

Table 1:Summary statistics of input and output per hectare in seed yam production in Akwa Ibom State.

Variable	Unit	Value per hectare	Standard deviation
Output	Kg	5207.84	2422.25
Fertilizer	Kg	170.35	79.23
Labour	Man-day	259.37	120.64
Planting materials (Minisett)	Kg	389.44	181.13
Stakes	₦	8,055.79	3746.88
Capital	₦	4,058.02	1887.45

Source: Compiled from field survey data, 2005

The double logarithmic function gave the best estimates based on economic statistical and econometric criteria and therefore was chosen as the lead equation used for discussion. Except for the coefficient of minisett, that was significant at 10 percent level, all other coefficients were either significant at 1 or 5 percent levels respectively. The adjusted coefficient of multiple determination (R^2 =0.940), indicates that about 94 percent of the variability in output of yam minisett was jointly explained by the independent variables. The F-ratio (F=314.08) also indicates the overall significance of the model at one percent level.

Table 2 **Multiple Regression Estimates of the Production Function**

FUNCTIONA	FORMS		
VARIABLE	**EXPONENTIAL**	**SEMI-LOG**	**DOUBLE-LOG**
Constant	4.434 (28.678)***	-0.2213(0.445)	1.48(2.74)***
Fertilizer (X_1)	0.00629 (3.487)***	9333.46(2.096)**	0.284(5.844)***
Labour (X_2)	-0.00271(3.233)****	2154.72(3.761)***	0.501(8.014)***
Farm size (X_3)	0.390(2.736)***	911.011(2.414)**	0.501(2.506)**
Minisett (X_4)	0.000626(2.088)**	207.455(0.596)	0.073(1.93)
Stakes (X_5)	0.0000156(0.07)	-521.782(1.631	0.123(3.526)***
Capital (X_6)	0.000309(4.129)***	-4.21(0.96)	0.165(21.96)***
R^2	0.75	0.65	0.94
Adj R^2	0.73	0.63	0.94
F	55.60***	34.72***	314.08

Source: Computed using field survey data (2005).
t- values in parentheses, *** significant at 1%;** significant at 5%

The significance of the coefficients of fertilizer (X_1), labour (X_2) and Stakes (X_5) at the one percent level implies that these variables have a positive and significant effect on output of seed yam in the State. The same thing goes for the coefficients of farm size (X_3) and capital (X_6) that were significant at the 5 percent level. The elasticity of production with respect to fertilizer (X), labour (X_2), farm size (X_3) and Stakes (X_5) were 0.284, 0.501, 0.501 and 0.165 respectively. This implies that an increase by 10 percent in fertilizer, labour, farm size, and stakes will lead to 2.84, .5.01, .5.01 and 1.65 percent increases respectively in output of seed yam. The sum of elasticity (1.66) shows that the farmers were operating in the region of increasing return to scale and therefore within the stage one of the classical production function.. The results corroborate the finding of Kashwaha, et al, (2000). The results also indicate that the farmers were not efficient in resource allocation. There was underutilization of fertilizer and land (MVP=₦173.6 and ₦53120 >Px= ₦70 and=₦2000 respectively), while labour was over utilized (MVP= ₦204.8< Px=₦300) by the farmers. Most farmers did not apply fertilizer on the farms. Since yam is a heavy feeder, non application of fertilizer or under dosage makes mockery of efforts to achieve high yield with the existing, decreasing soil fertility and shorter fallow system practiced by the farmers.

Table3: The estimates of elasticity, average product, marginal products, marginal value products and input prices.

Resources	Elasticity of Production	Average Pro	Marginal Product	Marginal Value Product	Input price
Fertilizer(	0.248	30.57	8.68	173.60	N70/kg
Labour	0.501	20.08	10.24	204.80	N300/manday
Farm size	0.501	5207.87	2656	53120	N2000/Ha

Note: Price of seed yam = ₦20 per Kg

The underutilization of fertilizer is as a result of the high cost and relative scarcity of this input in the area. Idiong (2006) reported a similar result in his study of rice farmers in Cross River State. He also reported the problem of labour saturation as a result of increase use of family labour on small farm sizes.

CONCLUSION AND POLICY IMPLICATIONS

The study concludes that seed yam farmers using the minisett technology in Akwa Ibom State were inefficient in resource utilization. Labour was over utilized, while fertilizer use was at the sub-optimal level. Most farmers cultivated small plots and heavily depended on family labour. These factors are indicative of their subsistence level of production with no surplus for the market. The problems of small farm size, none or under application of fertilizer can be alleviated by active government policy.

The government should draw up a framework to revive, empower and re-direct farmers' groups to pool their fragmented individual plots into large group farms (since most of the yam farmers operate on common farming areas) in order to enjoy the advantage of economies of scale. The strength of these farmers' groups or cooperative is expected to favour large capital formation and reduced cost of production not commonly enjoyed by small scale farmers.

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