

Socio-economic Factors Determining Upland Rice Production in Small Holder Agriculture in Osun State, Nigeria

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Abstract

This study examined the economics of upland rice production in Osun State with a view to evaluating the socio-economic factors influencing rice output in dryland rainfed rice production system among small holder farmers. Multistage random sampling technique was used to select 111 farmers from three rice growing communities in Oriade local government area of Osun State. These communities are located on deeply weathered but steeply sloping ridges which predisposes them to soil erosion and degradation. Farm business survey technique was used to collect information from the respondents. Results revealed that rice farmers had a mean age of 51 years and cultivated an average of 3.73 hectares of farmland. Rice cultivation is profitable with a rate of return of 35.4 percent which was higher than the prevailing rate of interest on commercial bank loans. Labour cost is the single most important variable cost item making up about 47.2 percent of the total variable cost. Elasticity estimates suggests that cost of fertilizer and herbicide has the highest potential (0.65) to increase rice output while number of children helping on the farm had the lowest potential (0.08). Use of crop residue was the best soil improvement technique adopted by 67.7 percent of the farmers and yielded a net return of ₦17,142.49 per hectare of rice cultivated. Major factors constraining upland rice production include non-availability of inputs, low prices and shortage of labour. Policy efforts to increase output of rice should focus on providing subsidized inputs to farmers, expanding farmers holding of rice, appropriate labour saving technology and strategies that will eliminate importation of rice in the medium to long term.

Key words: Dryland, Rainfed, Rice, Gross margin, Socio-economics

INTRODUCTION

In recent times, escalating food prices at the national and global levels has deepened the problem of food insecurity that has continued to trail the nation since the early 1970's (Oluwasola and Adewusi, 2008). This has prompted the government of the federation to take some panic measures to stem the tide of possible social

dislocations that could follow the problem of acute food shortages in a country of 140 million people growing at 3.0% and urbanizing at 5.5% per annum (National Population Commission {NPC}, 2006). Some of the measures taken include a short term import duty waiver on rice; a ₦10 billion long term intervention fund for the cultivation of the product locally (Daily Independent, 2008) and an immediate release of ₦80 billion from the Natural Resource Development Fund (NRDF) for the importation of 500,000 metric tonnes of Rice from Thailand (Federal Government of Nigeria Report, 2008).

Rice has increasingly become a major staple in Nigeria. Akande (2002) reported that domestic consumption of rice has been increasing at 10% since the 1970s. In fact the demand for the commodity has been increasing at a much faster rate in Nigeria than in any other country in Africa since the mid 1970s (FAO, 2001; Akande, 2002). The increasing demand for rice is not unconnected with the impact of increasing urbanization and globalization in changing the food culture and dietary pattern of most Nigerians among other reasons. Farmers have also responded to the increasing demand as the local production of the staple has continued to increase

over time, especially, after the introduction of the Structural Adjustment Programme (SAP). For instance, from a national output level of 280,000 metric tonnes in 1970, production increased to 808,000 metric tonnes in 1987 and 4.6 million metric tonnes in 2004 (CBN, 2005; Akande, 2002). In addition the area put under rice cultivation in the country also increased from 550,000 ha in 1980 to 3,713,900 ha in 2004 (PCU, 2001; CBN, 2005). In fact between 1987 and 1997, the area harvested increased by over 7.5 times (FAO, 2001).

In spite of increases recorded in rice output however, national output falls short of its demand hence, the nation over time has been increasingly spending substantial proportion of her foreign exchange earnings on importing the commodity to bridge the gap between demand and supply of the commodity. For instance Akande (2002) noted that by 1970, Nigeria expended US\$0.1 million on importing rice. By 1999, this has increased to US\$259 million. Currently and on the average, Nigeria expends US\$ 300 million annually to import one million metric tonnes of rice. This has become a major drain on the national foreign reserve situation of the country.

In Nigeria, rice is cultivated

mainly by small holder farmers who are resource poor; hence, yield per hectare is very low compared to what obtain elsewhere in the West African sub-region. For example, while the average yield of upland and lowland rain-fed rice in Nigeria is 1.8 tons/ha and that of the irrigation system is 3.0 tons/ha (PCU, 2001), the corresponding values for other countries like Cote d'Ivoire and Senegal in the same sub-region are 3.0 tons/ha and 7.0 tons/ha respectively (WARDA and NISER, 2001). In spite of these disparities, rice production is increasingly expanding in Nigeria. Rice is produced in five main ecosystems in Nigeria. These include the dryland (rainfed upland), hydromorphic (rainfed lowland), mangrove swamp, inland swamp and irrigated ecologies. The most important of these five according to (FMARD, 2001; Oteng and Sant'Anna, 1999), is the dryland (rainfed upland) which is characteristically an extensive rice culture based on traditional shifting agriculture. In the South-West Geopolitical zone the dryland rainfed upland rice is produced mainly in Ekiti, Ogun and Osun states. Incidentally, side-by-side with the economic prospects of upland rice production is the vulnerability of the ecosystem to the process of erosion and degradation except appropriate

strategies are put in place.

Recognizing the strategic importance of rice to Nigeria's food security plan as well as the need to reduce its imports, various policy measures and incentives have been put in place to stimulate domestic production of the product. These as detailed in Moses and Adebayo (2007), Manyong *et al.* (2005) and Akande (2002) include specific and direct agricultural policies like the National Accelerated Food Production project (NAFPP); the World Bank-Assisted Agricultural Development Programmes (ADPs); Operation Feed the Nation (OFN); the River Basin Development Authorities (RBDs); adoption of improved technology of different rice varieties including OS6, FARO15, FARO26 and FARO27; input supply policies; and other indirect measures like the Directorate of Food, Roads and Rural Infrastructures (DFRRI), trade policies and, monetary policies. In spite of these incentives, the production potentials of rice have not been attained and there has continued to be a wide gap between the demand for and supply of rice to the Nigerian food market. Factors implicated in this include: vagaries of weather, inconsistent and unstable policies, lack of technical and economic knowledge about rice cultivation and

unfavourable political climate (Adesimi and Fabiyi, 1995) as well as high cost of labour input (Okoruwa and Ogundele, 2004). This study was therefore carried out to examine the socio-economic factors that could affect the production of dryland (rainfed upland) rice in Osun State, in southwestern Nigeria with a view to offering appropriate policy measures to ensure the sustainability of the process.

OBJECTIVES

The main objective of the study was to evaluate the socio-economic factors influencing the production of dryland rice in Osun state. The specific objectives include:

1. examining the socio-economic characteristics of rice farmers in the study area,
2. analyzing the costs and returns to dryland rice farm enterprise,
3. determining the socio-economic factors affecting the output of dryland rice production in the study area, and,
4. identifying the management techniques used by farmers to check resource degradation in upland rice cultivation.

METHODOLOGY

Data Collection

The study was carried out

in Osun State located in the South-Western part of Nigeria. It covers an area of approximately 14,875 square kilometers and lies between longitude 4⁰ and 5⁰ E and latitude 7⁰ and 8⁰ N. Rice production in the State is carried out mainly in Oriade and Obokun local government areas (LGAs) which are situated on deeply weathered ferromagnesian rocks in the forest belt hence, the soil is rich in organic matter content. However, their location on the western uplands, traversed in several places by steeply sloping ridges and hills makes the land susceptible to erosion and degradation. The two main rice species grown in the area are *Oryza sativa* and *O. glaberrima*. Other species widely cultivated also include: ITA 150, Nerica 1, Nerica 3 and p.31.

Multistage sampling technique was used to select respondents for the study. Three communities, namely Erinmo, Erin-Ijesa and Ikeji-Arakeji, which constitute the core rice producing areas in the State were purposively selected from the study area. The lists of rice producing farmers in the selected communities were also obtained from the zonal office of the Osun State Agricultural Development Programme (OSA DEP), Ilesa. Using the list, a random selection of the farmers was made in proportion to the size

of the rice farmers in each community. In all, 50, 40 and 50 farmers were selected each from Erinmo, Erin Ijesa and Ikeji-Arakeji respectively. However, out of the 140 copies of questionnaire administered, only 111 were analyzable. The farm business survey method was employed to collect information from respondents with the aid of pre-tested structured questionnaire.

Data Analysis

Data collected were analyzed using descriptive statistics, budgetary analysis and the ordinary least square regression technique. Descriptive statistics, including frequency counts, means and percentages were used to describe the socio-economic characteristics of selected rice farmers-age, family size, farm size-in the study area. Budgetary analysis was employed to estimate costs and returns to enterprise. The gross margin was estimated as the difference between total revenue and total variable cost in farm production operations as stated in equation (1):

$$\pi_i = P_i Q_i - VC_i \dots\dots\dots(1)$$

where,

- π_i = gross margin per hectare (₦),
- P_i = price per unit of rice ((₦),
- Q_i = rice output (kg), and,

VC_i = variable costs of production (₦)
 Variable costs included in the analysis were expenditures on labour, seedlings, agrochemicals and transportation. Items that could be used for more than a production cycle were classified as fixed costs. These included cutlasses, sprayers and farm-bans. Efficiency measures were further computed to assess the economic performance of the enterprise during the survey period.

Finally, the ordinary least squares regression technique was used to estimate the socio-economic determinants of rice output and profitability in the study area. The model was specified as:

$$Q = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, \epsilon_i) \dots\dots\dots(2)$$

where,

- Q = rice output per hectare (kg/ha),
- X_1 = Transportation cost (₦),
- X_2 = Age of farmers (years),
- X_3 = number of children in the farm household,
- X_4 = Total farm size (ha),
- X_5 = cost of clearing and weeding (₦),
- X_6 = cost of harvesting/drying (₦),
- X_7 = cost of parboiling (₦),
- X_8 = cost of fertilizer and herbicide application (₦).
- ϵ_i = error term.

A priori, X_2, X_4, X_5, X_6, X_7 and X_8 are expected to be positively correlated to the level of output; X_1 , was expected to be

negatively correlated while X_3 , could be either positively or negatively correlated depending on whether it is a production or consumption unit. The Cobb-Douglas model was fitted to establish relationships between the specified variables given the reasonability of the underlying assumptions and the fact that it is generally acknowledged to provide a more realistic representation of the production function on the farm (Gujarati, 2005; Olayide and Heady, 1982).

The description of the variables used and their means is presented in Table 1. These variables were selected based on the assumptions that in traditional agriculture characterized by low resource inputs, farm size, labour, (hired and family labour) and age of the farmer are crucial to output

(Aihonsu, 2002; Oluwasola, 1996). Studies by Amaza and Maurice (2005) and Moses and Adebayo (2007) on resource use efficiency in rice production among small farmers further added inputs like seedling and agrochemicals. The selection of these variables followed these earlier studies. Opportunity costs concept (Lipsey, 1976) was utilized to estimate the direct costs involved in land improvement in the study area. This is because of the predisposition of the area to land degradation. The soil improvement strategies practiced by farmers were observed while the output obtained by farmers practicing different soil improvement techniques were computed and compared. The results of the various analytical techniques are presented in Tables 1 to 5.

Table 1: Variables used in the Regression Analysis

Variable	Mean	Standard Deviation
Gross margin (Naira)	77,958.73	78,410.95
Age of farmer (years)	51.27	9.85
Number of wives	1.41	0.67
Number of Children	5.83	3.03
Total Farm Size (Hectares)	3.73	4.03
Cost of clearing (Naira)	2,523.61	1,877.09
Cost of Harvesting/Drying (Naira)	1,408.03	1,868.04
Cost of Parboiling (Naira)	1,547.94	3,304.96
Cost of Transport (Naira)	578.64	552.47
Cost of Fertilizer/herbicide (Naira)	4,385.21	3,056.43

Source: Field Survey (2004)

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

The distribution of the socio-economic characteristics of the respondents is presented in Table 2. The mean age of the respondents was about 51 years which compares favourably with other studies in South Western Nigeria (Saka *et al.*, 2005). Most (67.3%) of the respondents fell within the 41-60 years age range. Only 8.2% of the respondents were aged below 41 years. Clearly, the farmers involved in upland rice cultivation in the study area were in their peak productive age and all things being equal, would be highly experienced in upland rice cultivation and farming generally. However, their age could affect their capacity to take risks and innovative methods that will yield returns only in the long term. This is because, as farmers age, they tend to be more risk averse (Oluwasola, 1996). It is thus important that younger farmers who could take risks, use modern farm inputs and modernize the small holder farming system be attracted to the farm if the national goal of becoming a net exporter of rice is to be achieved.

About 60.9% of the respondents had only one wife while another 30% had two. The remaining had more while only

2.7% were not married. Table 2 further shows that 36.4% had less than five children while 52.7% had between 6 and 10 children. Less than 2% had more than 16 children. The mean number of children was six. This shows that the average family in the study area was made up of about eight people. The large family size, typical of most rural farming communities in Nigeria where household labour is the most dependable source of farm labour (Oluwasola and Alimi, 2007) could be readily available for the heavy labour required on rice farm operations. However, large family sizes could increase household consumption expenditure and leave little for re-investment in the farm business.

All things being equal, the size of farms cultivated by farmers is a reflection of other socio-economic variables like availability and access to land, labour, credit, personal drive and other resources. A total of 39.1% of the respondents operated less than 2 hectares, 38.2% operated between 2 and 4 hectares while the remaining operated larger farmlands. In all, 60.1% operated more than 2 hectares. The average farm size operated by the respondents was 3.7 hectares which is larger than the national average of 2.0 hectares (NINCID 2006; Oluwasola, 1996) although most of the farmers were

still small holder cultivators. The average farm size cultivated by the respondents is also higher than the average of 1.12 ha reported for the State by OSSADEP (2004) or 2.6 ha for upland rice farmers in Southwestern Nigeria (Saka *et. al.* (2005) but comparable to 3.9 ha reported for swamp rice producers in Ogun State (Aihonsu, 2002).

Table 2: Socio-Economic Characteristics of the Respondents

Variable	Frequency	Percentage	Mean
Age (years)			
< 20	01	0.91	
21 – 40	08	7.27	
41 – 60	74	67.27	
61 – 80	27	24.55	
Total	110	100.00	51.3
No. of Children			
< 5	40	36.36	
6 – 10	58	52.73	
11 – 15	10	9.05	
16 – 20	2	1.82	
Total	110	100.00	6.0
No. of wives			
None	3	2.73	
1	67	60.91	
2	33	30.00	
3	5	4.54	
4	2	1.82	
Total	110	100.00	1.0
Farm Size (Ha)			
< 2	43	39.09	
2.1 – 4.0	42	38.18	
4.1 – 6.0	12	10.91	
6.1 – 8.0	4	3.64	
8.1 – 10.0	6	5.64	
> 10.0	3	2.74	
Total	110	100.00	3.7

Source: Field Survey (2004)

The breakdown of the cost components obtained from the study is presented in Table 3. Results from the table show that labour is the single most important cost component in the enterprise,

as it constitutes 47.2% of the variable costs. This is followed by the cost of fertilizer and herbicides (37.3%). The total variable cost components make up 75% of the total cost of production, showing that rice production enterprise is flexible since the fixed cost component is low. The knowledge of cost composition is important in understanding the nature of investment and the enterprise being studied. This is more so, when the enterprise is being operated in an environment susceptible to erosion and land degradation. The gross margin obtained per hectare was ₦21, 203.00 and is lower than the gross margin reported for upland rice farmers in Ogun State (Aihonsu, 2002). While the difference could be attributed to the nature of soil and variety of rice which affect yield, a major reason could be the fact that Ogun State is much closer to Lagos State where demand for the product and thus its market price is higher.

The financial efficiency ratios in Table 3 reveal that for every ₦100 spent on rice cultivation, ₦24.90 was spent on fixed inputs while ₦76.10 was spent on variable inputs. This

suggests that the farmers can easily adjust to market conditions. It also implies that oscillations in the market price of variable inputs could highly impact the gross margin obtained. Policies that will lead to a reduction in the costs of these inputs will thus enhance output as more farmlands could then be brought under cultivation and enhance of income which could then lead to the attraction of younger and able bodied men into rice cultivation. The Rate of Return on investment is 35.4% which suggests that rice production is profitable as this was much higher than the prevailing rate of interest at the time of the study which was about 22% National Bureau of Statistics (NBS) (2007). This implies that even if credit funds are used to operate the farm business, returns from sales of farm produce were sufficient to pay back the loan and still return substantial profits to operators. Thus existing credit policies should be vigorously implemented to ensure small holder farms are transformed to medium sized farms for enhanced rice output. The Benefit-Cost was also high at 1.354.

Table 3: Analysis of Costs and Returns to Rice Production

Item	Amount (₦)	Percentage in Cost Category
Returns	32,959.00	
Clearing costs	(2,524.00)	21.5
Harvesting/Drying costs	(1,480.00)	12.6
Parboiling costs	(1,548.00)	13.2
Transportation costs	(579.00)	4.9
Rice seed	(1,240.00)	10.6
Fertilizer/Herbicide application	(4,385.00)	37.3
Total variable costs	(11,756.00)	100.1
Gross margin	21,203.00	
Depreciation	(1,650.00)	42.3
Other fixed costs items	(2,250.00)	57.7
Gross profit	17,303.00	
Expense-Structure Ratio	0.249	
Benefit-Cost Ratio	1.354	
Rate of Return	0.354	

Source: Data analysis (2008)

Estimation of Factors Affecting Output of Upland Rice in the Study Area

The estimated regression equation of output for the rice farmers is presented in equation (3).

$$\ln Q = 3.88 + 0.138 \ln X_1 + 4.1832 \ln X_2 + 0.067 \ln X_3 + 0.187 \ln X_4 - 2.1229 \ln X_5 + 0.491 \ln X_6 + 0.366 \ln X_7 + 0.6533 \ln X_8 \dots \dots \dots (3)$$

(0.072) (6.1783) (0.015) (0.018) (1.2062) (0.017) (0.145) (0.1672)

Adjusted R² = 0.534 F-ratio = 20.742* (figures in parentheses are the standard errors)

*significant at 5% level.

Results from equation (3) show that most of the variables included conformed with *a priori* expectations except transportation cost (X₁), and cost of clearing and weeding farmland (X₅).

The positive sign on cost of transportation (X₁) shows a direct relationship between rice output and transportation cost. The coefficient of the variable indicates that a unit increase in transportation cost will increase output by about 14%. This relationship could have resulted from national energy pricing policy which has resulted in high petroleum prices and consequently on transportation cost. Although

statistically significant, the variable did not conform with *a priori* expectations. The age of the farmer (X_2) is positively correlated with output although the variable was not statistically significant. All things being equal, the age of the farmer is positively related to his experience in farming hence, it is expected that it will positively influence upland rice cultivation in terms of output and management of the farming process. The number of children of respondents (X_3) is positively correlated with rice output and is also statistically significant. As indicated by the coefficient of the variable, a unit increase in the number of children will lead to a corresponding 7% increase in rice output. This shows the significant role children play in rice production in the study area. The more children a farmer has, the larger the farm size although substantial part of the farm earnings will have to go into consumption expenditure.

Farm size (X_4) is also positively correlated to rice production. The variable is statistically significant with its coefficient indicating that a unit increase in farm size will lead to 19% increase in rice output. This shows the need for bringing more land area into rice cultivation for increased output to farmers. This will however call for adopting

sound soil management practices to prevent soil degradation that could result from deforestation as more land are brought under cultivation in the hilly region. There is however a statistically significant but negative correlation between the cost of clearing and weeding (X_5) and rice output with the variable indicating that a unit increase in the cost of clearing and weeding will lead to 212% decrease in farm output. The positive and statistically significant coefficients of cost of drying (X_6) shows that a unit increases in the cost of drying will increase output by 2%. The cost of drying paddy rice eats into the profit hence, as the cost for the activity rises, higher output levels are required to be achieved to absorb the price increase. This shows that increase in the cost of drying relates to increase in the volume of rice output. However, such costs are incurred at the mill as the task of drying is carried out mainly with family labour, especially children, in the study area. In the same vein, there is also a positive correlation between the cost of parboiling (X_7) and output of rice with the coefficient indicating that a unit increase in the cost of parboiling will lead to an increase of 15% in output of rice. Again, parboiling is a task carried out with family labour. Finally, there is a positive

correlation between cost of fertilizer and herbicide application (X_8) and rice output. The coefficient of the variable indicates that a unit increase in the cost of fertilizer and herbicide applied on the farm will lead to a corresponding increase of 65% in rice output. The increase in the cost of fertilizer and herbicide indicate an increase in the quantity of the inputs used in farm production. The variable is statistically significant and suggests that to improve the output from rice cultivation, fertilizer and herbicide application should be increased.

The adjusted coefficient of determination of 0.534 indicates that about 53% of the variability in rice output in the study area is associated with the explanatory

variables specified in the model.

The estimated elasticity coefficients obtained from the regression model is presented in Table 4. The result from the table reveals that most of the significant variables are elastic since they have value ranging from zero to one. The costs incurred in fertilizer and herbicide application has the greatest potential to increase rice output with an elasticity coefficient of 0.65. This is followed by the cost of drying (0.49) while the least is the number of children with a value of (0.067). There is therefore the need to access rice farmers to timely supply of fertilizers and herbicides and at rates that will help reduce the cost component of the variable in the total farm cost.

Table 4: Elasticity Estimates

Variable	Elasticities
X_1	0.138
X_2	4.183
X_3	0.067
X_4	0.187
X_5	-2.123
X_6	0.491
X_7	0.336
X_8	0.653
Returns to scale	3.521

Source: Data Analysis, 2008

Relative Costs of Soil Improvement Methods

Given the topography of the study area and a traditional dryland (rainfed upland) rice culture that is based mainly on shifting cultivation, soil erosion and land degradation could be exacerbated. Therefore, it is imperative for farmers to employ some soil management strategies to check overland flow of rain water. This will help reduce soil erosion, and enhance the sustainable production of upland rice in the study area. Two forms of soil management strategies were used by the farmers in the study area. A total of 67.3% of the respondent farmers used crop residue to check overland flow of water. This means, when the farm is cleared, the residues are not burnt but allowed to remain and decay on the land. This works in three ways to enhance soil resources management. First, when

the rain comes, they reduce the speed of the overland flow and hence erosion; second, as they decay, organic matter is added into the soil in a natural process and third, they tend to reduce the incidence of weed infestation thus lowering the cost of weeding (Oluwasola, 1996). The remaining 32.7% however ridged their farmlands to check overland flows. The income accruing to each of the two groups are presented in Table 5. The use of crop residues yielded a gross margin of ₦17,142.49 per hectare and a net revenue of ₦11,405.00 per hectare. Conversely, ridging of farmlands yielded a loss of ₦2,645.59 per hectare and a net revenue of ₦4,348.74. The use of crop residue by most farmers is therefore justified economically since it was the technique that yielded the most return of the two available options.

Table 5: Relative Costs of Alternative Soil Improvement Techniques

Soil Improvement Method	No. of practicing farmers	Percentage	Gross margin per hect. (₦)	Net revenue Per hect. (₦)
Minimum tillage/ Crop residue	74	67.3	17,142.49	1,405.00
Ridging	36	32.7	(2,645.59)	4,348.74

Source: Data analysis (2004)

Problems Confronting Upland Rice Production in the Study Area

Farmers involved in dryland (rainfed upland) rice production are confronted with a number of problems. Topmost among these problems mentioned by 94.6% of the respondents (Table 6) is the problem of input supply in terms of price and timeliness. National policies in terms of input supply have gone through several phases from the extreme of subsidizing inputs to that of outright removal of subsidies. For example, by 1997, subsidy on inputs like fertilizer was fully

removed but by 1999, it was reintroduced to the tune of 25%. By 2000, government completely liberalized procurement, trade and distribution of agricultural inputs including fertilizer (Akande, 2000) and placed it firmly in the hands of private individuals and firms. Given the topography of the rice producing communities, the use of shifting cultivation and the fact that substantial resources are spent on labour, easy access to cheaper inputs especially fertilizer, herbicides and improved seedlings will go a long way to enhance output of rice in the area.

Table 6: Problems Constraining Upland Rice Production

Problem	Frequency	Percentage
Input supply (cost and timeliness)	105	94.6
Low market price of rice	103	92.8
Shortage and high cost of labour	95	85.6
The menace of pests (grass-cutter and birds)	87	78.4
Difficulties of transporting farm produce	59	53.2
Delay in rains	38	34.2

Source: Data analysis (2004)

Another 92.8% of the sampled farmers complained of low prices of rice in the market. The flooding of the local markets with imported rice which are sorted and polished adversely affects the unsorted local ones. This is a major disincentive to sustained local production of the product in the country with implications for

continued importation and financial stress on the national foreign exchange utilization.

The third main problem is that of shortage of farm labour (85.6%) which forces farmers to depend heavily on family labour while the problem of pests, birds and grass cutter, was mentioned by 78.4% of the respondents. Another

53.2% of the respondents felt transportation of the produce from the farm to their homes was a major problem while 34.2% complained of the problem of having to depend on the generosity of nature to provide adequate and timely rain. When this fails, the investment also fails and the economic wellbeing of rice farming families becomes jeopardized. A way out of this is finding out the possibility of providing irrigation through well and hand-pumps in the area. This will call for further studies to identify the depth of water table in the deeply weathered rocks.

CONCLUSIONS

This study of rice production in the hillside communities of Osun state have yielded results that are quite relevant for agricultural policy formulation. From the findings of this study, it is apparent that fertilizer and herbicide constitute an important cost item in upland rice production. The farmers themselves have identified this as a major constraint to sustained production of upland rice in the area. The liberalization of procurement and distribution of farm inputs especially at a time of severe national food shortages is questionable more so when developed economies are still

subsidizing their own agricultural sector (Akande, 2002). Conscious efforts should therefore be made to access farmers to these inputs at low cost to ameliorate soil fertility level, increase rice output locally and reduce the importation of the product. The elasticity of the inputs to rice output makes their financial as well as physical access to rice farmers in order to increase the output of dryland (rainfed upland) rice in the country imperative.

In addition, labour for various farm activities like clearing and weeding, parboiling and drying, constitute major cost items in upland rice production in the study area. Policy efforts should also be directed towards providing labour saving technologies to augment the efforts of the farmers. This is most needful in the drying process of rice paddy. Furthermore, a policy measure to enhance farmer's access to production resources, especially land, is important. This is because the statistical analysis shows that increasing farm size will significantly increase farm output. However, bringing more land under the cultivation of dryland (rainfed upland) rice requires that soil management strategies that are able to check soil degradation are put in place to ensure sustainability.

The size of rice farms of 3.73ha shows that farming is still on a small scale. If Nigeria is to become self-sufficient in rice production, conscious plans that will transform the small holder farming structure to at least medium sized ones that are fully mechanized is very imperative now than ever before. The vast resources of land available for dryland (upland rainfed) rice production in Nigeria (Oteng and Sant'Anna, 1999) should be harnessed and younger farmers attracted and accessed with appropriate technology and inputs. These technologies should be environmentally friendly and economically affordable to boost the production of rice.

Finally, the national policy on rice should be made less volatile. Heaping on the nation several thousand tonnes of imported rice especially when prices of food crops rise have the tendency to stifle the prices of local products and is a major disincentive for local farmers. National policy goals on food security should focus on making Nigeria self-sufficient in the production of rice in five years. Strategies should be put in place to stimulate local production while reducing importation of the product over the next five years. There of course will be shortages that will

trigger off increase in the price of rice in the short run but such will be an incentive to increase local output of the product and move the nation along the path of self-sufficiency in the output of rice.

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