Resource Use Efficiency of Cowpea Production in Ngaski Local Government Area, Kebbi State, Nigeria

[1]Dabai J. S., [1]Baba M. D. and [2]T. A. Manga

[1]Department of Agricultural Extension and Management Kebbi State College of Agriculture Zuru, Kebbi State, Nigeria
[2]Department of Crop Production Technology, Kebbi State College of Agriculture Zuru, Kebbi State, Nigeria
musababs1970@yahoo.com

Abstract: Inefficiency in the use and allocation of resources constitute a major problem to increased food production in Nigeria. This research analyses the resource use efficiency of cowpea production in Ngaski Local Government Area of Kebbi State, Nigeria. Essentially, it focused on the socio-economic characteristics of cowpea farmers, the resource use efficiency and problems associated with cowpea production. Data were collected from one hundred (100) cowpea farmers proportionate to the population. Structured questionnaire was utilized to collect primary. The data were analyzed using descriptive statistics and production function analysis. Result revealed that an average cowpea farmer is male, aged between 31 and 40 years, attended up to tertiary institution. Majority are farmers, married, with a household size of about 6-10 persons, with average monthly income of ₦41, 314.12 and has about 11-15 years' experience in cowpea production. Linear function gave best fit with R^2 value of 0.701. This indicated that 70% variation in cowpea output is explained by the inputs included in the model. For the efficiency analysis, seed and pesticide were under-utilized, while labour and farm size were over-utilized in the production of cowpea in the study area. Among the problems identified, pest and disease is the most severe problem suffered by cowpea farmers in the study area. It could also be concluded that resources used in the production of cowpea were inefficiently utilized. Increase in the use of under-utilized inputs and decrease in the use of over-utilized inputs as well as access to credit support are therefore recommended.
[Dabai J. S., Baba M. D. and T A. Manga. **Resource Use Efficiency of Cowpea Production in Ngaski Local Government Area, Kebbi State, Nigeria.** *N Y Sci J* 2015;8(3):47-51]. (ISSN: 1554-0200). http://www.sciencepub.net/newyork. 9

Keywords: Resource use, Efficiency, Cowpea, Production, Ngaski, Kebbi State.

1.0 Introduction

Cowpea (*vigna ungulculata*) is an important legume crop that is grown in many parts of Nigeria though much of its production takes place in the savanna region of the country. It is an important staple food and a cheap protein source to rural and urban dwellers with the demand for the commodity increasing in the nation. However the domestic production is in the hands of small scale farmers who obtain yield of 200-350kg/ha (Singh and Jackai, 2000). Similarly, Agboola (2001) reported an average yield of 271.5 kg/ha from the vast area of 3.8 million hectare devoted to cowpea in Nigeria. In addition, they further reported that, with the use of improved technologies, a cowpea production yield of 1,500-2000kg/ha can be obtained on soled cropping. This provides household food security, compared to other grains; cowpea is more tolerant to soil fertility and thrives well in warm climate with moderate and evenly distributed rainfall.

Cowpea provide income and employment opportunity for most people in the rural communities particularly women who are entirely responsible for its processing and marketing. It provides them additional earning opportunity to contribute to the household food security. Every Nigerian eats cowpea and per capital consumption is about 25kg to 30kg per annum (Falusi, 2002). The grain is a good source of protein for human nutrition, while the haulms are valuable source of livestock protein. It is also a source of income for many smallholder farmers in sub-saharan Africa and contributes to the sustainability of cropping systems and soil fertility improvement in marginal lands through provision of land cover and plant residue, nitrogen fixation and suppressing weed (Falokun *et al.*,, 2011). In addition, cowpea is regarded as a cheaper source of protein to the poverty ridden populace of Nigeria. Recently, following the interest of international bodies in reducing hunger, poverty and malnutrition, in developing countries, including Nigeria, the prospect for reducing hunger, malnutrition and food insecurity through increase in cowpea productivity is significant (Coulibaly and Lowenbherg-debber, 2000).

Resource allocation in productivity is an important aspect of increased food production which is also associated with the management of the farmers who employ these resources in production. Furthermore, efficiency in the use of available resources is a major pivot for a profitable farm enterprise combination in Nigeria (Okorji and Obiechina, 2002).

2.0 Methodology

Ngaski Local Government Area is one of the twenty one (21) Local Government Areas of Kebbi State. It is located in the extreme Southern part of the State on the shores of Kainji lake with its headquater in Warrah town and covers an area of about two thousand six hundred and thirty three (2, 633 km^2) square kilometres (National Population Commission, 2006). Ngaski LGA is bounded in the east by Auna LGA of Niger State, in the West by river Niger, in the South by Nasko LGA of Niger State and in the North by Rijau LGA of Niger State. It lies between latitude 10^o 05'N and longitude 4^o 10'E of the equator. The estimated population of the LGA is one hundred and twenty four thousand seven hundred and sixty six (124, 766) people (NPC., 2006).The climatic condition of the study area falls within the guinea savannah zone. The area usually receives a rainfall ranging from 1200mm – 1500mm per annum with a mean temperature of 35^oC which favours the cultivation of crops ranging from cereals, pulses and vegetables as well as animal production and fisheries resources (Zakari, 2004). Ngaski Local Government comprises of many ethnic groups but the dominant indigenous ethnic groups of the Local Government Area are Kambari, Gungawa, Lopawa and Hausawa the other non indigenous ethnic groups in the Local Government Area are Yoruba, Igbo, Fulani and other tribes found in the country. All these tribes mention have a long-standing peaceful interacting and harmonious relationship among themselves and their immediate neighbours. This peaceful and harmonious co-existence could be attested by the fact that no single inter communal or religious clashes have ever been recorded in the study area. (Zakari, 2004).

2.1. Sampling Technique

Ngaski Local Government Area is made up of five (5) administrative districts namely; Maginga, Ngaski, Makurdi, Birnin Yauri and Kambuwa districts. With aid of a sampling frame adopted from the cowpea farmers association of Ngaski Local Government Area of Kebbi State. Two (2) villages were purposively selected from each district, making a total of ten (10) villages. Therefore, from each of the selected villages cowpea farmers were selected proportionate to the population. Thus, a total of one hundred (100) cowpea farmers constitute the sample size for the study.

2.2. Method of Data Collection

The basic instrument used for data collection for this research is a structured questionnaire containing both open and close ended questions.

2.3. Analytical Techniques

The data collected from the administered questionnaire were analyzed using descriptive statistics, while production function was used to determine the resource use efficiency of cowpea production.

Production function could be defined as the technical relationship between inputs and outputs. It has been widely used to acquire information on productivities of resources, elasticity of production, and return to scale (Tanko, 2004). The estimation of input-output relationship involves the specification of production function, which depicts the factor-product relationship (Heady and Dillon, 1972).The production function model used is implicitly stated as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, e)$……………… (1)

Where:

Y = Output (kg);

f = Functional notation;

X_1= Seeds (kg);

X_2 = Labour (man-days);

X_3 = Pesticides (litres);

X_4 = Farm size (ha);

e = Error term.

Four functional forms used were explicitly stated as follows:

Linear Function

$Y = b_o+x_1b_1+x_2b_2+x_3b_3+x_4b_4+e$……. (2)

Semi-Logarithmic Function

$Y = bo+b_1lnx_1+b_2lnx_2+b_3lnx_3+b_4lnx_4+e$. (3)

Cobb-Douglas Function

$lnY = lnbo+b_1lnX_1+b_2lnX_2+b_3lnX_3+b_4lnX_4+ e$ (4)

Exponential Function

$lnY = b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+e$…….. (5)

Where;

b_o= Constant term,

b_1- b_5 = Regression coefficients.

The most widely used measure of resource use efficiency is the MVP/UFC ratio. The MVP/UFC is more reliable and statistically testable since it could be obtained from the coefficient estimates (Alimi, 2000).Marginal value productivity analysis was used to determine the efficiency with which each variable was used. Marginal value productivity of factor was derived and compared with respective prices in order to determine how efficient resources were being used in the production process. Efficiency of resources used were determined by the following ratio.

$r = \frac{MVP}{UFC}$………………..………...... (6)

Where:

r = Resource use efficiency;

MVP = Marginal value product and

UFC = Unit factor cost.

Theoretically, a resource is optimally utilized when ratio of MVP to UFC is equal to unity. A ratio of less than unity is interpreted to mean that a variable resource is over utilized, while a ratio greater than

unity is an indication of resource underutilization (Tanko, 2004).

3.0 Results and Discussion

3.1. Socioeconomic Characteristics of Cowpea Farmers

Result revealed that an average cowpea farmer is male, aged between 31 and 40 years, attended up to tertiary institution. Majority are farmers, married, with a household size of about 6-10 persons, with average monthly income of ₦41, 314.12 and has about 11-15 years' experience in cowpea production. This showed that cowpea production was dominated by youths in the study area. This implied that people within this age bracket are able-bodied that are likely to produce more. Another reason could be that young farmers are likely to adopt new innovations than the older ones. Result also indicated that participation by females is very low compared to their male counterparts. This is probably because men are the bread winners of most families. They therefore, have to engage in income generating activities to raise money in order to provide for their families. Conversely, the high level of men involvement may also be due to high demand for labour in terms of weeding and pesticides application which women may not be able to combine with household activities. Another reason might be that women might not be in a financial position to purchase the necessary inputs for cowpea production because they are costly and or have access to farm land for production. This coincided with the findings of

3.2. Production Function of Cowpea

Linear function was chosen as the best fit with R^2 value of 0.701, which implies that about 70% of the variation in dependent variable (cowpea output) is explained by the independent variables included in the model. The F-ratio is statistically significant at 1% level indicating that the explanatory variables included in the model adequately explained the dependent variables. This is in line with the findings of Stephen *et al.* (2009) that reported About 68% of the variation in output of cowpea is explained by the factor inputs as indicated by the value of R^2 (0.676). The regression coefficients with respect to seeds (X_1), labour (X_2), pesticide (X_3) and farm size (X_4) were all positive, but, only pesticide is statistically significant at 1%. This implied that further increase in the use of these inputs by 1 unit, will lead to further increase in cowpea output by 52.489, 2.885, 764.645 and 1.386 respectively. The importance pesticide to cowpea yield cannot be over-emphasized; this is evident as timely, proper and adequate application of pesticide determine to a large extent the quantity of cowpea output to be realized and vice versa.

Table 1: Production Function Estimates of Cowpea

Variables	Régression Coefficients	Standard Error	T-ratio
Constant term (b_o)	-626.890	154.514	-4.057***
Seeds (X_1)	52.489	66.487	0.789^{ns}
Labour (X_2)	2.885	14.460	0.200^{ns}
Pesticides (X_3)	764.645	164.167	4.658***
Farm size (X_4)	1.386	6.175	0.224^{ns}
R^2	0.701		
F-ratio	55.668***		

Source: Field survey Data and Computation by the Researchers, (2015). Note *** implies statistically significant at 1 level and ns means not significant.

3.3 Resource Use Efficiency of Cowpea Production

The marginal value analyses of inputs in cowpea production in the study area revealed that the ratio of marginal value products to unit factor costs for seed and pesticide are greater than 1, suggesting under-utilization of the inputs. Implying that the inputs were used under their economic optimum and productivity of cowpea can be increased by increasing the levels of these inputs used. Under-utilization of seeds and pesticides could be as a result of the costly nature of these in inputs when their demands were at peak. Labour and farm size had MVP/UFC ratio of less than 1 suggesting over-utilization of the inputs. Labour was over-utilized because there might be availability of family labour or it could be attributed to the small-scale nature of cowpea production in the study area, while farm size was also over-utilized because there might be availability of farm land or leasing (rent) of land is cheaper in the study area. It could also be that cowpea farmers in the study area are not strictly following the intra and inter row spacing during planting which may lead small plant population in a relatively large farm size.

Table 2: Resource Use Efficiency of Cowpea Production

Variable	MPP	MVP (₦)	UFC (₦)	MVP/UFC	Efficiency
Seed (X_1)	52.489	8398.2	120	69.985	Under-utilized
Labour (X_2)	2.885	461.6	1, 000	0.4616	Over-utilized
Pesticide (X_3)	764.645	122343.2	1, 200	101.95	Under-utilized
Farm Size (X_4)	1.386	221.76	2, 500	0.0887	Over-utilized

Source: Field Survey Data and Computation by the Researchers, 2015. Note: Py is the unit price of output = ₦160.

Table 3: Problems of Cowpea Production

Problems	Frequency*	percentage	Ranking
Pest and Diseases	146	78.01	1st
Inadequate capital	56	29.94	3rd
Inadequate Extension Services	48	25.66	4th
Low yield	34	18.18	2th

Source: Field survey and Computation by the Researcher, (2013). *Multiple responses were recorded.

3.4 Problems of Cowpea Production

The study identified four (4) problems associated with cowpea production in the study area, they include; pest and disease problem, inadequate capital, inadequate extension services and low yield of cowpea. Result further indicated that pest and disease was the most severe problem faced by cowpea farmers in the study area as it is ranked first. This can be attributed to the fact that pest attack especially during flowering stage drastically affect yield of cowpea. However, low yield, inadequate capital and inadequate extension services were ranked second, third and fourth, respectively.

4. Conclusion and Recommendations

From the findings, it could also be concluded that resources used in the production of cowpea were inefficiently utilized seeds and pesticide were under-utilized. This means that cowpea farmers should increase the quantities of seeds and pesticide used in the production of cowpea in order to bring about increase in output, while labour and farm size were over-utilized as such further decrease in their use by cowpea farmers will lead to increase in output as well. The major problem faced in cowpea farmers in the study area was pest and disease as it was ranked first among all the problems. Increase in the use of under-utilized inputs and decrease in the use of over-utilized inputs as well as access to credit support are therefore recommended.

Acknowledgement:

Authors are grateful to the management of College of Agriculture Zuru, Kebbi State for their support and cooperation towards the conduct of this research.

Correspondence to:

Department of Agricultural Extension and Management, College of Agriculture, PMB 1018 Zuru, Kebbi State, Nigeria.

musababs1970@yahoo.com

References

1. Agboola S.A. (2001). An Agricultural Atlas of Nigeria, Oxford university press, London. Pp 97.
2. Alimi, T (2000). "Resource Use Efficiency in Food Crop Production in Oyo State". Journal of Agriculture and Environment, 1 (1): 1-7.
3. Coulibaly, O. and Lowenberg-Debber, L. (2000). "The Economics of Cowpea in West Africa" in Changes and Opportunities for Enhancing Sustainable Cowpea Production. Proceedings of the World Cowpea Conference III held at the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria. Pp 4 – 8.
4. Falokun, A.C., S.A. Tarawali, B.B. Singh, P.M. Kormawa and Tarno, M. Technical Efficiency of Cowpea Production (eds). International Institute for Tropical Agriculture (IITA) Ibadan, Nigeria, (2011). Pp 52 – 61.
5. Falusi, A.O. (2002), concept Papers for Phase Two of National Agricultural Research Project.
6. Heady, E.O, and J.L. Dillon (1972). Agricultural Production Functions, IOWA, State University Press Ames. IOWA.64Pp.
7. NPC (2006). National Population Commission (2006) provisional Census Figures Yauri Area Office, Kebbi State.
8. Okorgi, E.C. and Obiechina, C.O.B. (2002). Bases for Farm Research Allocation in Traditional Farming System: A Comparative Study of

Productivity of Farm Resources in Abakaliki Area of Anambra State, Nigeria, Agricultural System, Vol. 17, Pp 197 – 210.
9. Singh, S.R. and Jackai, E.N. (2000). Insect Pests of Cowpea in Africa: their Life Cycle, economic Importance and Potentials for Control of S.R. Singh and K.O. Rachie (eds) Cowpea Research Production and Utilization (CRPU), S.R. John Wiley and Sons Ltd. Pp 219 – 231.
10. Stephen, J., Mshelia, S. I. and Kwaga, B. T. (2008). Resource-Use Efficiency in Cowpea Production in the North-East Zone of Adamawa State, Nigeria. http://www.verypdf.com/
11. Tanko, L. (2004). Optimum Combination of Farm Enterprise in Kebbi State, Nigeria: A Linear Programming Approach, "Unpublished Phd Dissertation, department of Agricultural Economics", Micheal Okpara University of Agriculture Umudike Nigeria.
12. Zakari, U. B. (2004). Climate Aspect of Desertification and Tree Planting in Ngaski Local Government Area of Kebbi State, Nigeria. A Seminar Paper Presented at Ngaski Local Government Secretariat, 20th June, 14Pp.

3/6/2015