Resource Use Efficiency Of Sugarcane Production In Mubi North Local Government Area Of Adamawa State Nigeria

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Abstract: This study examined the resource use efficiency of sugarcane production in Mubi North Local Government Area of Adamawa State Nigeria. The objective of the study was to describe the resources used efficiency in sugarcane production and to identify the main constraints associated with sugarcane production in the study areas. 80 sugarcane farmers were selected using multi-stage sampling technique and administered with well-structured questionnaire to generate primary data. Descriptive statistics and inferential statistics regression analysis were used as analytical tools for the study. Results of the regression analysis revealed that, quantity of seeds (x_5) age (x_1) and cost of hired labor were important in explaining the variation in output of sugarcane production in the study area. Inadequate capital and credit inaccessibility, shortage of land, unavailability of fertilizer at affordable price, unimproved varieties, lack of standardized means of measurement, bad road and distance of market from the farm were the major problems militating against sugarcane production in the study area. Based on the findings, it can be concluded that, the study area had great and substantial potential to increase sugarcane production and farmers' income, if efforts are made for the widespread of new technologies and identified constraints are properly and carefully addressed. However, effort should be made to mobilize and encourage farmers to form co-operative society, so that they can pool their resources together to increase their scale of operation. Also government should make production inputs like improved seeds variety, agro-chemical and also aid like cash funds at the right time and at subsidized rate because production inputs were some of the limiting resources that adversely affected sugarcane production in the study area.

[Anaryu. B. Wahu, Joyce D Moses, Jimjel Zalkuwi and Dolaree A Dolaree. **Resource Use Efficiency Of Sugarcane Production In Mubi North Local Government Area Of Adamawa State Nigeria.** *Rep Opinion* 2017;9(12):25-29]. ISSN 1553-9873 (print); ISSN 2375-7205 (online). http://www.sciencepub.net/report. 5. doi:10.7537/marsroj091217.05.

Keywords: Sugarcane Production, Mubi North Local Governmen, Adamawa State Nigeria

Introduction

Sugarcane is produced predominantly in the tropical and sub-tropical regions and sugar beet predominantly grown in colder temperature regions of the world. Other than sugar, products derived from sugarcane include, *falerrum*, molasses, rum, *coshaca* (a traditional spirit from Brazil), bagasse and ethanol (Godheja Shekhar and Mod, 2014). The important sugar producing countries in the tropical Africa are Mauritius, Kenya, Sudan, Zimbabwe, Madagascar, Cotedivoire, Ethiopia, Malawi, Zambia, Tanzania, Nigeria, Cameroun and Zaire.

The current estimated sugarcane production of the nation Nigeria as at 2008 was put over 1.4m tonnes. These figures represent the combined production of both industrial and domestic consumption of sugarcane. For domestic consumption is produced more than that produced for industrial used. Thus chewing cane accounts for between 55 – 65% of the total cane production. The bulk of these are consumed raw for its sweetness of the juice but some of it is processed into a variety of product such as sugar, Molasses, bagasse, sweet and left over leaves/stalks (Busar and Misari, 2007). Sugarcane has three main product namely; sugar, boggasse and molasses and the sugar industry is responsible for the manufacture of raw of refined granulated brown or cubed sugar from sugarcane which is consumped as a basic food item. In addition it serves as a raw material for a variety of product for brewing beer, soft drinks, and confectionaries pharmaceuticals etc (Nasir, 2001). Sugar cane plant is the most efficient converter of solar energy, carbon dioxide and water into energy giving food and the first food sweetening materials of our ancestors (Kochar, 1996). The area where sugarcane is cultivated is located in Fadama of northern Nigeria. There areas have a total minimum of 1500mm of rainfall during the growing season. However, in some areas like the Bacita Sugar Company in Kwara State and Savannah Sugar Company at Numan in Adamawa State, water is supplemented through irrigation to enhance production. 40% of the sugar, which is consumed in Nigeria, is from these establishments (Girel, 2006).

Sugarcane is grown for chewing, drinking juice, raw sugar and centrifugal sugar. Thick noble canes, which are relatively soft with a high sugar and juice content and low fibre, are best for chewing. By boiling the juice over an open fire until it is almost dry, a form of sugar is prepared (Onwueme and Sinha, 2003). With further improvement, all insoluble materials and all impurities are separated from the juice and the resulting product is a fine – grained, pale yellow. Sugar which is further refined to produce white sugar has become an important item of human diet. The dark brown viscous liquid separatedfrom the crystalline sugar in the last stage of juice processing is called Molasses containing 35% sucrose and 15% reducing sugars. It is an important industrial raw material in producing run, gin, vodka, ethyl alcohol, acetone and butanol, also bakers and brewer's yeast are produced from it. It is widely used as a stock feed and preparing silage as additives and used in constructing roads (Davies, 2009). Bagasse is another by – product of sugarcane used as fuel in sugar factories, in paper manufacturing, cardboard and plastic, cattle feed and in producing furfural (Gibbon and Pin, 1995).

The demand – supply gap of major industrial crops in Nigeria and most countries in sub-saharan Africa is largely met by importation (Global Agriculture Network Information (GAIN), 2008). Hence the resource use efficiency determination analysis to ascertain the input output relationship and to know the constraint associated

Methodology

Study area

The local government is located in the north east part of Adamawa State, Nigeria. It lies between latitude 90 30^0N and longitude 11^0 45^0E, it has a land mass of 4,772827km^2according to National Bureau of Statistics (2008), and (Adebayo and Tukur, 1999; NPC, 2006) respectively. It shares common boundaries with Borno State to the North, Hong Local Government area to the West, Maiha Local Government to the South and Cameroun Republic to East temperature is normally warm to hot with minimum temperature of 120^0C and maximum temperature of 370^0C (Adebayo, 2004). The mean annual rainfall ranges between 1000-1200mm, the rainy season extend from May/June to September/October. The dry season start from September/October to April/May.

Sources of Data and Sampling Procedure

Data for this research were collected from primary sources, using structured questionnaires. The questions were structured to elicit answers on the objectives of the study. Mubi North comprises of four (4) districts (Mubi-Town, Bahuli, Mayo-Bani and Muchalla) out of which it is divided into eleven (11) political wards namely; Mijilu, Lokuwa, Mayo-Bani, Kolere, Digil, Yelwa, Vimtim, Muchalla, Bahulli, Sabon-layi and betso. The multi-stage random sampling techniques was used in selecting the respondents, out of the population, four wards were chosen from the local Government area that were noted for sugarcane production from which 20 farmers were selected from each ward.

Regression Analysis

In the regression model, four functional forms were used. These include the linear, exponential, the double long and semi log functions to determine the equation of the best fit. The regression analysis was used to determine objective (iii).

Linear Function

$$\mathbf{Y} = b_0+b_1x1+b_2x2+b_3x3+b_4x4xb_5x5+b_6x6+b_7inx7+b_8x8+U_i$$

Double long function

$$LnY = inb_0+b_{11n}x1+b_{2in}x2+b_{31}x3+b_5x5+b_6x6+b_7x7x6_8x8+U_i$$

Semi – logarithm function

$$Y = Inb_0+b_{11n}x1+b_{2in}b_2+b_{3in}x3_{+}b_{4in}x4+b_{5in}x5+b_{6in}x6+b_{7in}x7xb_{8in}+U_i$$

Where;

Y = Total output of sugarcane (100kg bags)
X_i = Age of the respondents (years)
X_2 = Household size
X_3 = Farm size (Ha)
X_4 = Farming experience (years)
X_5 = Quantify of seeds planted
X_6 = hired labour (manday)
X_7 = family labour used (man days)
X_8 = Number of years spent in education (years)
b_0 = Constant/intercept
b_{1-8} = Coefficient of independent variables
U_i = Error term

Result And Discussion

Interpretation of Regression Analysis

Different functional forms were tried for the regression analysis and they include; linear semi log,

exponential and double log functions respectively as shown in table 1 below. The choice of the best functional form (lead equation) was then selected based on both statistical econometric and economic criteria (T-test, F-statistic, R^2) and a priori expectation of the signs of the coefficients. Semi-log function was found to be the best fit. Among the dependent variables used for the analysis x_1 (age), x_5 (quantity of seeds) and x_6 (cost of hired labour) were found to be significant at various level of probability.

The coefficient of quantity of seed (X_5) was significant at (5%) which suggest that quantity of seeds is directly related to output meaning that viable and improved seed variety brings greater productivity to the farm. Also this might be due to improved germination and the number of millable canes in two and three bed sets. This results are in conformity with the finding of Geddaway*et al.,* (2002), Sogheir and Mohammed (2003). The coefficients of both age (X_1) and cost of hired labour (X_6) were significant at 1% implying that farmers usually at the age of 41 and above from table 2 engaged themselves more in sugarcane production in the study area because of their maturity and also there may be increase in productivity as a result of the use of hired labour on the farm in the study areas. From this analysis it was clear that labour constituted substantial part of input required in the production of sugarcane and it is generally noted that sugarcane production is both labour and capital intensive, National Sugar Development Council (NSDC, 2002). The coefficient of household size (X_2), farm size (X_3) cost of family labour (X_7) and years in education (X_8) were all found to be insignificant suggesting that family labour is indirectly related to output. This confirms the need for family labour by farmers especially in traditional agriculture. This result agrees with the study carried out by Ya'aishe*et al.,* (2010) in their study on economic of cowpea production among women farmers in Askira local government Borno State. Also the coefficient of farm size is indirectly related to output; this implies that there is no need of increasing the farm size for greater output. The years in education also indirectly related to output level because sugarcane production can be practice without the need of proper education in the study area and lastly, the coefficient of household size was insignificant which implies that it was indirectly related to output suggesting to the fact that most of the respondents may have labour problem as less of it could be supplied within the family.

Table 2. Regression analysis results

Variable	**Linear**	**Semi-log ₦**	**Exponential**	**Double Log**
Constant	1.112 (2.004)***	0.921 (14.980)***	-0.594 (11.09)***	-0.168 (-1.062)
Age X_1	-0.086 (-0.934)	0.01 (0.912)***	-0.010 (-1.1156)	0.142 (1.644)
House hold size X_2	0.011 (0.455)	0.051 (1.370)	0.000 (0.027)	0.061 (0.646)
Farm size X_3	0.156 (1.400)	0.014 (-0.0355	0.027 (3.493)***	-0.57 (-0.575)
Farming experience X_4	-0.0071	0.022 (1.112)	0.000 (-0.123)	-0.091 (-1.847)*
Quantity of seed X_5	0.105 (0.665)	-0.110 (2.936)**	-0.009 (-0.554)	0.447 (4.639)***
Cost of hired labour X_6	0.245 (1.052)	1.773 (52.663)***	0.555 (35.303)***	0.158 (1.825)*
F Value	0.919	422.75***	278.365***	8.145***

Source: Field survey, 2016.

Key: * - Indicate significant at 10% level of probability

** - Indicate significant 5% level of probability

*** - Indicate significant at 1% level of probability

₦ Leading equation.

Table 3: Percentage distribution of problems affecting sugarcane farmers

Problems	Frequency	Percentage (%)
Inadequate capital and credit inaccessibility	4	5
Shortage of land	4	5
Unavailability of fertilizer at affordable price	12	15
Unimproved varieties	8	10
Lack of standardized means of measurement	4	5
Bad road to and distance of market from the farm	12	15
All of the above constraints	32	40
Inadequate storage facilities	-	-
Diseases and pest	4	5
None of the above	-	-
Low demand for crop	-	-
Total	80	100

Sources: Field survey, 2016.

Constraints of Sugarcane Production

The result in table 3 below shows that 45% of the respondents in the study area were faced with all the above problems. 15% of the problems was caused by unavailability of fertilizer at affordable price, likewise 15% of the farmers were faced with the problems of bad roads to and distance to market from farm, while the rest of the farmers encountered the problems of inadequate capital and credit inaccessibility, shortage of and lack of standardized means of measurement in which each of the problem has 5% respectively. The problems mentioned above contributed to low productivity of sugarcane in the study area.

Conclusion

The results of the regression revealed that quantity of seeds (X_5), age (X_1) and cost of hired labour (X_6) contributes to increases in output, so in order to increase the productivity of sugarcane in the study area there is need to increase the input use of seed and hired labour in sugarcane production.

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12/25/2017