

Contributive Roles of Sorghum Production to Food Security and Economic Empowerment of Rural Farming Households in Katsina State, Nigeria

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ABSTRACT

Sorghum is an important food and economic crop in Nigeria. However, the full potential of the crop for domestic and industrial uses has not been harnessed in Nigeria. This study was conducted to assess the roles of sorghum in food security and economic empowerment of rural farming households with the view to promote its productivity in Katsina State. Simple random sampling technique was used to select 215 sorghum farmers for this study. Descriptive statistics and chi-square analysis were used to analyze the data. Result of the study revealed that sorghum production immensely contributed to food (89.3%), job (86.5%) and income (70.7%) of the rural farming households in the study area. Also, result of chi-square analysis showed that there is significant association between constraints and roles of sorghum in household food security and economic empowerment at $p < 0.05$ level of significance. The study concluded that sorghum production contributed to household food security and economic empowerment in the study area.

Keywords: *Contributive roles, Sorghum, Production, Food security, Economic empowerment, Farming households.*

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1. BACKGROUND OF THE STUDY

Sorghum is a cereal grain crop mostly cultivated in Sub-Saharan African (SSA) countries and other parts of the world to enhance food security, provide employment and generate income for rural farming households. It is the world's fifth largest grain crop and it is second most important crop in terms of tonnage in Africa [1]. However, Africa production accounts only for a quarter of world's sorghum produced. Nigeria is the largest producer in Africa, its production represents 71% of the total sorghum output in the region [2]; [3] and ranked third as the largest world producer of sorghum after the United States and India [4]; [1]. Nigeria thus remains the world leading country for food grain sorghum production. Its production exceeds other arable crops. It is the third cereal in terms of production after maize and millet in the country with more than 4.5 million tonnes harvested in 2010 [4]. In almost all parts of the Northern Nigeria, it is grown in large quantity and used as the primary food crop in a diverse forms [5]. Unlike in Nigeria where the whole grain may be grinded into flour fine particle product, which is later transformed into diverse traditional foods for human consumption, in the United States and India sorghum are primarily used for animal feed. Sorghum stands out as an important staple food in Nigeria. Godwin and Garry, [6] reported that close to 300 million people from the developing countries consumed sorghum. It contributes to energy food supplies and household food security. Sorghum became an important household food crop when the Nigerian government banned the importation of barley in 1986 [7]. It was one of the crop priorities of the Nigerian government's Agricultural Transformation Agenda in 2012 (Sorghum Transformation Plan) [8]; [9]. It is industrially used for brewing alcoholic and non-alcoholic drinks and other confectionery in Nigeria. Researchers have also reported health benefits of sorghum as strong anti-proliferative activity against colon cancer cells [10] has higher antioxidants compared to other grains and fruits [11] and slows the growth of cancer generally in human [12]. Sorghum bran may protect against diabetes and insulin resistance [13]. People that react to gluten proteins found in wheat, barley and rye could safely consumed sorghum without any side effect [14]. It has also been recommended as food ingredients or dietary supplement to control cholesterol levels in humans [15]. In many parts of the world sorghum has been used in food products and various food items like malted beverage, cake, ethanol, bread, cookies and brewery are made from this grain [3]. However, the huge potentials of sorghum as household food, income generation and raw materials for livestock feed and industries have been constrained by continuous reduction in its annual production in Nigeria due to climate change, production and socio-economic factors, and insecurity. For instance the issue of Boko-Haram insurgency has caused lot of havoc and losses in terms of human lives, household properties and farmlands in the North-east region of the country thereby putting the whole country in serious food insecurity and economic distress. In addition, the industries that primarily make use of the crop as raw materials for finished products and profit are not helping the farmers with training, inputs, technology and financial support as most of these industries are located farther away from the reach of the farmers, mostly in the urban centres. Rural farmers are therefore wallowing in abject poverty despite their effort and commitment to agriculture as a means of living. Zalkuwi [3] reported that production has been declining due to the strong reduction of both area harvested and yields since 2013 till date and making it difficult for farmers to realize higher income and move out of poverty. It is based on this premise that this study found it necessary to assess the roles of sorghum in food security and economic empowerment of the rural farming households with the view to identify problems militating against achieving higher production and proffer possible suggestions to revitalize the sorghum production and productivity in Katsina State, Nigeria. Increasing productivity would definitely have substantial effect on income of the farming household and poverty status, and it would as well go a long way in helping the country to sustain the leading position as largest sorghum producer in Africa. The specific objectives of this study are to:

- 1) identify socio-economic characteristics of the sorghum farmers in the study area
- 2) assess roles of sorghum in household food security and economic empowerment in the study area
- 3) identify constraints to sorghum production and productivity in the study area

1.1. Hypothesis

H₀₁: There is no significant association between constraints and roles of sorghum in household food security and economic empowerment

2. METHODOLOGY

2.1. Description of the Study Area

The study area is Katsina State. The State is one of the seven states in North-west Nigeria. It is located in the Sudan savannah agro-ecological zone. The state lies between longitude 12°59' N and latitude 7°36' E. The state is bounded in the East by Kano and Jigawa States, in the West by Zamfara State, in the South by Kaduna State and in the North by Niger Republic. It has a total land area of 1.64 million ha. Rainfall in Katsina State ranges from 400-800 mm. The state has a population of about 5,792,579 [16]. The economy of the State is basically agrarian in nature. Farming and rearing of animals occupies the lives of about 80% of the total population of the state. Katsina State features prominently in the cultivation of crops like millet, sorghum, maize, rice, sugarcane, cowpea, groundnut, cotton and vegetables. The state is the largest producer of cotton and second largest producer of Sorghum in Nigeria. The major livestock produced in the state include cattle, sheep, goat, poultry, donkey and camel. These provides huge opportunities for setting up of large Scale Agro-allied industries such as Sugar Processing Industry, Rice Milling, Oil and Flour Milling, Textiles, Dairy Products, Confectioneries, Meat processing, Tannery, Hatchery and Poultry production, etc.

2.2. Sampling Technique and Sample Size

Simple random techniques was used to select 4 Local Government Areas (Mashi, Daura, Mai'adua and Mani) out of 34 LGAs. This represents 12% of total LGAs in Katsina State. Three villages were randomly selected from each of the selected LGAs making 12 villages. The selected villages are Katoge, Dokawa, Tsintsiya, Dana-kola, Ganga, Kaligo, Koza, Maiturumi, Bosunsuwan, Muduru, Sheme and Fadigure. From each of these villages 10% sorghum farmers were randomly selected from their registered list (Growth Enhancement Support Scheme record) to make up 215 respondents as sample size for this study.

2.3. Measurement of Variables

Variables assessed include respondents' socio-economic characteristics, benefits derived from sorghum production was operationalized as To a greater extent, To a lesser extent and No contribution with scores of 3, 2 and 1 assigned respectively, constraints to sorghum production was nominally measured as Yes and No with scores of 1 and 0 assigned. Percentages were used in ranking of the constraints.

2.4. Method of Data Analysis

Frequency distributions and mean were used for the objectives while chi-square analysis was used for the hypothesis of the study.

3. RESULTS AND DISCUSSION

As revealed in Table 1 that only very few (7.0%) of the respondents were less than 30 years of age. Twenty-seven percent were between 41 and 50 years of age. About fifty percent of the respondents were above age of 50 years. The average age of the respondents was 44.1 years. This is a pointer to a growing ageing population in rural farming. The ageing population is as a result of youth reluctance to go into farming; agriculture is assumed not to be profitable by the youth and rural infrastructure are generally lacking hence, the youth prefer to search for paid-jobs in the urban centres. Government effort to reverse the trend has not producing feasible result going by the declining in food production and supply in the country. The results revealed that most (79.2%) of the respondents were male while few (20.8%) were female. Sorghum production is dominated by male because it is time and effort demanding and even tedious for the women. Islamic practice of the people in the study area also limits the women to domestic works. Omoare, et al. [17] reported that most farming work is energy demanding which make men to be more involved in production stage while women are involved in processing and marketing of harvested sorghum. It was also revealed that most (84.2%) of the respondents were married, 6.0% were single, 4.2% were separated and 5.6% were widowed. Marital status is a crucial factor in shaping social rural participation and acceptance [18]. Result on respondents' education indicated that about thirty percent of the respondents did not have formal education, 19.1% had primary education, 15.3% had secondary education and 2.3% had tertiary education. This is an indication that the respondents have low level of formal education. The low literacy level of the sorghum farmers need to be addressed for better farming and increased productivity. However, more than thirty percent of the respondents had Arabic Education by virtue of being Muslims and importance attached to acquiring knowledge in Quran by the respondents. Moreover, the result showed that less than fifteen percent of the respondents had less than 4 people as household size, 44.6% had 5 – 9 people and 31.2% had 10 – 14 people. The average household size was 9 people. These findings indicated that the household size of respondents was large. Large household size provides manpower for farm and other household activities [19]. The also result showed that 18.6% of the respondents had spent less than 10 years in sorghum production, 24.2% had spent 11 – 20 years, 40.9% had spent 21 – 30 years and 16.2% had spent more than 30 years in sorghum farming. The average year of experience in sorghum farming was 19.8 years. This implies that the respondents are full of experience because of number of years they have put into sorghum farming. Years of experience in farming business can be linked to the age of farmers. Furthermore, 32.6% of the respondents cultivated less than 4 hectares of farm land for sorghum while 53.5% cultivated less than 5 - 9 hectares. This means that sorghum farming is practiced at subsistence level. National Bureau of Statistics (NBS) [20] reported that farmland of 0.1 – 8.9 is small-scale. In addition, majority (77.7%) of the respondents harvested less than 1 tonnes/ha while 22.3% realized more than 2 tonnes/ha. The mean harvest was 1.2 tonnes/ha. The average income generated from sorghum was ₦106,605/ha. Majority (66.5%) of the respondents generated ₦81,000 – 160,000/ha while only very few (8.4%) obtained more than ₦161,000/ha.

3.1. Roles of Sorghum in Household Food Security and Economic Empowerment

Sorghum provides food and income earning for the rural farmers. Uses of sorghum in Nigeria are categorized into Traditional and industrial uses. Traditional uses are mainly as foods, beverages and drinks for household consumption while industrial use is brewing. Result in Table 2 showed that to a greater extent sorghum contributed to household food security. Majority of respondents consumed sorghum *darwa* as breakfast (89.3%), sorghum *tuwo* for lunch (82.3%) and *fura* for refreshment (79.5%). Sorghum straw is however used as blood tonic herb in babies' food (64.2%). These findings are in tandem with the report of [4] that sorghum consumption

accounts for 30% of the total cereal consumption in Nigeria and that it is highly consumed in the northern part of the country than any other parts.

Table-1. Distribution of respondents by their socio-economic characteristics (n = 215)

Variables	Frequency	Percentage	Mean
Age (years)			
≤ 30	15	7.0	
31 – 40	38	17.7	
41 – 50	57	26.5	44.1
51 and above	105	48.8	
Sex			
Male	170	79.2	
Female	45	20.8	
Marital status			
Single	13	6.0	
Married	181	84.2	
Separated	09	4.2	
Widowed	12	5.6	
Educational Status			
No formal education	64	29.8	
Primary education	41	19.1	
Secondary Education	33	15.3	
Arabic education	72	33.5	
Tertiary Education	05	2.3	
Household size			
≤ 4	29	13.5	
5 – 9	96	44.6	9.0
10 – 14	67	31.2	
15 and above	23	10.7	
Years of experience			
≤ 10	40	18.6	
11 – 20	52	24.2	19.8
21 – 30	88	40.9	
31 and above	35	16.3	
Farm size			
≤ 4	70	32.6	
5 – 9	115	53.5	6.6
10 – 14	16	7.4	
15 and above	14	6.5	
Yield (tonnes/ha)			
≤ 1	167	77.7	
≥ 2	48	22.3	1.2
Income (₦/ha)			
≤ 80000	54	25.1	
81,000 – 160,000	143	66.5	106,605
≥ 161,000	18	8.4	

Source: Field survey, 2016

Furthermore, sorghum production contributed to economic empowerment of the farming households as most (86.5%) of the respondents reported that to a larger extent the family members are engaged in every stages of sorghum production chain, it increases family earnings (70.7%) and safes the family members from running into domestic debt (60.0%). It was also reported that profit from sorghum is used to cater for basic household needs (88.4%). By implication, it can be inferred from these findings that sorghum production plays an important role in providing food, job and income for the rural farming households in the study area.

Table-2. Distribution based on roles of sorghum in household food security and economic empowerment (n = 215)

Contributions	To a greater extent	To a lesser extent	No contribution
Food security			
Sorghum paste (<i>Dawa</i>) contributes to household breakfast	192 (89.3)	23 (10.7)	0 (0.0)
Sorghum <i>Tuwo</i> (Stiff porridge) is normally taken for lunch/dinner by the family members	177 (82.3)	38 (17.7)	0 (0.0)
<i>Fura</i> (Sorghum and fermented milk) for refreshment in the evening by the family members	171 (79.5)	35 (16.3)	09 (4.2)
The straw is used as blood tonic herb in the babies food	138 (64.2)	26 (12.1)	51 (23.7)
Economic empowerment			
It engages the family through the production chain (planting, harvesting, processing and marketing)	186 (86.5)	17 (7.9)	12 (5.6)
It increases family income	152 (70.7)	28 (13.0)	35 (16.3)
It prevents the family from high risk of indebtedness	129 (60.0)	54 (25.1)	32 (14.9)
Profit from sorghum sold is used to take care of household basic needs like feeding and clothing	190 (88.4)	25 (11.6)	0 (0.0)

Source: Field survey, 2016

3.2. Constraints to Sorghum Production

Sorghum production like every other agricultural enterprises in Nigeria is confronted by series of problems which require urgent attention in order move forward in agriculture. All respondents (100%) ranked financing as first and major problem to expansion of sorghum in the study area. The finding is in line with Philip, et al. [21] and Oyediran [22] that under-funding of agricultural sector by government constituted major limitation to its growth and development. Similar to that was the report by almost all (99.1%) the respondents that there was no improved seeds hence, they are solely rely on seeds from previous harvest and those purchase from local markets. This undermines productivity as little output is often realized from harvest by the farmers despite huge investment put into it. Poor extension service support (90.2%), poor rural infrastructure (87.9%) and lack of modern processing and storage facility (84.2%) were most disturbing problems to sorghum production and productivity in the study area. In addition, poor market linkage (72.1%) and high cost of agro-inputs (70.7%) were other serious problems in the study area. Government has spent huge sum of money for silos construction yet they are not functional, thus high postharvest losses occur during glut.

Table-3. Distribution of constraints to sorghum production (n = 215)

Constraints	Yes (%)	Rank
Poor extension service support	194 (90.2)	3 rd
Lack of improved seeds variety	213 (99.1)	2 nd
Lack of financial support	215 (100.0)	1 st
Problems of weeds and pest	126 (58.6)	8 th
Poor rural infrastructure	189 (87.9)	4 th
Lack of modern processing and storage facility	181 (84.2)	5 th
Poor market linkage	155 (72.1)	6 th
High cost of agro-inputs (fertilizers and agrochemicals)	152 (70.7)	7 th

Source: Field survey, 2016

3.3. Association between Constraints and Roles of Sorghum in Household Food Security and Economic Empowerment

The result of hypothesis showed that constraints affected the roles of sorghum production in the study area. Poor extension service support ($\chi^2 = 20.9$), lack of improved seeds variety ($\chi^2 = 12.5$), lack of financial support ($\chi^2 = 17.1$), problems of weeds and pest ($\chi^2 = 14.2$), poor rural infrastructure ($\chi^2 = 12.5$), lack of modern processing and storage facility ($\chi^2 = 8.3$), poor market linkage ($\chi^2 = 4.5$) and high cost of agro-inputs ($\chi^2 = 8.7$) had positive and

significant association with roles of sorghum in household food security and economic empowerment at $p < 0.05$. This implies that the constraints have inhibiting influence on roles of sorghum in food security and economic empowerment. Thus, the null hypothesis that “*there is no significant association between constraints and roles of sorghum in household food security and economic empowerment*” is rejected.

Table-4. Association between constraints and roles of sorghum in household food security and economic empowerment

Variables	χ^2	df	p-value	Decision
Poor extension service support	20.9	2	0.00	Significant
Lack of improved seeds variety	12.5	2	0.01	Significant
Lack of financial support	17.1	2	0.02	Significant
Problems of weeds and pest	14.2	2	0.02	Significant
Poor rural infrastructure	12.5	2	0.01	Significant
Lack of modern processing and storage facility	8.3	2	0.03	Significant
Poor market linkage	4.5	2	0.04	Significant
High cost of agro-inputs (fertilizers and agrochemicals)	8.7	2	0.03	Significant

Source: Field survey, 2016
df – degree of freedom

4. CONCLUSION AND RECOMMENDATIONS

This study established that sorghum farmers are older, predominantly male, married, had large household size and experienced. Sorghum production significantly contributed to the household food security and economic empowerment of the rural farming households. But the optimal potentials of sorghum in terms of production and productivity has not been achieved due to some serious constraints such as poor financial support, lack of improved seeds variety, and poor extension service support. Result of chi-square indicated a significant association between constraints and roles of sorghum in household food security and economic empowerment in the study area. Based on these findings it is hereby recommended that the sorghum farmers should form themselves into cooperative to be able to access credits from Bank of Agriculture and Micro-finance Banks. Improved sorghum seeds should be produced by breeders and made available to the farmers by extension agents. In addition, extension agents should not relent efforts in organizing training for the sorghum farmers and encouraging them to adopt better farming practices. All these will ultimately help in addressing the problems of low production and other counter-productive issues in the study area and Nigeria at large.

REFERENCES

- [1] A. H. Thabit, "Economics of sorghum production under traditional farming system in Nyala Governate of South Darfur State, Sudan," *ARPJ Journal of Science and Technology*, vol. 5, pp. 74 - 79, 2015. [View at Google Scholar](#)
- [2] Ogbonna, *Current developments in malting and brewing trials with sorghum in Nigeria: A review* ogbonna. Sorghum: An Environmentally Friendly Food and Industrial Grain in Nigeria, 2011.
- [3] J. Zalkuwi, "Socio-economic factors that affect Sorghum production in Adamawa State, Nigeria," *International Journal of Science and Research*, vol. 4, pp. 1610 – 1614, 2013.
- [4] FAOSTAT, "Food and agricultural organization of the united nations. FAOSTAT ProdSTAT, Production Crops." Retrieved from www.faostat.fao.org, 2012.
- [5] Foreign Agricultural Services (F. A. S.), "United States department of agriculture," Grain and Feed, Annual Report 2011.
- [6] I. D. Godwin and S. J. Garry, *Overcoming productivity and quality constraints in sorghum: The role for genetic engineering. In transgenic cereals: O'Brien, L. and Henry, R. J. (Eds.)*. USA: AACCC St Paul Minnesota, 2000.
- [7] African Agricultural Technology Foundation (AATF), *Feasibility study on striga control in sorghum*. Nairobi: African Agricultural Technology Foundation, 2011.

- [8] Federal Ministry of Agriculture and Rural Development, "Abuja, Nigeria. Agricultural transformation implementation Council. Sorghum transformation strategy," Technical Report. IFPR2013.
- [9] Federal Ministry of Information, "Maku lists gains of Jonathan's Agricultural Transformation Agenda," 2013.
- [10] L. Yang, J. D. Browing, and J. M. Awika, "Sorghum 3-deoxyanthocyanins poses strong phase II enzyme inducer activity and cancer cell growth inhibition properties," *Journal of Agricultural Food Chemistry*, vol. 57, pp. 1798 -1804, 2009. [View at Google Scholar](#) | [View at Publisher](#)
- [11] J. M. Awika and L. W. Rooney, "Sorghum phytochemicals and their potential impact on human health," *Phytochemistry*, vol. 65, pp. 1199 – 1221, 2004. [View at Google Scholar](#) | [View at Publisher](#)
- [12] C. Gomez-Cordoves, B. Bartolome, W. Vieira, and V. M. Virador, "Effects of wine phenolics and sorghum tannins on tyrosinase activity and growth cells," *Journal of Agricultural Food Chemistry*, vol. 49, pp. 1620 – 1624, 2001. [View at Google Scholar](#) | [View at Publisher](#)
- [13] J. L. Farrar, D. K. Hartle, J. L. Hargrove, and P. Greenspan, "A novel nutraceutical property of select sorghum (Sorghum Bicolour) brans: Inhibition of protein glycation," *Phytotherapy Research*, vol. 22, pp. 1052 – 1056, 2008. [View at Google Scholar](#) | [View at Publisher](#)
- [14] C. Ciacci, L. Maiuri, N. Caporason, C. Bucci, L. DedGiudice, M. D. Rita, P. Pontieri, and M. Lohdei, "Celiac diseases: In vitro and in vivo safety and palatability of wheat-free sorghum food products," *Clinical Nutrition*, vol. 26, pp. 799 – 805, 2007. [View at Google Scholar](#) | [View at Publisher](#)
- [15] T. P. Carr, C. L. Weller, V. L. Schlegel, S. L. Cuppett, D. M. Guderian, and K. R. Johnson, "Grain sorghum lipid extract reduces cholesterol absorption and plasma non-HDL cholesterol concentration in hamsters," *Journal of Nutrition*, vol. 135, pp. 2236 – 2240, 2005. [View at Google Scholar](#)
- [16] National Population Commission (NPC), "Population and housing census: Enumerators manual. Federal Republic of Nigeria," p. 11, 2006.
- [17] A. M. Omoare, W. O. Oyediran, and E. O. Fakoya, "Comparative assessment of Cocoa farmers' knowledge and attitude to trainings on good cultural management practices in ogun and ondo States, Nigeria," *International Journal of Agricultural Extension and Rural Development Studies*, vol. 3, pp. 36 - 51, 2016.
- [18] S. O. Ebewore, E. O. Egho, and E. C. Enujeke, "Effect of farmer field school training on the management of Cocoa marids (Sagbergella Singularis) by famers in Edo State Nigeria," *Asian Journal of Agricultural Sciences*, vol. 5, pp. 6-10, 2013. [View at Google Scholar](#)
- [19] A. M. Omoare and W. O. Oyediran, *A survey on the perception of residents of Iwajorwa L.G.A of Oyo State on the contribution of charcoal production to deforestation and environmental degradation*, *Journal of Changes in the Environment: Strategies for its Sustainability, A Production of Department of Biology*. Ondo State: Adeyemi College of Education, 2015.
- [20] National Bureau of Statistics (NBS), *National database general household survey*. Abuja: National Bureau of Statistics, 2006.
- [21] D. Philip, E. Nkonya, J. Pender, and O. A. Oni, "Constraints to increasing agricultural productivity in Nigeria: A review (No. 6). International Food Policy Research Institute (IFPRI)," 2009.
- [22] W. O. Oyediran, "Factors affecting melon (Citrullus Colocynthis) production in Oyo state, Nigeria," Unpublished, M. Agric. Thesis, Department of Agricultural Extension and Rural Development, Federal University of Agriculture Abeokuta. pp: 108-111, 2013.

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