EFFICIENCY OF LABOUR AND FERTILIZER USE IN SUGARCANE)DUCTION SMALLHOLDER FARMERS IN GBAKO LOCAL GOVERNMENT AREA OF NIGER STATE.

Yisa, E. S., A. Ogaji, O. J. Ajayi and T. Hamza,

Department of Agricultural Economics and Extension Technology, Federal University of Technology Minna. Niger State.

ABSTRACT

This study examined efficiency of labour andfertilizer usage in sugarcane production by smallholderfarmers in Gbako Local Government Area ofNiger State. Primary data was collectedfrom 110 randomly selectedfarmers using structured questionnaire. The data were analyzed using descriptive statistical tools, the gross margin analysis, multiple regression analysis and resource use efficiency ratio. The result shows that 10.9% of the sampled farmers fall below 30 years of age and 96.3% are married, 40% of the farmers had Quranic education. About 90.9% of the sample farmers had over 30 years offanning experience. 68.1% of the sample farmers had farming as their primary occupation. The predominant system of land tenure in the area is by inheritance. The estimated gross income gives an average value of 87,550 per annum while the net farm income was estimated at 50,500 respectively. The production function analysis show that seedling (X2) and agrochemical (X5) were significant factors influencing the output of sugarcane production at 1% and 5% level ofprobability respectively. The efficiency ratio (r) indicates thatfann size was underutilized while fertilizer and labour were over utilized. The major problems facing farmers include high cost of transportation, price fluctuation, Farm input, Input Incentives and Lack ofadequate modernfacilities.

INTRODUCTION

Sugar cane (Saccharum.sp.) is believed to have ome established as• domestic garden crop around 800B.C.by neolithic horticulturalists in •hat is now New Guinea according to some ecounts (Alkulola, 1978). Sugar cane was first ught to a village along the western and eastern coast of Nigeria in the 15th century by European Sailors. Although few farmers planted it then as a garden crop, it was noticed that it —uired a relatively higher amount of water to its cultivation spread into wet lands and "t•zmp patches in flood plains.

Following the development of a new technique of raking honey from sugarcane around the *ginning of the 18th century, further interest in the —cp was generated and it rapidly spread from the to other parts of the country, even to the drier an-±.ern areas. By the end of the first world war, technology for the production of crude sugar aes or Mazarkuailla (Hausa) had been *eloped some mills were imported during the •cod world war to increase the output of cakes consumption by African soldiers. Today, —z:zkwailla is still a common sugar product in the

—±ern part of Nigeria, where it is used as —Sconal sweetener over the years, the sugar-cane had adopted itself to a variety of soil and conditions such that it is now grown across Nigeria. Although, it actually started late 50s (Oguntoyinbo 1978).Today, the two of canes are grown in commercial quantities Nigeria But while large scale cultivation of cane is limited to 3 or 4 major estates at 6000ha) Numan (500ha) and Lafiagi

Chewing cane is grown by thousands of *mers cropping between 0.2-2.0 ha of land over the country.

The total land area currently under care cultivation is not known but is estimated at 25-

35,000ha out of which industrial cane cultivation of the two types of sugar-cane is witnessing a drastic change, albeit it opposite direction. While the production of industrial cane on the estimate is witnessing a decline, more farmers especially in the northern part of Nigeria are getting in to chewing cane cultivation. Admittedly, through the effort of both NCRL and NSDC, states like Jigawa, Bauchi, Kano, and Katsina are also devoting large expanses of land to industrial cane production with a view to established mini Sugar plants. The efforts are however still at their infancy stage and do not substantially contribute to the overall cane production.

In some countries, Sugar cane is considered as a type of fruit, being used for fresh juice extract. However, it is raw material that it is produced by small-scale farmers and particularly, by the sugar industry. Because of the practical difficulties that small farmers in India, China, Colombia and Philippines etc. have in growing the crop, Sugar cane can be grown in the Tropics, the sub-Tropics or the Equatorial areas of the world where the ecological factors are favorable. Frost and water availability are the main technical constraints that affects the growing of canes and the main economic limits on its cultivation are the protective measures that may be imposed by the governments.

Sugar cane is a strongly growing grass with a C4

carbon cycle photosynthetic pathway and a high chromosome number recent research has shown that sugar cane which has been crossed with other saccharum SPP. Has potential yields of up to 400 Commercial and

tones of green matter per hectare per year, equivalent to 160 tones of dry matter obviously, this type of cane will have a much lower sucrose content (Blume, 1985). A sugar cane has tillers or steams, bunched in to stools and usually erect with at harvest, a sucrose content of 10-18% and a fibred content of 10-15%. When the steam is cut into pieces with a number of buds of each piece, they are called stem cuttings or sets and can be used for propagating the crop. Stems develop from the buds grown into stalks or canes are ready for harvesting 10 to 24 months later. After a first harvest, which can be for production of sets or for processing at the factory, the underground buds on the tool develop to give a second, third or even more crops is similar or slightly shorter growth period. These are known as Raton crops. Raton cane (the cane which re-grows after each unit) can, with care, give profitable yield that are less costly to achieve because of the reduction in soil preparation and planting costs. Sugar cane is a pluriannual plant with a cycle that can last 4 to 10 years.

In all aspects of crop production the issue of fertilizer and labour are of critical importance to output and productivity.lin sugar cane production in particular, the level of fertilizer use is a factor that cannot be ignored if higher production levels are to be obtained. Similarly, the production of sugar cane is very labour intensive therefore the issue of availability and cost of labour is also very critical. Therefore, the two resources are central and critical in sugar cane production (Okorie, 2000). The constraint to the rapid growth of food production in Nigeria is the low crop yields and resource productivity. The low agricultural productivity in Nigeria, if revealed by the actual yields of major crops compared with the potential yields.

The following are some of the specific research questions relating to efficiency in sugarcane production which this study seeks to find answers to.

1. What are the socio-economic characteristics of farmers in the study area?
2. What are the factors affecting the efficient utilization of resources use in sugar cane production in the study area?
3. What is the profitability of sugar cane production in the study area?
4. What determine the efficiency of the utilization of resources in sugar cane production in the study area?

The main objective of the study focus on the efficiency of labour and fertilizer usage in sugar cane production among small scale farmers in Gbako Local Government Area of Niger State. The specific objectives of the study are to:

i. describe the characteristic of farmer in the study area, ii. evaluate the level of profitability of sugarcane production in the study area.
iii. determine the factors affecting resource use efficiency in the study area, iv. determine the efficiency of the utilization of labour and fertilizer in sugar cane production in the study area

This study is crucial in examine the resource use efficiency of farmers in sugar cane production, since increased output and productivity are directly related production efficiency. Contributions by researci institutes and extension organizations to improve efficient use of fertilizer and .labour in the production sugar cane. However, studies in both NCRI and NSDR shows that Nigeria could in fact do better than they are presently producing if fertilizer and labour properly used by farmers, it is hoped that this study generate imperial research information to the extensn agencies and government for possible policy action information generated from this study is also to serve as eye opener for future program* implementations in the area.

METHODOLOGY

Niger State was created on 3rd of February 1976.

lies between latitude 9.360^0 North and longitude

6.22^0 east. The State lies in the Guinea savanna vegetation of the country with favorable clirnaz.ic condition for crops and livestock production. Abxz 85% of Niger State populations are farmers the remaining 15% engaged in other vocations as business, white collar Jobs, etc.Niger experience distinct dry and wet seasons Annual rainTall varying from 1100mm in

northern part to 1600mm in the southern pars the State respectively. The State has a populaticg about 3,950,249 peoples according to the census. The State covers a total land area 85,733.17 km or about 8.6 million hectares represent 9.3 percent of the total land ara Nigeria (FRN, 2007). Niger State has twenty-6• Local Government Areas. Gbako LGA characterized by two seasons, the dry ard seasons. The annual rainfall varies from 1,200mm — 1500mm the raining season is
June and October, average temperature ot 23^0c 25%, soil types Alfisol. Major crops grc••.• the

region are sorghum, rice, sugarcane, maz groundnut.

Primary data for this study was collected field with the aid of objectively st:-a• questionnaires. Secondary data was obtairez journals and conference proceedings.

The primary data for this study was colleet the field with the aid of objectively st-c—-

farmer that can read and write to be fill by them while those that are not educated an interpreter was employed to assist in interviewing and filling the questionnaires.

The data collected was analyzed using descriptive statistics such as arithmetic means, frequency, distribution, etc. the technique was used to group and summarize the data obtained from the field. Gross margin(GM) analysis and Net Farm Income (NFI) were used for analysis to achieve objective 2. Gross margin is the deference between the gross farm income (GFI) and the total variable cost 'TVC). It is useful planning tool in situation where fixed capital is a negligible portion of the farming enterprise as is the case of small scale subsistence =riculture (Olukosi and Erhabor, (1988)
G.M = GFI -TVC
GM = Gross margin
GFI = Gross farm income =
    Total variable

SFI

$$k=l$$

V-ere:
    = Net farm income
            = Enterprise product (s) (Where i=l,2,3 .n

    = Unit Price of the product (s) xj   Quantity of the Variable input   (Where j=1,2,23.....m Variable input) pxj   Unit Price of the variable input (s) Cost of fixed inputs (Where fixed inputs) s   , = Summation (addition) sign.

            model was used to examine inputrelationship. This was used to determine the to which the inputs used explain the *C.acdlty in sugarcane output. To estimate the on function, the four major regression was employed, these are linear, semi-log, and exponential models. The of best fit or lead equation was by the level of coefficient of multiple tion (R^2) the level of significance of the zl equation CF — statistics and correct signs, coefficient

questionnaires, the questionnaire was gi•€.er NA XE 2010
            relative to prior expectation and Olayide, 1981)
            the implicit form of is:
X2 = quantity of seedling (kg)
X3 = quantity of fertilizer (kg)
X4 = labour input
(man day) X5 =
agrochemical (liters)
U = Error term.
The explicit forms of this model are
(a)   Linear: Y = a   b5X5+u
(b)   Semi-log: loga+bl
Logxl+b2Logx2+b3Logx3+b4 logx4+
b510gxs+u (c)   Cobb-douglas: log
a+blxl+b2Logx2+b3Logx3+b410gx4+
b510gx5+u (d) Exponential: Y = b5X5+II

Efficiency of resource use was determined by the ratio of marginal value product (MVP) to marginal factor cost (MFC) of inputs based on the estimated regression coefficients. Following Rahman and Lawal (2003) and Iheanacho et-al (2003) efficiency of resource @ is given as: r = MVP
    MFC
The rule provides that when r = 1, there is efficient use of resource; r > 1 and r < I indicate underutilization and over-utilization of a resource respectively. The values of MVP and MFC were estimated as follows:
MVP = MPP. Py
MFC =
Where MVP = Marginal Value Product of a variable input;
MPP = Marginal Physical Product;
Py   = Unit Price of Output;
PXI =Unit Price of
    Input   Xl   =
    Efficiency ratio

RESULTS AND DISCUSSION

output from sugar production (kg)

Table 1: Distribution of respondents by Socio economic characteristics

Characteristic	Fre uenc	Percenta e
Gender		
Male	107	9.27
Female	03	2.72
Marital Status		
Sin le	4	3.64
Married	106	96.36
21-30	12	10.91
31 above	98	89.09
Educational Level		
Primar Education	37	33.64
Secondary Education	25	22.72
Tertia Education	3	2.73
No Formal Education	1	0.91
Quranic Education	44	40

Ac uisition		
Inheritance	103	93.64
Purchase	2	I .82
Borrowino	5	4.54
Types Of Labour Used		
Famil Labour	7	64.55
Hired Labour	5	4.55
Communal Labour	28	25.45
Family And Hired I ahour	6	5.45
anil Size		
1-10	24	21.82
1 1-20	64	58.18
21' Above	22	20.00
Mode Of Land Cultivation		
Hand Tools	110	100
Tractors		
Sizes Of Farm Land Cultivated		
1-3	81	73.64
4-6	29	26.36
Source Of Ca ital		
Personal Savin	101	91.82
Loan From Famil /Friend	9	8.18
Loan From Formal Sources		
Farming Experience (Years)		
16-30	10	9.09
31 And Above	100	90.91
Occu ation		
Farmin Onl	7.5	68.18
Tradin	16	14.55
Civil Servant	10	9.09
Student	9	8.18

and

Source: Field survey 2009

According to table 1 above, 2.72% of the
respondent are female, the rest of 97.27% are male. This implies that few percentages of women help men in terms of fertilizer application, harvesting, in sugarcane production in the study area, because of the tedious nature of production process which most women are not accustomed to. The distribution of respondents according to marital status shows that 3.64% of the respondents are reported that they are single, 96.36% confirmed that they are married. This implies that marriage is a very important institution especially internal setting. A part from uplifting the status of a man, it also provides additional hands (wives and children) to help in the farm work thereby reducing the cost of hired labour.

Results indicate that majority (89.09%) of sugarcane producer fall between the age ranges of 31 years -above. This implies that sugarcane productions in the study area are dominated by mid-age and the old age. Farmers who are still active in terms of Agricultural production and constitute the working force of the populace.of 31 years above, this result envisage prospects to increase sugarcane production in the survey area. The distribution of respondents in educåtional level show 40% of the respondents have Quranic education, This indicates that awareness about the importance of education to farmers in the locality should be improved upon and encourage possibly by introducing some incentive along side. Following this group are those that had complete primary school education of about 33.64% and tertiary institution of about 2.73% these proportion of the respondent of this present age. Also, farmers that had complete secondary school education and those that didn't are 22.72% and 0.91% respectively. This result indicate that extension workers should do more by making the important of education known to the farmers.

Results indicate that almost all the respondents inherited the land on which production takes place, 93.64% of the total respondent acquire land inheritance. This implies that most respondents produce sugarcane at a subsistence level ard limited their size of production to what is obtainable from such fragmented inherited pieces of land which make expansion difficult, the natur of the farmer is not supportive to their outrac through production may be efficient. The value cf family labour in the study area which represeas about 64.55%. This implies that sugarcar production as an efficient motives required rrs:æ than family labour enough hands (people) ▪machinery will be used to boast output and nui.: production more technically efficient. Commztaᵣ labour also gives an average performance ▪▪about 25.45%. This implies that more importaat»y labour is highly the factor that determines ▪▪efficiency of sugarcane production, Hired 1±:• constitute about 4.55%, this implies that farmer not have a sufficient capital to embark on labour,

All the respondents use hand tools for culti%ütz This is reasonable since almost all of ther small scale farmers and it will be purchase modern equipment like tractcrs cultivating one or two hectares of land. P..EA.Ä reveals that only 93.64% of the respondents 3 hectares of farm lands. About 26.36% 'f respondent asserted that the size of their is between 4-6 hectares. Which implies that sugar cane farmers in the study areas ce scale farmers, compared to other sugg producing area? Majority of the (91.82%) sources their capital for seæ:x::—

*'duction through personal savings while sources cooperative bank are not embraced by the

•e:spondent except from family and friend who count for about 81.8%. This implies that

—ority of farmers prefer to source capital through personal saving and money lend from family friend due to the case of accessing such capital.

1 above shows that majority (90.91%) of the

had experience in sugarcane production

cr•ities of 31 years above which implies that —ed producers had required good sugarcane skill. Majority (68.18%) of sugar cane

take farming as their primary occupation. 14.55% of the sampled farmers were civil

this implies that farming only is the •munt occupation of sugar cane farmers in the —y area which is the major source of their 58.18% of the respondents have a

e:hold size of 11-20. This implies that family is important source for farming operation Sat most of the farmers have a large family

This is according to (Oyekanmi, 2004), farmer

rural areas are predominantly large families s due to what is contributes to the total farm required in production.

Estimated Gross margin and Net Farm Income roduction

		Cost (N/f-la)
nature		11,200
output	Material	6,200
ilue of		
resents		4,400
	Labour	9,000
arcane more		5,000
•scaation		I ,250
make	anable Cost	37,050
nmunal	me	87,550
with	Income	50,500

Labour (X4) 1.341e - 03
(0.830)

A ochemical (X) 5.283e - 02

0.789
Ad•usted R   0.779
F-Rati0

Implies significance at 1% level

Implies significance at 5% level
Implies significance at 10% level

Figures in parenthesis are the respective t-ratio the production function that was used to determine the

nature of inputs relationship in sugarcane production is shown in the (table 16 exponential production function). The value of coefficient of determination R^2 indicated that about 78.9% of the

variation in output in sugar cane production is explained by the inputs included in the regression model. The regression coefficient of land size (X l)

land size (X2) seedling (X3) fertilizer that an

increase in any of these inputs will lead to an increase in gross output implying that the variables significantly explained variation in the gross output. Seedling significant at 5% level of fffobability, Agrochemical (X5) and F-ratio are both significant in 1% level of probability.

Table 4. Resource use efficienc

VARIABLES	MPP	MVP	MFC	EFFICIENC RATIO
Land size (Xl	0.63	9450	4,500	2.1
Labour (X4)	0.039	585	800	0.73
Fertilizer (X3	0.014	210	2000	0.11

Table 4.. Revealed that the estimated efficiency ratio (r)

held survey, 2009

shows that two significant inputs in the model were over utilized i.e. (X3 and X4) while Xl is underutilized. This

from Table 2 implies that an average farmer in the study areas makes an Gross margin of N87, 550 and an average N50, 500 in the last cropping season.

implies that the resource Xl is not efficiently utilized, this finding is in consonance with the finding of Nwosu (2005) who showed that land was underutilized while labour was over utilized by both ADP and non ADP farmers in Orlu

#ies that sugarcane cultivation is quite

agricultural zone of Imo State, Nigeria.

In the study area given the high returns on

especially for small scale farmers.

Table 5: Production problems encountered by sampled farmers

Multi le re ession anal sis
Ex onential
3.829

3.500e - 02
(1.380)
2.108e -02

1.732e-05
(0.198)

PRODUCTION PROBLEM	FREQUENCY	PERCENTAGE
Inadequate ca ital in ut	66	60.00
Lack of rainfall at the right ti me	17	15.45
Lack of extension services and	27	24.55

NAAE 2010

Conunercial   and

credit		
TOTAL	110	100.00

Source: Field survey 2009

Table 6: Marketing problems encountered by sam led farmers

.VIARKETING PROBLEM	FREQUENCY	PERCENTAGE
Price fluctuation	53	48.18
Dubious act of middle men	32	29.09
Purchased Problem	25	22.73
TOTAL	110	100.00

Source-: Field survey 2009.

Table 5 indicates 60% of sampled farmers had inadequate capital input, also 15.45% of sampled farmers complained of lack of rainfall at the right time while 24.55% of sampled farmers had lack of extension services and credit. Table 6 reveal that marketing problems encountered by sampled farmers, this include price fluctuation (48.18%), dubious act of middlemen (29.09%) and purchased problem (22.73%) respectively.

CONCLUSION AND RECOMMENDATION In the study, various efforts geared at determining the efficiency of labour and fertilizer use among small holder farmers in Gbako Local Government Area of Niger State were critically undertaken. The result indicates that despite the various problems faced by the respondent farmers, sugar cane production is still efficient in the study area. Although the efficiency ratio reveals that labour and fertilizer were overutilized, with adequate subsidized farm inputs, capital, good infrastructure. Resources available tofarmers especially land and capital have affected the farmers from realizing feasible optimal sugarcane output. Sugarcane production has a very large profit margin and could serve as viable avenue for poverty alleviation to the youths. Farm inputs should be made available to the farmers in the study areas at the right time and at affordable prices. Farmers are price responsive in the use of inputs. Therefore, government should endeavor to remove all distribution bottlenecks which affect the availability and prices at the grass root level of these inputs especially fertilizers and agrochemicals, research efforts should be intensifies to redevelop improved small medium scale farm technologies suited to the small-scale nature of farming and favored by farmers, Extension agents should be posted to the study areas to educate the farmers on the Importance of adopting new ideas and technology, to improve on sugarcane Production, Government should provide and expand tractor-hiring scheme and offer services to reduce high cost of labour.

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