Research Article

Determinants and Profitability of Cowpea Production in Safana Local Government Area, Katsina State, Nigeria

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ABSTRACT

As an important cash crop in Nigeria, cowpea is extensively cultivated in most parts of northern Nigeria. This study was carried out to examine the profitability and factors influencing cowpea production in Safana local government area, Katsina State, Nigeria. Fifty farmers were randomly selected for the study area and semi-structured questionnaires were used to collect data. The data were analyzed using descriptive statistics, farm budget technique, and multiple regression analysis. Results indicated that most of the respondents (58%) were middle-aged within 30 - 50 years with 64% of the respondents having more than 5 years of farming experience. The most important determinants of cowpea production in the study area, include labour ($P< 0.01$), land ($P< 0.05$), and seed ($P< 0.1$). The production enterprise was very profitable as ₦ 46, 209.84 per hectare was generated as the net farm income. Also, the return per naira invested was found to be N 2.10. It was recommended that measures should be taken to bring about an increased generation of income, such as the use of improved seed varieties and the adoption of labor-saving technologies in the area.

Keywords: Profitability, Cowpea, Production, Regression

INTRODUCTION

Cowpea (*Vigna unguiculata*) is a food and animal feed crop grown in the semi-arid tropics covering Africa, Asia, Europe, the United States, and Central and South America. It originated and was domesticated in Southern Africa and was later moved to East and West Africa and Asia.

The grains contain 25% protein and several vitamins and minerals. The plant tolerates drought, performs well in a wide variety of soils, and being a legume replenishes low-fertility soils when the roots are left to decay. It is grown mainly by small-scale farmers in developing regions where it is often cultivated with other crops as it tolerates shade. It also grows and

covers the ground quickly, preventing erosion International Institute of Tropical Agriculture (IITA, 2017).

More than 7.4 million tons of dried cowpeas are produced worldwide, with Africa producing nearly 7.1 million. Nigeria, the largest producer and consumer, accounts for 48% of production in Africa and 46% worldwide. All parts of the cowpea crop are used as all are rich in nutrients and fiber. In Africa, humans consume the young leaves, immature pods, immature seeds, and mature dried seeds. The stems, leaves, and vines serve as animal feed and are often stored for use during the dry season. Fifty-two

percent of Africa's production is used for food, 13% as animal feed, 10% for seeds, 9% for other uses, and 16% is wasted (IITA, 2017).

Cowpea, known as beans in Nigeria, is an important economic crop whose seeds are consumed as a major source of protein, while the stems and leaves are used as animal feed during the dry season serving as a major source of income to its farmers. Its acceptability and consumption demand, adaptability to different soil types, and drought resistance make it an attractive and profitable crop to grow in Buhari (2017).

Nigeria produces nearly 47 million metric tonnes of beans from an estimated 4.5 million hectares annually, making it the largest pulses producer in Africa and the fourth largest producer of cowpea in the world (Daily Trust, Sun, 08 Oct 2017).

This study, therefore, identified the factors that influence cowpea production in Safana Local Government Area (L.G.A) of Katsina State, as well as to examine its profitability in the study area.

MATERIALS AND METHODS

Study Area

Katsina State is the study area. The state lies between longitudes 11^0 and 13^0 East of Greenwich meridian and latitudes 6^0 and 9^0 north of the equator. It covers a land mass of 23,938 square kilometers with a projected population of 10,368,500 by the National Population Commission of Nigeria & National Bureau of Statistics (NPC & NBS, 2022). The state shares a boundary with Kaduna in the south, Niger Republic to the north, Zamfara to the west and Jigawa and Kano States to the east (KTS official website, 2021).

The weather in Katsina State generally varies according to the season of the year. It is generally cool in the morning, hot in the afternoon, and cool in the evening. The Harmattan period (November-February) is usually cooler, windy and dust as a result of northeast trade wind (KTG, 2000). The State has about 863,000 farm families and cultivated land area of 1.64m ha ((KTS official website, 2021).The crops grown in the area include Cotton, Cowpea, Sorghum, Millet, Groundnut, Rice, Maize, Wheat and some vegetables. Livestock such as cattle, sheep, goat and poultry are also kept. Katsina State is also blessed with agro-allied industries such as flour mills, cotton crushing companies, cotton ginneries and oil mill (KTS official website, 2021).

This study was conducted in Safana Local Government Area (L.G.A) of Katsina State. Fifty farmers were randomly selected from five locations in the local government area. These are Gora, Kunamawa, Makanwaci, Runka and Zakka. Primary data were collected using questionnaires, which were administered to the respondents in the study area between September to November, 2021.

Analytical Techniques

The collected data were analyzed using descriptive statistics (means and percentages), farm budget technique to estimate the profitability of the enterprises, and multiple regression analysis to examine the determinants of cowpea production in the study area.

The farm budget technique is mathematically expressed as

$$TC = TVC + TFC \dots\dots\dots\dots \quad (1)$$

Where TC=Total Cost of Production

TVC=Total Variable Cost

TFC=Total Fixed Cost

Also

$$TR = TQ \times P \dots\dots\dots\dots\dots\dots\dots (2)$$

Where

TR=Total Revenue of Production

TQ=Total Quantity of output Produced

P=Unit Price (in Kilogram)

Then $NFI = TR - TC \dots\dots\dots\dots \quad (3)$

Where

NFI=Net Farm Income

TR = Total Revenue

TC = Total Cost

$$GM = TR - TVC \dots\dots\dots\dots\dots\dots (4)$$

Where

GM = Gross margin

TR = Total revenue ($P_Y . Y$)

TVC = Total variable cost

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The multiple regression model (linear) used for the study is presented as:-

$$Y = a_0 + b_iX_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + U \dots\dots\dots\dots\dots (5)$$

Where:

Y = Quantity of Cowpea produced (kg)

a_0 = Intercept

b_1- b_6 = Parameters estimated

X_1 = Labour used (mandays)

X_2 = Farm size (ha)

X_3 = Pesticides used (litres)

X_4 = Fertilizer used (kg)

X_5 = Farming experience (Yrs)

X_6 = Quantity of seeds used (kg)

U = Error term

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Educationally, most of the respondents (60%) attained the non-formal form of education (i.e. adult and Qur'anic education), while 40% of them acquired formal education in the study area. This means all the respondents are fairly educated; thus, they are capable of evaluating and managing risks associated with farm production. This result is similar to the findings of Kyiogom (2020).

Table 1 also, shows that 64% of the respondents are well experienced in crop production as their farming experience is more than 10 years. Also, most of the respondents (90%) cultivated farmlands of not more than 2 ha in the study area. Thus, they were adduced to be small-scale producers. This conforms to the assertions of Girei *et al*. (2018) that the largest proportions of total farm holdings in Nigeria, constituting more than 80% are small-scale holdings below 5.0 ha.

Determinants of Cowpea Production
The factors that influence cowpea production in the study area were determined using multiple regression analysis. The results are presented in Table 2. The result shows that the most important determinants (factors) of cowpea production in the study area were labour (X_1) significant at P < 0.01, farm size (X_2) significant at P < 0.05 and seed (X_6) significant at P < 0.1). It should be noted that cowpea production is labour intensive because important farm operations, such as weeding, harvesting and so on requires full utilization of labour to obtain high yield. Also, farm size determines the level of the output being produced; thus bigger farms are expected to produce more cowpea than the smaller ones. The quantity and variety of seeds used also influence the output Nkamigbo *et al*. (2018). It was noticed that most farmers in the study area uses improved varieties of cowpea for planting.

Furthermore, the regression coefficient of labour (X_1) was found to be negative (- 0.1333) and significant. This is contrary to economic theory that utilization of more labour input will lead to an additional level of output up to a certain point. Farm size (X_2) on the other hand, has a positive regression coefficient (9.516), which means that cultivation of more hectares will lead to increased farm output. Also, the quantity of seed (X_6) sown has a positive regression coefficient (0.2936). This means the more seed is sown, the higher will be the output.

However, the other variables were positive, though insignificant in influencing the level of cowpea production in the study area. These are use of pesticides (X_3), fertilizers (X_4), and years of farming experience (X_5) of the sampled farmers. Also, all the selected variables jointly influenced the level of cowpea production in the study area up to the extent of 98.6 %, as revealed by value of the R^2.

Profitability of Cowpea Production

The farm budget technique was used to determine the profitability of cowpea production enterprises in the study area. The result presented in Table 3, reveals that the total variable cost represent 98.8% of the total cost and 1.19% constitutes the total fixed cost. However, the cost of labour constituted the highest proportion (45%) of the total variable cost in the study area. This is in line with the findings of Haruna and Hamidu (2019) that labour is one of the most important inputs in poultry production in Bauchi state.

The total cost of production was estimated to be ₦22,040.16 per ha and the total returns was computed to be ₦68,250 per ha. The net farm income was found to be ₦46,209.84 per hectare with the return per Naira invested estimated to be ₦2.10. this means that the cowpea production enterprise was very profitable in the study area.

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Table 1: Distribution of the respondents according to their socioeconomic characteristics

Variables	Frequency	Percentage
Age		
< 30 years	21	42
30-50 years	29	58
Total	**50**	**100**
Level of Education		
Non- formal	30	60
Formal	20	40
Total	**50**	**100**
Farming Experience		
< 5 years	07	14
5-10 years	11	22
11-15 years	25	50
Above 15 years	07	14
Total	**50**	**100**
Farm size		
< 1 ha	19	38
1-2 ha	26	52
Above 2 ha	05	10
Total	**50**	**100**

Source; Field Survey, 2021

Table 2: Result of regression analysis for the factors that influences cowpea production

Variables	Regression Coefficient	t-ratios
Constant	-12862	-1.14
Labour (X_1)	-0.1333	-1.31***
Land (X_2)	9.516	2.17*
Pesticides (X_3)	0.0001590	1.00 n.s.
Fertilizer (X_4)	0.6628	1.25 n.s.
Farming experience (X_5)	0.03886	0.84 n.s.
Seed (X_6)	0.2936	2.43**
R^2	98.6	
F-value	253.12	

Source; Field Survey, 2021

Key: *** = Significant at $P < 0.01$, ** = Significant at $P < 0.1$; * = Significant at $P < 0.05$, n.s. = not significant.

Table 3: Costs and returns analysis for cowpea production

Item	Amount/ha(₦)	% of total
Variable Cost		
Seed	906.25	4.11
Agrochemical	2203.57	10.00
Transportation	2310.71	10.48
Fertilizer	6535.71	29.65
Labour	9821.42	44.56
Total Variable Cost	**21,777.66**	**98.8**
Fixed Cost		
Cost on depreciation on fixed inputs	262.50	1.19
Total Fixed Cost	**262.50**	**1.19**
Total Cost	**22,777.66**	**100**
Returns		
Total Returns	**68,250**	
Net Farm Income	46,209.84	
Gross Margin	46,472.34	
Returns/₦ investment	2.10	

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CONCLUSION

Cowpea production in Safana LGA of Katsina State was a very profitable venture and factors found to have significantly influenced its production in the study area were land, labour, and seed, with labour having a negative influence. However, there is a need for further improvement in the level of its production aimed at generating increased income. It is, therefore, recommended that farmers should be encouraged to patronize early maturing seed varieties and reduce the cost of labour by adopting appropriate labour-saving technologies on the farm. These practices could improve productivity and hence additional income, consequently improving the welfare of farmers.

REFERENCES

Buhari S. (2017). Nigeria's potential at global cowpea market. Daily trust newspapers. https://www.dailytrust.com.ng/nigeria-s-

Bwala, M. A. and Aniobi, U. J. (2018). Profitability of Rice Production in Bida Agricultural Zone of Niger State. *Journal of Bangladesh Agricultural University*, 16(1): 88-92.

Daily Trust (2017). Daily Trust Nigeria News Paper Sun, 08 Oct 2017.

Dei Antwi, K. and Aborisade, O. (2017). The profitability of Rice Production among Small-Scale Rice Producers in Ghana. *American Journal of Agricultural Science 4*, (1):1.

Girei, A. A., Zaknayiba, D. and Onyenye, P. O. (2018). Production Function and Profitability Analysis of Maize-Cowpea Intercropping In Nasarawa Eggon Local Government Area of Nasarawa State, Nigeria. J*ournal of Agriculture and Rural Research 2*(I-II), 1-8.

Haruna, U. and Hamidu, B.M. (2014). Economics of turkey production in the western agricultural one of Bauchi State. In: Ogunji, J.O; O.Sakwe I.I; Ewa, V.U; Alaku, S.O; Otuma M.O. and Nweze, B.O. (eds). *Seif sufficiency of Animal Proteins in Nigeria: A Reality or a Mirage?* Proceedings of 9^ Annual Conference of Animal Science Association of Nigeria. PP116 – 118

I.I.T.A. (2017); International Institute of Tropical Agriculture (IITA). Ibadan, Nigeria. http//;www.iita.org

Katsina State Government (KTG) (2021). Official Website.

Nkamigbo, D. C., Nwoye, I. I., Makwudo, E. O. and Gbughemobi, B. O. (2018). Economics of maize production in Oyi local government, Anambra State, Nigeria. *International Journal of Agriculture and Biosciences*, 7(2), 61-64.

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