

Analysis of Cowpea Production under the National Programme on Food Security in Argungu Local Government Area of Kebbi State, Nigeria



* M.I. Abubakar and **J.O. Olukosi

*Department of Agricultural Economics and Extension, Usmanu Danfodiyo University, Sokoto,

**Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

ABSTRACT: Attempt was made to analyze cowpea production under the phase 1 of the National Special Programme on Food Security in Argungu Local Government Area of Kebbi State, north western Nigeria. Information was collected from 45 randomly selected cowpea farmers by the use of structured interview questions. Data were analyzed using descriptive statistics, marginal analysis, farm budgeting and OLS multiple regression techniques. Analysis of the data revealed that the resource allocative efficiencies vary widely, ranging between 0.04 and 34.61 with a mean resource efficiency of 4.23, which implies that factor inputs were under – utilized in the area. Farmers obtained an average gross income of ₦1, 720.67/ha and ₦26, 079.66/ha with a return on investment of 44% in the adopted cowpea – millet and cowpea- sorghum-pearl millet cropping systems. The major problems faced by the cowpea farmers include insect-attack on field, inadequate supply of insecticides, intermittent drought and inadequate credit. Recommendations drawn from the knowledge acquired from the study were highlighted.

INTRODUCTION

Cowpea (*Vigna unguiculata* (L.) Walp) is a pulse crop cultivated mainly in the drier areas of the Guinea Savanna, the Sudan savanna, and Sahel agricultural zones of Nigeria but average yield are low. This is because the farmers plant local cowpea varieties in traditional intercropping systems (Arega *et al.*, 2003). A huge gap still remains between the potential and actual cowpea yields. Poor cowpea yields are caused by menace of insect infestation in large-scale cowpea producing areas of the country. Also, an uncontrolled infestation of the insect sucking bugs would cause losses of 80% and 95% for pod and seed yield, respectively (Ogunwolu and Efeke, 1991). Thus, effective field management practices for insect pest control are necessary if farmers are to realize positive returns from cowpea production.

The demand for cowpea is increasing in West Africa (Coulibaly and DeBoer, 2000). This is mainly because of high population growth, poverty and demand for low-cost food. In Nigeria, the demand for cowpea does not meet the domestic cowpea supply thereby leading to huge deficits and imports to cover the production short fall from the neighboring countries like Niger Republic. It has been shown that Nigeria will not produce sufficient cowpea to feed the

growing population by the year 2015, under the most plausible yield assumptions. The gap between demand and supply may even widen, depending on whether conditions and absence of a major breakthrough in insect pest control (Kormawa *et al.*, 2000) Hence, this makes it imperative to analyze cowpea production problem in order to evolve ways of increasing its production in the country.

In West Africa, cereals such as sorghum and pearl millet are intercropped with cowpea. The productivity of the traditional system is low. Pesticides are not generally used in the traditional systems. This is because they are too expensive or not available. Ogunsumi *et al* (2002) reported that unavailability of farm inputs and unaffordable costs of most of the input components and adulteration in the content of herbicides were the major constraints to cowpea production in south west Nigeria. Hence, if cowpea yields could be increased it is necessary to identify the socio – economic constraints to cowpea production in the area.

In Argungu, there have been much agricultural extension efforts to disseminate new cowpea production technologies through establishment of demonstration plots, organizing group method

and farmers cooperative societies in recent years. However, there has been little research efforts in the economics of cowpea production especially in the area. Information on this aspect is equally important to the farmers and policy makers. Therefore, this study examines the resource use efficiency, costs and returns and problems encountered in traditional cowpea production systems under the National Special Programme on Food Security in Argungu Local Government Area of Kebbi State, Nigeria.

MATERIALS AND METHODS

The study was conducted at the National Food Security Site under the phase I in Argungu Local Government Area of Kebbi State, north-western Nigeria (Latitude 12° 35' N and Longitude 4° 45' E). Four villages were selected purposively and 45 cowpea farmers were selected using simple random sampling. Resource use and output data were collected by the use of structured interview questions. The analytical

tools for data analysis include descriptive statistics, marginal analysis, farm budgeting and OLS multiple regression techniques. Primary data collected were complemented with secondary data from published reports of the Kebbi Agricultural and Rural Development Authority in Argungu, Journals and other relevant statistical bulletins of the Central Bank of Nigeria and National Bureau of Statistics.

Analytical Framework

The economic models relating to the problem of individual resource poor farmers were specified following Farrell, 1957; Heady and Dillon, 1961; Olayemi and Olayide, 1981, Dawson 1985; Olukosi and Ogungbile, 1989; Ayinde, *et al.*, 2005. The gross margin model was built on the assumption that fixed costs are negligible in subsistence agriculture. The efficiency model assumed that market prices of factor inputs were used in proportion.

$$GM = GFI - TVC \tag{1}$$

$$Y = a_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e \tag{2}$$

$$Y = a_0 + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + e \tag{3}$$

$$\log Y = \log a_0 + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + e \tag{4}$$

$$r = \frac{MVP}{MFC} \tag{5}$$

$$NFI = GM - TFC \tag{6}$$

If $r = 1$, resource is efficiently utilized;

$r > 1$, resource is under – utilized; and

$r < 1$, resource is over – utilized

Where,

- | | | |
|-----------------------------------|-------------------------|---|
| GM = Gross margin | (₦) | e = Error term |
| GFI = Gross Farm Income | (₦) | a ₀ = Intercept |
| TVC = Total variable cost | (₦) | b ₁ – b ₅ are parameters |
| Y = Crops output in mixture | (kg – grain equivalent) | a ₀ , b ₁ – b ₅ are determined empirically |
| X ₁ = Land area | (ha) | MVP = Marginal Value Product |
| X ₂ = Labour used | (man – hrs) | MFC = Marginal Factor Cost |
| X ₃ = Local seed input | (kg – grain equivalent) | r = relative allocative efficiency ratio |
| X ₄ = Fertilizer | (kg) | NFI = Net Farm Income |
| X ₅ = Insecticide | (litres) | TFC = Total Fixed Cost |

RESULTS AND DISCUSSIONS

Costs and Returns Analysis

The gross margin analysis was the tool used for the farm budgeting technique. This was used to assess the profitability of the cowpea cropping systems. The analysis of the costs and returns revealed that the total variable costs as indicated in Table 1, were ₦11731.39/ha and ₦12,268.22/ha in cowpea=millet and cowpea – sorghum – pearl millet mixtures, respectively.

Table 1: Estimated costs and returns ₦/ hectare

Items	Cowpea - Millet	Cowpea-Sorghum- Millet
Gross Revenue	13452.06	38347.82
Variable costs		
Seed	894.14	792.61
Fertilizer	3611.55	4678.61
Labour	65391.96	6135.65
Insecticide	428.40	610.43
Manure	55.34	50.89
Total variable costs	11731.39	12268.22
Gross margin	1720.67	26079.66

Source: Field survey data, 2005/2006

From Table1, the average gross margin realized were ₦1720.67/ha and ₦26, 079.66/ha in 2-crop and 3 – crop mixtures, respectively. This implies that cowpea production under the National Programme on Food Security was profitable judging by the value of the gross margin as estimated in the table. It can be seen that the 3 – crop mixtures attracted the highest gross margin of ₦26, 079.60. This shows that the growing of crops in mixtures helped to stabilize farm

income. This compares favourably with Shehu (2001) who reported similar finding in cereal – legume mixtures in Kaduna State of Nigeria. It was also observed that the estimated returns from the sale of cowpea hay are expected to increase the level of income of the farmers in Argungu. The average rate of return on investment was 44%, which implies that a return of N0.44 was realized on every Naira invested. Researchers are of the view that the type of varieties (early or late varieties), field management practices of farmers, the type of pesticide used by the farmers and forms of precautionary measures adopted for pest control could explain the difference in gross margins of the cowpea cropping systems.

Marginal Analysis of factor Inputs

Ordinary least squares (OLS) regression procedure was used to estimate production function for the cowpea cropping systems, and determined the variation explained by all the explanatory variables on crops output. The Cobb – Douglas (double – log function) was selected as the lead equation for further analysis. The marginal physical product (MPP) was derived from the OLS regression estimates and market prices of factor inputs were used in the efficiency analysis. The results are presented in Table 2. It can be seen in Table 2 that the allocative efficiencies vary widely among cowpea cropping systems, ranging between 0.04 and 34.61 with a mean resource efficiency ratio of 4.23. This implies that the factor inputs in the area were inefficiently utilized. The inefficiency in the use of inputs may be attributed to smaller farms cultivated at the study sites in the area.

Table 2: Allocative Efficiency ratio of resource use for cowpea cropping system in Argungu area.

Cropping systems	Items	Land	Labour	Seed	Fertilizer	Insecticide
C/P	MVP(₦)	183.1	146.17	291.67	21.11	423.22
	MFC(₦)	1325.00	281.67	65.22	52.00	592.43
	MVP/MFC	0.14	0.52	4.47	0.41	0.71
C/S/Pm	MVP(₦)	45862.74	12.90	4.52	66.45	42.58
	MFC(₦)	1325.00	288.06	49.60	53.17	678.26
	MVP/MFC	34.61	0.04	0.09	1.25	0.06

Source: Field survey data, 2005/2006

Note: C/p = cowpea – millet; C/S/Pm = cowpea – sorghum – pearl millet

Constraints Associated with cowpea production at the study sites.

The farmers were asked to mention problems encountered in cowpea production as well as sort them into three categories: “not important”, “important”, and “very important”. These categories were assigned a respective score of 1, 2 and 3. These scores were then weighted according to their importance to the farmers’ situation, to produce an index representing the mean importance of each constraint. The results in Table 3 revealed that the major problems faced by the cowpea farmers include insect attack in field and inadequate supply of insecticides. The farmers complained that the problem of insect attack resulted in low yield of crops in the area. Also, the farmers mentioned that they faced difficulty in obtaining the necessary insecticides, which were untimely supplied under the programme in the area.

Table 3: Problems encountered by the cowpea farmers at the study sites.

* Problems	Frequency	%
Insect attack on field	19	38
Ill-timed supply of insecticides	10	20
Intermittent drought	8	16
Inadequate credit in kind	7	14
Inadequate extension contact	3	6
Shortage of hired labour	2	4

Source: Field survey data, 2005/2006

* = Multiple response of problems.

CONCLUSION

As in the semi arid region of west and central Africa, Argungu farmers traditionally cultivate different cowpea varieties for grain and fodder. The study found that the farmers obtained average gross margin of ₦720.67/ha and ₦26,079.66/ha with a return on investment of 44% in the adopted cropping systems of cowpea – millet and cowpea sorghum – pearl millet, respectively. It has been found that the allocative efficiencies of resource use vary widely among cowpea cropping systems, ranging between 0.04 and 34.61 with a mean resource efficiency ratio of 4.23. This implies that factor inputs were

under – utilized in the area. Evidence from this study has re – affirmed the claims that inefficiency in the use of available resources poses the major constraints to increased food production in Nigeria. It is suggested that the farmers should be encouraged to increase their level of resource use to earn higher returns from their production. The major problems faced by farmers include insect attack in field, ill-timed supply of insecticides and inadequate credit. Therefore, it is suggested that policies are needed that will enable not only cowpea farmers but farmers in general to have adequate access to necessary agrochemical farm inputs (insecticides and pesticides) to guide against poor cowpea performance and obtain good cowpea yields in the study area.

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