PAT December, 2018; 14 (2): 50-57 ISSN: 0794-5213

Online copy available at *www.patnsukjournal.net/currentissue*

Publication of Nasarawa State University, Keffi

Economics of Millet Production in Funakaye Local Government, Gombe State Nigeria

Ali* A., M.I. Hudu and O.A. Ojeleye

National Agricultural Extension Research and Liaison Services, ABU, Zaria
Department of Agricultural Economics, Ahmadu Bello University Zaria
** Corresponding Author alimabdul@yahoo.com.+2348059063393*

Abstract
The study was conducted in Funakaye Local Government Area of Gombe State, Nigeria, to examine the economics of millet production. A total of 156 millet farmers were randomly selected across villages in the LGA and later classified into low income, middle income and high income farmers with 62, 61 and 33 farmers respectively on the basis of the household income from millet production. Data were collected using a well prepared questionnaire supplemented with oral interview between April and May, 2018. Data were analysed using simple descriptive statistics, farm budgeting model and Cobb Douglas production model. Results showed that majority (28%) of the farmers fell between the ranges of 20-30years, 36% had Quranic form of education and 96% of them were married. The result also revealed that millet production is profitable with a profit margin of ₦16,312 per hectare (low income) ₦53,721 per hectare (middle income) and ₦165,406 per hectare (high income). Return per Naira was 0.44 (low income), 1.50 (middle income) and 2.42 (high income). Operating ratio was 0.69 (low income) 0.40 (middle income) and 0.29 (high income) respectively. The regression analysis revealed an R^2 value of 81.0% for low income group, 53% for middle income group and 87% for high income group. The coefficients of labour, inorganic and organic fertilizers were found to be positive and significant for low income group. For the medium and high income groups, seeds, labour and inorganic fertilizer coefficients were positive and significant. In conclusion, millet has been found to be profitable in the area and therefore may serve as a means of poverty reduction. However, the major constraints identified in millet production were lack of basic amenities (good road network, health care), high cost of inputs, low prices of produce, inadequate provision of capital amongst others. Therefore, intervention such as provision of inputs, soft loans, and good storage facilities, health care facilities and good roads will go a long way to increase production scale and profitability.
Keywords*: Economics, Millet Production, Gombe State, Income group*

Introduction

Africa is the centre of origin and also a major producer of several cereals like sorghum, pearl millet, finger millet, and African rice. Agriculture is the 'engine for growth' in Africa. With subsistence agriculture practiced by majority of small holder farmers, yield gaps are high and poor soils, amongst other constraints add to the difficulties for sustainable farming and incomes. Cereals like Sorghum, Millets, Wheat, Maize and Rice are major staple foods of the most population. These cereals are grown over an area of 98.6 m ha producing 162 m tons.

Sorghum is the second most important cereal after maize with 22% of total cereal area. Pearl millet is a climate hardy crop which is grown in harsh conditions, but as a subsistence crop. African pearl millet contributes 19% area to cereal production.

Cereal yields in Africa are lower than half the world average. The average fertilizer ($N + P_2O_5$) consumption is 16.24 kg/ha (FAOSTAT, 2010) which is 1/6th compared to the world consumption of 98.20 kg/ha. Increasing productivity of the small holder farmers, bridging the yield gaps by providing appropriate inputs along with improved technologies such as stress resistant and high yielding varieties and empowering farmers to better manage climate risk will be will be a huge step towards agricultural transformation in Africa.

The primary demand for sorghum and millets is for food in Africa, especially in the dryland regions where these are the principal crops. This continuing demand is reflected in the trend for increasing area under sorghum and millets in Africa over the last fifty years but crop productivity has not kept pace with this increasing demand. This is due to both a lag in crop improvement efforts in these crops and the extreme environmental conditions and the low- input agriculture under which these crops are grown. Thus it is immediately evident that crop improvement efforts combined with improved agronomic practices is a must for these crops in Africa. Interventions of the Bill and Melinda Gates Foundation-supported HOPE project (Harnessing Opportunities for Productivity Enhancements) for sorghum and millets (http://hope.icrisat.org) that started in 2009, have demonstrated that yield gains from as low as 17 to as high as 141 per cent for these crops are possible through the use of improved varieties and associated improved agronomic practices.
This study therefore characterized millet farmers, determined the profitability and production efficiency of millet production and also described the constraints limiting millet farmers' productivity.

Methodology

Study Area

The study was conducted in Funakaye Local Government Area of Gombe State, Nigeria. The area is Located within Sudan Savannah agro-ecological region of Nigeria; the area lies between longitude 11°10´E and 11°17´E and between latitude 10°17´N and 10°23´N, and 240m Altitude. The temperature of the area ranges between 24^0 C- 48^0C mean annual rainfall of the area is 760-1100 mm, the two distinct seasons of rainy and dry seasons range from (May-October) raining season and dry season (November-April). The people are predominantly subsistence farmers producing crops such as millet, sorghum, beans, groundnut, sesame and rice. They also rear animals such as cattle, sheep, goat and chicken (Gombe State Diary, 2012). Population for the study include all millet farming households in Funakaye.

Sampling Technique

A multistage sampling approach was utilized for this study. The first stage involves the purposive selection of Funakaye LGA due to the bulk of millet farmers therein. The second stage involves the random selection of 156 millet farmers across 9 villages in Funakaye LGA, in line with the assertion of Eboh (2009), that simple random sampling enables every individual element in the population, the chances of being selected. On the basis of their income and for a more reliable results, the respondents were categorized into a group of 62, 61 and 33 for low, medium and high income farmers respectively.
Data for the study was retrieved through the use of structured questionnaire administered in the study sites. The farmers were asked questions on the size of their farms, farm resources, output, and quantity of millet consumed, socio-economic characteristics and other production constraints among others. The secondary data were obtained from journals, textbooks, projects thesis and other documented information.

Method of Data Analysis

Data were analysed using descriptive and inferential statistics such as frequency, percentages, farm budgeting and production function.

Descriptive Statistics: This method was adopted to achieve objectives on demographic characteristics and constraints of millet farmers. It involves the use of frequencies, percentages and mean.

Gross Margin Analysis: This Method was used to compute profit margin of millet farmer's. It is mostly use in instances where farmers are does not use fixed items or the cost of utilizing the fixed items in insignificant and as a result is been neglected. It can be explicitly shown as follows;

GM = TR – TVC

Where;

GM = Gross Margin

TR = Total Revenue (Total output of Millet (Kg) X Unit price (₦/Kg)

TVC = Total Variable Costs (Cost of all variable items used such as seeds, labour, fertilizer, agrochemicals)

Other indicators of profitability used includes;

i. Returns on Naira Invested (ROI): This shows the amount recovered on every naira invested, in other words, it shows the recovery power of every naira invested. It is given by;
   Profit Margin/Total Variable Costs
ii. Operating Ratio (OR): This shows the relationship between total variable cost and total revenue, it shows the amount of revenue that pays the operating cost. It is given by;
   Total Variable Cost/Gross Revenue

Production Function Model: Production function model was used to examine the input-output relationship in millet production and it was given as:

$Y= f(x1, x2, x3, x4, +...e)$ .....(1)

Explicitly given by,

$\text{Log } Y = B_0 + B_1\text{Log}X_1 + B_2\text{Log}X_2 + B_3\text{Log}X_3 + B_4\text{Log}X_4 + B_5\text{Log}X_5 + e$…… (2)

Where

Y = Output of Millet (kg)

X_1 = Seeds (kg)

X_2 = Labour (Man days)

X_3 = Agrochemical (litres)

X_4 = Inorganic Fertilizer (kg)

X_5 = Organic Fertilizer (kg)

E = Error disturbance term.

$B_0 – B_5$ = Parameters to be estimated and they show the relationship existing between the dependent variable (Y) and independent variables (X_1-X_5)

Log = Natural logarithm

Results and Discussion

Demographic Characteristics

Results in Table 1 indicate the socioeconomic characteristics of millet farmers in Funakaye and it shows that majority (28.1%) of the farmers are within the age bracket of 20-30 years and the least (2.6%) are within the 61-70 years. A significant percent (97.4%) of the farmers are male and only 2.6% are female. Due to the early age at which people got married in northern Nigeria, over 96.8% are married with only 2.6% and 0.6% as single and widowed respectively. Number of household members contributes to farm labour, therefore farming household with more members are presumed to incur less labour costs compared to those with less members, the results shows that over 48.7% of the respondents has household members of between 13-16, followed by 10-12 with 17.9% and the least falls in the group 1-3 with 4.5%. Majority (36.5%) of the respondents had

Qur'anic education, followed by 26.3% having secondary education and 0.6% with adult education, though 7.7% were not educated. Cooperative membership is highly perceived in the area as over 83% are members of cooperative group while 17% are not involved. Mode of land acquisition in Funakaye is mostly by inheritance with over 69.2%, followed by purchased (18.6%), the least (1.28%) was for land acquired through rent. The farmers in the study area mostly are small scale in terms of the land size devoted for millet production, 31.4% operate in land area between 1.6-2.5, followed by 0.5-1.5 (221.8%) and the least (7.1%) group operate between 4.6-5.5 hectares of land.

Table 1: Demographic Characteristics of Millet Farmers in Funakaye

Options	Socioeconomic Variables	Freq.	Percent (%)
Age	20 – 30	44	28.21
	31 – 40	42	26.92
	41 – 50	37	23.72
	51 – 60	29	18.59
	61 – 70	4	2.56
Gender	Female	4	2.56
	Male	152	97.44
Marital Status	Married	151	96.79
	Single	4	2.56
	Widowed	1	0.64
Highest Education	None	12	7.69
	Adult Education	1	0.64
	Primary School	25	16.03
	Quranic Education	57	36.54
	Secondary School	41	26.28
	Tertiary	20	12.82
Cooperative Membership	No	27	17.31
	Yes	129	82.69
Household Size	1 – 3	7	4.49
	4 – 6	21	13.46
	7 – 9	24	15.38
	10 – 12	28	17.95
	13 – 16	76	48.72
Farm Size	0.5 - 1.5	34	21.79
	1.6 - 2.5	49	31.41
	2.6 - 3.5	25	16.03
	3.6 - 4.5	13	8.33
	4.6 - 5.5	11	7.05
	Above 5.5	24	15.38
Mode of Land Acquisition	Gift	4	2.56
	Inheritance	110	70.51
	Purchased	29	18.59
	Rented	6	3.85
	Walked in	5	3.21
	Rented	2	1.28

Source: Field Survey (2018)

Benefit-Cost Analysis of Millet Farmers

Benefit-cost analysis gives investors an idea of the margin a particular activity will yield, profitability ratios are mostly included to better inform stakeholders. Results from Table 2 indicated that a large percent of the operating cost is spent on labour with 61.35%, 63.74% and

59.65% for low, middle and high income millet farmers respectively. This is followed by the cost of inorganic fertilizer accounting for 15.78% on low income farmers cost, 17.03% for middle income farmers and 16.46% for high income farmers. For all the income groups, the least cost was spent on seed procurement with only 3.58%, 5.11% and 6.41% for low, middle and high income farmers respectively. The study fits into the findings of Sani *et al.* (2013) and Hudu *et al.* (2018) in their studies of sorghum and Irish potatoes respectively and they indicated that more of crop production costs is spent on Labour, fertilizer, and agrochemicals. With all the income groups reaping more gross revenue than total variable costs, it therefore implies that millet production is a profitable enterprise with a margin of ₦16,312, ₦55,721 and ₦165,400 per hectare for the low, middle and high income farmers respectively. The high income farmers group had the highest return on investment ROI of 2.42 implying a returns on investment of ₦2.42 for every naira expended, whilst the middle income group had an ROI of ₦1.50 and ₦0.44 for the low income farmers. Farmers operating ratio indicates the amount of gross revenue that pays for the operating cost of cultivating a hectare of millet farm, the study therefore shows that 69%, 40% and 29% of the gross revenue of the low, middle and high income farmers is paid as operating cost and the farmers are left with 31%, 60% and 71% to cater for other expenses incurred. This implies that farmers in the low income group needs to devise a way of minimising their operating costs and at the same time by enhancing their profitability because any form of shock in the economy can remove them out of business.

Table 2: Benefit-Cost Analysis of Millet Farmers in Funakaye Local Government

Variables	Low Income		Middle Income		High Income	
	Costs	%	Costs	%	Costs	%
Seed (₦/Ha)	1317	3.58	1898	5.11	4388	6.41
Labour (₦/Ha)	22559	61.35	23680	63.74	40853	59.65
Agrochemical (₦/Ha)	1652	4.49	1904	5.13	6083	8.88
Inorganic Fertilizer (₦/Ha)	5803	15.78	6326	17.03	11270	16.46
Organic Fertilizer (₦/Ha)	5440	14.79	3345	9.00	5888	8.60
Total Variable Costs (₦)/Ha	36771		37154		68482	
Gross Revenue (₦)/Ha	53082		92875		233888	
Margin (₦)	16312		55721		165406	
Returns per Naira Invested	0.44		1.50		2.42	
Operating Ratio	0.69		0.40		0.29	

Source: Field Survey (2018)

Income Distribution of Millet Farmers within the Study Area

Table 3 on income distribution among the groups of millet producers indicated that, 32.26% of the low income group have an income between ₦10,001-₦20,000, followed by the group with less than ₦10,000 (30.65%) and the least (11.29%) are those in the income bracket of ₦30,001-₦40,000. Majority of the middle income class operate at an income group of Above ₦60,000 with 39.34%, followed by 22.95% of ₦50,001-₦60,000 class of income and finally 16.39% belongs to the 30,001-40,000 class. About 97% of the high income farmers earn income above ₦60,000, while 3.03% earn between ₦40,001-50,000. This implies despite majority (84.62%) of millet farmers in the study area are small-scale in terms of the land size used for production, there exist discrepancies in their income.

Table 3: Income Distribution among Millet Farmers in Funakaye Local Government

Income (₦)	Low Income		Middle Income		High Income	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
< 10,000	19	30.65	0	0.00	0	0.00
10,001-20,000	20	32.26	0	0.00	0	0.00
20,001-30,000	16	25.81	0	0.00	0	0.00
30,001-40,000	7	11.29	10	16.39	0	0.00
40,001-50,000	0	0.00	13	21.31	1	3.03
50,001-60,000	0	0.00	14	22.95	0	0.00
Above 60,000	0	0.00	24	39.34	32	96.97
Total	62	100.00	61	100.00	33	100.00

Source: Field Survey (2018) Group 1 n= 62 Group 2 n=61 Group 3 n=33

Millet Farmers Input-Output Relationship

Table 4 presents the production efficiency of millet farmers in Funakaye Local Government. The coefficient of determination (R^2) for the farmers indicates that 81.5%, 53.1% and 87.8% of the variations in output was determined by the variables included in the model. For the low income farmers, a unit increase in the amount of labour, inorganic and organic fertilizer used results to an increase in output by 0.61, 0.06 and 0.02 respectively and are significant. Coefficients for seeds and agrochemicals are positive but not significant which implies underutilization of the inputs, there is therefore the need to increase the quantities used of seeds and agrochemicals. Results from the middle income farmers indicates that all variables have a positive relationship with the output which indicates a unit increase in the variables leads to a considerable increase in output. For the same group, seeds, labour and inorganic fertilizer were significant while agrochemical and organic fertilizer are not significant. In the high income group, a unit increase in agrochemical and organic fertilizer reduces output by -0.003 each and are not significant, while coefficients on seeds, labour and inorganic fertilizer were positive and significant. This implies that, inputs on agrochemical and organic fertilizer has reached stage III of the optimality curve and hence leads to reduction in output with increase in quantity used, farmers in this group will have to reduce the quantity of such variables to target the stage II.

Table 4: Production Efficiency of Millet Farmers in Funakaye Local Government

Variables	Low Income				Middle Income				High Income			
	Coef.	Std. Err.	T	P	Coef.	Std. Err.	T	P	Coef.	Std. Err.	T	P
Constant	3.883	0.136	28.47	0.000	5.367	0.134	40.10	0.000	5.621	0.132	42.59	0.000
Seeds	0.063	0.050	1.25	0.216	0.106	0.032	3.31	0.002*	0.215	0.042	5.06	0.000**
Labour	0.612	0.048	12.79	0.000**	0.265	0.039	6.87	0.000**	0.314	0.048	6.54	0.000**
Agrochemical	0.024	0.018	1.35	0.183	0.014	0.013	1.04	0.303	-0.003	0.014	-0.21	0.833
Inorganic Fertilizer	0.060	0.017	3.59	0.001**	0.042	0.012	3.43	0.001**	0.041	0.010	3.92	0.001**
Organic Fertilizer	0.024	0.011	2.10	0.040*	0.006	0.008	0.71	0.481	-0.003	0.008	-0.38	0.705
	R^2 = 0.815, R^2 Adj = 0.799				R^2 = 0.531, R^2 Adj = 0.489				R^2 = 0.878, R^2 Adj = 0.855			

Source: Field Survey (2018) (*,** indicates significance at 5 and 1%)

Millet Farmers Constraints

Table 5 presents the constraints to production of millet farmers in Funakaye Local Government. Constraints are set of activities or the presence of a number of entities that hinders farmer's productivity. Lack of basic amenities is the most pressing constraint limiting farmer's growth, it accounts for over 54.49% of farmer's problem in the study area, followed by lack of sufficient capital (18.59%) and the least (1.92%) is insufficient skilled labour. Other constraints include Market for produce (12.18%), Insufficient Rainfall (7.69%), High input costs (2.56%), and Pest and diseases (2.56%).

Table 5: Constraints of Millet Farmers to Production in Funakaye Local Government

Constraints	Freq.	Percent
High Input Costs	4	2.56
Insufficient Rainfall	12	7.69
Insufficient skilled labour	3	1.92
Lack of Basic Amenities	85	54.49
Lack of Sufficient Capital	29	18.59
No Market for Produce at/after Harvest	19	12.18
Pest and Disease Infestation	4	2.56
Total	156	100.00

Source: Field Survey (2018)

Conclusion

This study shows that millet farmers in the study area are small-scale farmers and are mostly youth within the age group of 20-30. Majority of the farmers are male, married and have passed through formal education enough to allow for reading and understanding simple farm instructions if the need arise. Millet production at all level was found to be profitable enterprise in the study area with different level of input efficiency recorded by the respondents. Seed was found to be insignificant and underutilized by low income farmers while the major constraints limiting millet production is lack of basic amenities (54.45%).

Recommendation

It is recommended that government through the relevant authorities to come up with interventions that will provide farmers with soft loans and to also make sure basic amenities are constructed in the rural and farming communities because doing so will go a long way in improving farmers output and income.

References

Eboh, E. C. (2009): Social and Economic Research: Principles and Methods, 2nd eds., published by African Institution for Applied Economics.

FAOSTAT, (2010). Statistical Yearbook of the Food and Agricultural Organization - FAO Retrieved November 12, 2018; from *www.fao.org/docrep/018/i3107e/i3107e.PDF*

Gombe State Diary, (2012) History of Industrial Development in Gombe State, 1974-2011 Retrieved November 12, 2018; from https://oer.fukashere.edu.ng/.../31HISTORY%20OF%20INDUSTRIAL%20DEVELOP..

Hudu, M. I., Ahmad, M. M. Yusuf, M. Saleh, I. and Abdullahi, A.Y. (2018): Analysis of Small-Scale Irish Potato Farmers Income in Plateau State 52nd Agricultural Society of Nigeria Conference Proceedings, Abuja 2018 Pp 82-86.

Sani, R.M. Haruna, R. and Sirajo, S. (2013): Economics of Sorghum (Sorghum bicolor(L) Moench) Production in Bauchi Local Government Area of Bauchi State, Nigeria, *presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia*