

Cost and Returns of Sole Cowpea Production in the Northern Agricultural Zone of Adamawa State

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Abstract

The study was aimed at examining the cost and returns of sole cowpea production in Northern Agricultural Zone of Adamawa State, Nigeria. Multi-stage random sampling technique was used to select 180 sole cowpea farmers using structured questionnaire. From the survey, the socio-economics characteristics of the farmers showed that 59.4% of the respondents were within the age bracket of 31 and 50 years which are predominantly male 81.11%. The result further revealed that 89.44% are married with average family size of eight persons. Land was mostly acquired (58.89%) through inheritance and about 88% had no contact with extension agents. Analysis of costs and returns revealed that the total production cost and gross income were N33, 741.88/ha and N84, 835.56/ha respectively, while the average gross margin and net income were N58, 113.10/ha and N51, 094.32/ha respectively. The rate of return was 1.51. The major problems of the farmers were striga infestation, high cost of inputs, high cost of labour and inadequate supply of improved seeds. Timely supply of inputs like agrochemicals, improved seeds and credit were recommended.

Keywords: cost, returns, sole-cowpea, production, northern zone.

Introduction

Nigeria is a typical agrarian economy where agricultural growth is increasingly recognized to be central to sustained improvement in economic development, as agricultural production occupies a very important link in the food security, poverty alleviation, human and national development chain in the country. The sector provides food, income, raw materials, foreign exchange and employment to the nation with over 65% of her population living in the rural areas and derives their livelihood from agriculture and its related enterprises (Ajila, 2007; Fabusoro and Agbonlahor, 2002). Therefore, the development of the agricultural sector is very important especially for increasing food supply in the country as well as achieving food self-sufficiency.

Cowpea is an important staple food in Nigeria and is produced largely for domestic consumption. It is a veritable source of protein and thus capable of providing solution to the protein-carbohydrate imbalance of the nutrition of Nigerians (Afolami, 2001). It is also an income earner, livestock feed, industrial raw material and capable of improving soil fertility (Quin, 1997). Production of cowpea is expanding in the country although is concentrated in the northern part (Sudan zone). Nigeria is a major producer of cowpea in the world; its production estimate in 1997 were 1.7 million tons from about four (4) million hectares and greater part of it was from the drier regions of the north (Singh *et al.*, 1997). The increasing demand for the commodity has led to more of its cultivation in many parts of the country. The use of improved technologies such as agro-chemicals and seeds also have

encouraged farmers into cowpea production in recent times for expected yield increase and economic gain. Thus, area of adoption for cowpea is on the increase in Nigeria.

Similarly, cowpea is produced virtually throughout Adamawa State with much of its production in the north-eastern part of the state. It is grown as a cash crop beside its value as food crop and, farmers are more into the production in the area especially with introduction of promising varieties such as 1792 KD and 178KD-76. In addition, the crop is increasingly cultivated as sole among the farmers (Sajo and Kadams, 1999; Gadiga, 2004). For the period 1996 - 1999, it was estimated that 147,380 tons of cowpea were produced in Adamawa State from a total of 203,520 hectares with an annual average yield of 181kg/ha. The hectareage was highest compared to that of groundnut and bambara nut which are also important legumes grown in the state (Owuama, 2005). Also, the production estimate of cowpea in Adamawa State for both 2000 and 2001 were 91,020kg from a total of 127,620 hectares which indicate a very low productivity. Also 8,972.80 tons of cowpea were produced from the northeast zone of the state in 1998 with an estimated 12,037.20 hectares put under cultivation which gives an average of 745.42kg/ha (ADADP, 2002).

Cowpea is one of the major legumes grown in Adamawa State and whose status has changed to an important cash crop especially in the north-eastern part of the state. And with the rising demand for the commodity the crop is being grown in all areas of the place. However, the production is mainly in the hands of small scale or resource poor farmers operating within the framework of traditional agriculture and they grow cowpea on scattered farms under rain fed situation. These small (subsistence) farmers have inefficient farming associated with low levels of farm finance, output, input and income among others as stressed by Seyoum *et al.* (1998) and Olayemi (1980). Farmers who produce cowpea in the study area face problems of resource allocation and use for economic optimum, poor use of corresponding input among farm enterprises, low productivity and inadequate familiarity with improved technologies. In spite of the cowpea varieties developed and recommended for different parts of Nigeria (Adeoye *et al.*, 2002; National Cereals Research Institute, NCRI, 1986), inefficiency in the use of available resources, input supply and socio-economic problems contribute to low productivity of the farmers and hence, it is needed to be examined for improvement in Adamawa State.

Methodology

Study area

The study was carried out in the Northern Agricultural Zone of Adamawa State. The area consists of ADADP Zones I and II of the state and it comprises of Madagali, Michika, Mubi North, Mubi South, Maiha, Hong, Gombi, Song and Girei Local Government Areas (LGAs). The area lies between Longitudes 12°15' and 13°45'E and Latitudes 9°15' and 11°N (Adebayo, 2004; Sajo and Kadams, 1999) (Figure 1). It has a land area of 14,345.77 km² and a population of 1,319,600 people according to the national census figure in the year 2006, with an annual population growth rate of 2.8% (NPC, 2006). Therefore, the projected population of the study area based on the yearly increment of 2.8% is 1,691,921 people in 2015. The area has a typical tropical savannah climate that is characterized by a dry and rainy season every year with the rainy season commencing in April and ends in October while the dry season starts in November and ends in April, and the wettest months are August and September. The mean annual rainfall ranges from 800 mm to 1050 mm and mean monthly temperature is 27.8°C, while the vegetation type is Sudan savannah characterized by scattered trees and short grasses/shrubs over the area (Adebayo, 1999a; Adebayo, 1999b).

The soils of the northern part of Adamawa State generally consist of well-drained light sandy loam soils (rich acidic soils) derived from the mountainous characteristics of the area as well as relatively high rainfall. This support the production of maize, sorghum, cowpea, rice and cassava as major food crops in the area while groundnut and sugar cane are the major cash crops. Livestock such as cattle, sheep, goat and poultry are also reared in the area (Sajo and Kadams, 1999).

Sampling and Data Collection Procedures

Primary data were used for the study and which were collected from sole cowpea producers in the northern agricultural zone of Adamawa State. A multi-stage random sampling technique was employed in selection of the respondents. First, five LGAs (5) out of the nine (9) LGAs in the area were randomly chosen. Next is the random selection of five wards from each of the chosen LGAs, then two (2) villages were selected from each of the wards. Finally, a total of 180 sole cowpea farmers were sampled from the 50 villages proportionate to their population size. Table 1 gives a summary of sampling procedure for data collection and the sample size. Structured questionnaire was used for the data collection and which administered with the assistance of trained ADADP staff. The data were based on two production seasons.

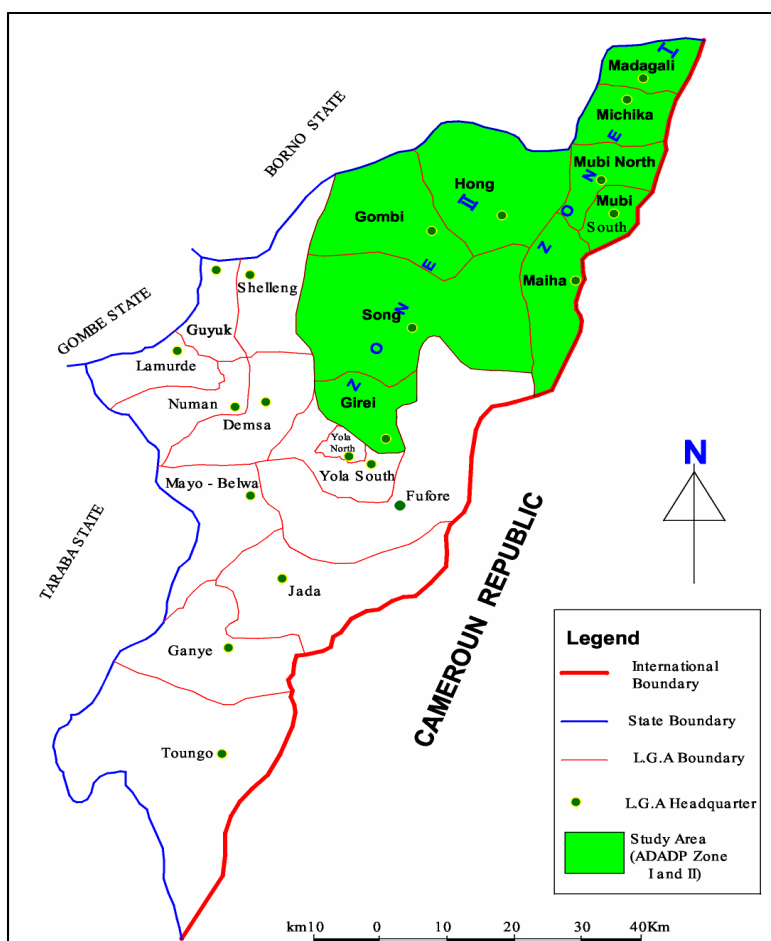


Figure 1: Adamawa State Showing the Study Area (Northern Agricultural Zone).

Source: Adapted from A. A. Adebayo (1999c): *Adamawa State in Maps*

Data Analysis

Descriptive statistics such as means, percentages and frequency distributions were used in analysing the socio-economic characteristics of cowpea farmers and problems of cowpea production in the study area. While gross Margin Analysis was used to determine the profitability of sole cowpea farming in the area. The estimation is given as follows:

$$GM = \sum Q_y P_y - \sum X_i P_i \dots\dots\dots (1)$$

$$NFI = \sum Q_y P_y - \sum X_i P_i - \sum F_k \dots\dots\dots(2)$$

Where:

- GM = Gross margin (N/ha)
- Q_y = Output of cowpea (kg/ha)
- P_y = Unit price of the output (N/kg)
- $Q_y P_y$ = Total revenue from cowpea (N/ha)
- X_i = Quantity of the i^{th} input used per hectare
- P_{X_i} = Price per unit of the i^{th} input
- $X_i P_{X_i}$ = Total variable cost associated with the i^{th} input per hectare
- NFI = Net farm income per hectare (N)
- F_k = Cost of fixed inputs per hectare (N)
- $\sum$ = Summation sign

Profitability index (PI)

It was used to determine the productivity of sole cowpea production based on returns to every Naira invested in the enterprise. It is given by the formula

$$PI = \frac{NI}{TC} \dots\dots\dots (3)$$

Where NI is the net income in naira per hectare and TC is the total cost of production in naira per hectare. The value obtained will be the net capital turnover for investment in cowpea production.

Results and Discussion

The socio-economic characteristics of the respondents examined were age, gender, marital status, extension contact, land acquisition and family size. This is illustrated in Table 1. Most of the respondents (59.4%) fell within the age of 31 and 50 years, implying that most of the respondents are in their productive age. Having a considerable number of farmers who are in their active age is of great advantage, because studies have shown that they are probably stronger and are willing to take risk, hence may easily adopt high yielding technology that are essential for greater productivity. The average age of the respondents is 46.52 years. This is similar to the report from the finding of Ajibefun and Aderinola (2003) who reported that the average age of food crop farmers in Ekiti state was found to be about 46 years. Result of the gender indicate that majority (about 81%) of the respondents are male while 18.89% are female. This could mean that there are more male folks in cowpea production in the study area than female folks. This result is similar with the report of Ayodeji *et al.* (2014) that cowpea production is male-gender biased in the study area given that 93% of the respondents were men. This finding is again similar with the report of Adebayo *et al.* (2008) who found in their study that majority (82.20%) of millet farmers in the study area were males, and who also dominated the production in the area, while female was just only about 18%. The marital status of the respondents indicates that majority (89.44%) are married, 6.11% are widowed while about 4%

are single. This means that, married folks are the majority in cowpea production. This may be to cater for the livelihood of their families. The finding relates to that of Ajani and Olayemi (2002) who found that majority (81%) of food crop farmers studied in Oyo North area were married. The family size distribution of the farmers shows that, 44.44%, and 50% have family sizes of 1-5 and 6 -15 persons respectively. The result generally indicated that majority (85.55%) of the respondents have a family size of between 1 and 10 persons per household. This means these farmers have a rather relatively large family size and could also mean that there will be available family labour for the house holds' farm production activities. However, the average family size of the respondents is eights (8) persons per household as shown on the table. This is similarly to the result of Ajibefun and Aderinola (2003) who reported a mean family size of eight (8) persons in their work on food crop farmers in Ekiti and Osun states respectively. The finding however reveals that majority (72.22%) of the respondents attended one form of tertiary education or the other. This implies these farmers would easily accept changes through new ideas. This result agrees with that of Adebayo *et al.* (2008) who reported that more than half (53.40%) of millet farmers hold primary and secondary educational qualification in the study area. However, a high percentage (about 28%) had no formal education.

Distribution of the farming experience of the respondents shows about 81 % had farming experience between 6 years and over 20 years. This shows that majority of them are experienced cowpea farmers and most likely, they would know the practices involved for increased output in production. The mean years of experience of the farmers are about 11 years. This finding is in consonance with the report of Adebayo and Anyanwu (2012) where they discovered that most of the respondents (male and female) have experience because they have been farming for more than 10 years. The result of farm size shows that majority (68.89%) of the respondents had farm sizes of 1-2 hectare while 17.22% of them had 3-4 hectares' farm size. The finding revealed that majority (68.89%) of the cowpea farmers in the area are small scale farmers since they have farm size of 1-2 hectares. From the result on Table 1, 40.56% of the farmers had contact with agricultural extension services through the agents while majority (59.44%) did not have contact. This could mean that these farmers were unable to benefit from agriculture extension-productive package since majority (59.44%) did not have any contact with farm extension. The result is in consonance with the findings of Idiong *et al.* (2006), who revealed in their study that majority (57.1%) of swamp rice farmers in Cross River State did not have contact with extension whereas 42.9% of the farmers had contact. Distribution of respondents based on cooperatives indicates that 33.33% are members of cooperative organizations, while majority (66.67%) are non-members. this could mean that they would not have the benefit of unity and oneness in their farm production particularly in accessibility and subsidized procurement of inputs. The finding however, corroborated the report from Idiong *et al.* (2006) who discovered in their study on swampy rice production that majority (57.13%) did not belong to any farmers' organization or cooperative, and they submitted however, that cooperative membership is important in enhancing farmers' knowledge on improved technologies through information sharing.

Table 1: Socioeconomic characteristics of the respondents

Age (years)	Percentages (%)
21-30	4.44
31-40	25.00
41-50	34.45
51 and above	36.11

Total	100
Mean = 46.52	
Gender	
Male	81.11
Female	18.89
Total	100
Marital status	
Married	89.44
Widowed	6.11
Single	3.89
Divorced	0.56
Total	100
Family size	
1-5	44.44
6-10	41.11
11-15	8.89
16-20	2.78
More than 20	2.78
Total	100
Mean = 8	
Educational level	
No formal education	27.78
Primary school	21.11
Secondary school	31.11
Tertiary education	20.00
Total	100
Years of experience	
1-5	19.44
6-10	31.11
11-15	21.67
16-20	12.78
Over 20	15.00
Total	100
Mean = 11.12	
Farm size	
Less than 1	9.45
1-2	68.89
3-4	17.22
5-6	2.22
7 and above	2.22
Total	100
Mean = 2.102	
Extension contact	
Had contact	40.56

No contact	59.44
Total	100
Cooperative membership	
Member	33.33
Not Member	66.67
Total	100

Source: Field survey, 2011

Costs and Returns of Sole Cowpea production among the Farmers

The profitability of sole cowpea production for the two cropping seasons is presented on Table 14. It revealed that the total production cost and gross income are N 35, 026.90/ha and N84, 922.77/ha respectively for the 2008/2009 season, while the same values are N 32.455.26/ha and N 84, 748.34/ha respectively for the 2009/2010 production. The gross margins for the respective cropping seasons are N57,109.75 and N59,116.44 per hectare respectively, while the net incomes are N49,895.87/ha and N52,292.77/ha respectively. Therefore, the profit margins revealed that sole cowpea production is a profitable venture in the area and it is worthwhile undertaking for income and livelihood earning. This finding agrees with the report from Ajani and Olayemi (2002) where cowpea was revealed to be profitable among food crop farmers in the study area. Moreover, the result for the pooled data on the costs and returns of sole cowpea in the same table indicated that the enterprise is reasonably profitable in the study area, given that the return is higher relative to the operational capital expenses incurred.

Costs and Returns of Sole Cowpea Production per hectare in the Study Area

Item	Value (N /Ha) 2008/2009	Value (N /Ha) 2009/2010	Pooled Value (N /Ha)	% of Total cost
Variable Costs:				
Seed	1,362.08	1,297.28	1,362.08	3.94
Ploughing	5,338.08	4,929.84	5,133.96	15.22
Agrochemical	2,686.17	2,675.13	2,680.65	7.95
Hired labour	7,725.55	7,533.97	7,629.76	22.61
Family labour	7,679.21	6,595.09	7,137.15	21.15
Other cost	3,021.93	2,600.28	2,811.11	8.33
TVC	27,813.02	25,631.59	26,722.31	
Fixed costs:				
Rent on land	6,201.25	5,919.75	6,060.50	17.96
Depreciation of tools	1,012.63	903.92	958.28	2.84
TFC	7,213.88	6,823.67	7,018.78	100
TCP	35,025.90	32,455.26	33,741.88	
Returns:				
Gross income	84,922.77	84,748.34	84,835.56	
Gross margin	57,109.75	59,116.44	58,113.10	
Net farm income	49,895.87	52,292.77	51,094.32	

Source: Field Survey, 2011

Problems of Cowpea Production in the Study Area

The distribution of the constraints encountered by the respondents in their cowpea production is shown in Table 2. The analysis revealed that the most serious problems of the farmers are weeds infestation-*striga* (23.86%), high cost of inputs due to inadequate supply (21.05%), high cost of labour (16.14%) and inadequate supply of improved seeds (14.39%). In addition, lack of tractors, shortage of rains, low capital base and poor soil fertility (depletion) as well as shortage of rains were not left out as challenges facing the cowpea producers in the area. Thus, the distribution of the problems in the table indicates that these farmers face many challenges in cultivation of cowpea in the study area which need to be addressed for increased cowpea production. This is because such constraints can limit the expansion of sole cowpea farming among farmers in the study area or it can make the farmers been discouraged to continue with the enterprise in the area. However, it was found from the study that nine (5%) of the respondents did not face problem in their production during the cropping seasons under study.

Findings from other studies showed that farmers are faced with notable problems that militate against increased production in different agro-ecological areas. For instance, Tologbonse and Muiyiwa (2001) reported that high cost, non-availability of herbicides and farmers' choice for hoe weeding have caused lack of adoption of the input among cowpea farmers in the study area. Similarly, problems which continue to militate against increased cowpea production in Adamawa State were identified as pests/diseases, high cost of transportation and agro-chemicals, lack of improved seeds and lack of tractor hiring services (Mshelia *et al.*, 1999).

Table 2: Problems Faced by Farmers in sole Cowpea Production

Problem	*Frequency	Percentage
Weeds (<i>Striga spp.</i>)	68	23.86
High cost of inputs	60	21.05
High cost of labour	46	16.14
Inadequate improved seeds	41	14.39
Lack of tractors	25	8.77
Shortage of rains	17	5.97
Inadequate capital	9	3.16
Soil depletion	7	2.46
Water-logging	5	1.75
Pests/diseases	5	1.75
Others (rodents, animals)	2	0.70
Total	285	100

Source: Field Survey, 2011, * Multiple responses

Conclusion

Costs and returns to sole cowpea production revealed that the total production cost and gross income were N 33,741.88/ha and N84, 834.56/ha respectively while the average gross margin on net income were N58,113.10/ha and N51,094.32/ha respectively. This indicated that sole cowpea production is a profitable enterprise worth undertaking.

Recommendation

Farmers should be encouraged to increase investment in cowpea production in the area since it is a profitable venture in the area. This could be achieved by enlightening the farmers to plough back

their surplus earnings into the enterprise or by sourcing for more funds to expand their present cowpea production. They should be educated through formal education process or extension education to improve their efficiency levels.

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