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Comparative Analysis of Productivity and Poverty Status among Users and Non Users of Improved Sorghum Varieties in Kano State, Nigeria

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Abstract

This study comparatively analyzed the productivity and poverty status among users and non-users of improved sorghum varieties in Kano State, Nigeria. A multi-stage sampling technique was adopted in the selection of 131 users and 132 non users of improved sorghum varieties. Data collected were analyzed using descriptive and inferential (productivity index and FGT model) statistics. The result of the socioeconomic characteristics showed that the mean age of users was 40 years while non users were 39 years, 93.13% and 88.64% of the users and non users were male. Also, the result indicated that majority (82.44%) and (81.06%) of the users and non users were married, with most of them having quranic education (36.64% and 46.97%) with mean farm size of 3.6Ha and 2.1Ha for users and non users respectively. The finding further showed that the mean farming experience for users and non users were 19 years and 16 years respectively with average income of about ₦48,794 per month for users and ₦23,152 for non users. The result also showed productivity of 192,977kg/ha for users compared to 120,725kg/ha for non users of improved sorghum varieties with a noticeable difference in productivity of about 72,252kg/ha between users and non users while the result of the poverty status shows that 62.88% of the users were not poor, 21.21% were poor and 15.91% were very poor while that of non users was 61.07%, 21.37 and 17.56 for non poor, poor and core poor respectively. Also, the result shows that the incidence of poverty for users and non users were 16% and 17.4% respectively, indicating that incidence of poverty was higher among the non users than the users. The study therefore recommended that government and stakeholders should ensure the availability of improved sorghum varieties at subsidized rate to sorghum farmers in the study area.

Keywords: Foster Greer Thorbecke, Sorghum, Productivity, Poverty Status

Introduction

Sorghum (*Sorghum bicolor L. Moench*) which is of African origin is an important food and feed crop of the semi arid tropics. Sudan savannah provides the most suitable production environment for sorghum where different varieties from local strains (KL2, KSV4 and NR71168) and improved varieties (CSR01, CSR02, ICSV111, ICSV400 and Samsorg14 and 17) are commonly cultivated under rain fed condition. The conditions include higher solar radiation, predominant sandy loam soil and lower incidence of pests and diseases. Grain sorghum can endure limited, short term water stress thus making the cultivation of the crop possible in the drier regions of Nigeria with supplementary irrigation. It responds rapidly to additional water especially during flag leaf and booting growth stages when the number of seeds per head is set (Ogidi and Abah, 2012). Therefore, cultivation of sorghum may be possible under irrigation to supplement rain fed production system thereby increasing food and feed supply for ever increasing consumer population and livestock. The major constraint during this period is the incidence of birds infestation at maturity stage that drastically reduced the yield and sometimes lead to total failure.

In Nigeria, sorghum is the second cereal in terms of production after maize with a production value of about 6.9 million tonnes in 2016 representing 32% of the total cereal production (FAOSTAT, 2017). There are two uses for sorghum in Nigeria: traditional and industrial uses. The traditional uses include a variety of foods, beverages and drinks. Moreover, sorghum is traditionally used for thatching of roofs and fencing of compounds. Regarding the industrial production, the cereal is used for brewing. The majority of domestic production is used for household consumption and fodder. Improved agricultural technologies and its adoption are central to transformation of farming system and a path of food insufficiency and poverty reduction in developing countries (Washington *et*

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al., 2012). It has been demonstrated in numerous experiments that the performance of improved seed varieties is superior to the traditional varieties among most farmers (Tripp, 2000). According to Gerald (2014), food production can be increased by simply ensuring the availability of good quality seeds and this will make small-scale farmers to have the potentials to increase their welfare and food security situation if they adopt the use of improved seeds. It is clear that sorghum has an important role to play in food security and income generation to rural areas and the whole of the country in general. Therefore, intensification of improved technologies for crop production which would lead to increased yields of sorghum is indispensable. It is in this regard that this study therefore seeks to provide answers to the following research questions: what are the socio-economic characteristics of sorghum farmers, what is the productivity level of sorghum farmers and what is the poverty status of sorghum farmers in the study area?

Methodology

The Study Area: The study was conducted in Kano State. Kano State is one of Nigeria's major sorghum producing States. It was created on the 27th May, 1967 and located in North-Western Nigeria within the geographical coordinates of Latitudes 13° 2'N and Longitudes 4° 24'E. It covers a total land area of about 20,131 km² and borders Katsina State to the north-west, Jigawa State to the north-east, Bauchi State to the south-east and Kaduna State to the south-west. It is the most populous state in the federation with an estimated human population of about 9,383,682 (NPC, 2006) which was projected to be about 11,729,602 in 2016, with an annual growth rate of 2.5%. Kano State has forty-four (44) Local government areas (LGA's) which are divided into three (3) Agricultural Development Project (ADP) Zones.

Sampling Techniques: A multistage random sampling technique was adopted in selecting respondents for this study. The ADP zone in the state is divided into three zones and two sets of respondents was considered for the study; users and non users. The first stage involved random selection of 2 LGA's from each of the agricultural zones. The second stage involved random selection of 2 villages from each of the selected LGA's. In the third stage, using the sampling frame obtained from KANARDA, Taro Yamane's formula at 8% precision level was used to determine the representative sample comprising of 131 users and 132 non-users.

Data collection and analytical techniques: Primary data was used for this study. A well-structured questionnaire was used to elicit the necessary information from the respondents. The questionnaire was pre-tested to ensure its validity and reliability for the research. Both descriptive and inferential statistics were used; the descriptive statistics includes mean, frequency distributions and percentages while the inferential statistics were Productivity Index (PI) and Foster Greer and Thorbecke (FGT) model.

Model Specification

Productivity Index: PI was used to determine the productivity level of users and non users of improved sorghum varieties in the study area as adopted by Coker *et al.*, (2014). The formula is expressed as:

$$PI = P_i / A_i \quad (1)$$

Where;

P_i = Output of i^{th} farmer (kg) and A_i = Area of land cultivated by i^{th} farmer (ha).

Foster Greer and Thorbecke (FGT) Model: The respondents' per capita expenditure was used to classify sorghum farmers into three, namely non poor, poor and core poor based on World Bank classification of Poverty status as explained: Non poor: $NP > 2/3$ of the mean expenditure per day, Poor: $P < 2/3$ of the mean expenditure per day and Core poor: $P < 1/3$ of the mean expenditure per day. The FGT model was then used to obtain the poverty indices as follows:

$$P_0 = q/n \quad (2),$$

$$P_1 = P_0/q \quad (3) \quad \text{and}$$

$$P_2 = P_1/q \quad (4)$$

Where: P_0 = poverty incidence, P_1 = poverty depth, P_2 = poverty severity, q = number of respondents below poverty line and n = total number of respondents.

Results and Discussion

Socioeconomic Characteristics of Sorghum Farmers: the results of socioeconomic characteristics of sorghum farmers as presented in Table 1 revealed that the mean age of users was 40 years while non users were 39 years. The results indicate that the respondents were in their productive age, which implies a likelihood of an increase in the responsiveness to the use of improved sorghum varieties among youth as a means of poverty alleviation among the farmers. The study also showed that 93.13% and 88.64% of the users and non users were male, implying that men dominated sorghum production in the sampled communities. Also, the result indicated that majority (82.44%) and (81.06%) of the users and non users were married, with most of them having Quranic education (36.64% and 46.97%) with mean farm size of 3.6Ha and 2.1Ha for users and non users respectively.

The finding further showed that the mean farming experience for users and non users were 19years and 16years respectively with average income of about ₦48,794 per month for users and ₦23,152 for non users. The shows that users of improved sorghum varieties had larger farm size, more experienced and therefore earn more farm returns compared to the non users. This result is in line with the findings of Remiet *al.*, (2017) who found average values of 45years for age, 11years for farming experience, 7persons for household size, and 4hectares for farm size.

Productivity level of Sorghum Farmers: The result of productivity level of sorghum farmers in Kano State, Nigeria in Table 2 shows that sorghum productivity of users was 192,977kg/ha compared to 120,725kg/ha for non users of improved sorghum varieties with a noticeable difference of about 72,252kg/ha which was attributed to the use of improved sorghum varieties and as such an increase in the productivity of users.

Poverty Status of Sorghum Farmers: Table 3 presents the poverty status of sorghum farmers classified into groups of non-poor, poor or core poor respectively. A non-poor poverty line was drawn from above 2/3rd of the mean expenditure per day, a poor poverty line equivalent of 2/3rd of the mean expenditure per day while core poor poverty line equivalent of 1/3rd of the mean expenditure per day. About 62.88% of the users were non poor, 21.21% were poor and 15.91% were core poor while for non users, 61.07%, 21.37 and 17.56 were non poor, poor and core poor respectively. This shows that users in non-poor categories were more than non-poor in non user category while a total of 38.93% of the non users were poor (poor and core poor) compared to about 37.12% poor of the users.

Measures of Poverty Indices among Sorghum Farmers: The respondents' measure of poverty was analyzed by decomposing it using three indicators of poverty – incidence (P_0), depth (P_1) and severity (P_2). Table 4 shows that the incidence of poverty was higher among non users (17.4%) than users (16%). The implication is that the percentage of people living below poverty line was higher among the non users than the users, which could be as a result of the positive economic effect of adopting improved sorghum varieties. About 0.7% of the users and non users sank deeper into poverty while poverty severity shows 0.03% for both users and non users. This finding corroborates that of Tanko and Olasunkanmi (2016) who found that the percentage of non-poor farmers was greater among the adopters of IMV while non-adopters had higher percentage of poor farmers with pronounced incidence, depth and severity of poverty.

Conclusion and Recommendations

This study concludes that the non users had lower socioeconomic characteristics, lower productivity and were poorer than users of improved sorghum varieties and therefore recommended that government and stake holder should ensure the availability of improved sorghum varieties at subsidized rate to sorghum farmers in the study area.

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Table 1: Socioeconomic characteristics of sorghum farmers

VARIABLES	USERS			NON USERS		
	Frequency	Percentage	Mean	Frequency	Percentage	Mean
Age (Years)						
≤ 40	82	62.59		72	54.54	
41 – 50	28	21.37	40years	39	29.55	39years

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51 – 60	9	6.88		12	9.09	
> 60	12	9.16		9	6.82	
Gender						
Male	122	93.13		117	88.64	
Female	9	6.87		15	11.36	
Marital Status						
Single	20	15.27		18	13.64	
Married	108	82.44		107	81.06	
Divorced	3	2.29		7	5.30	
Educational Level						
Quranic	48	36.64		62	46.97	
Primary	26	19.85		46	34.85	
Secondary	34	25.95		20	15.15	
Tertiary	23	17.56		4	3.03	
Farm Size						
1 – 3	84	64.12		123	93.18	
4 – 6	33	25.19	3.6Ha	9	6.82	2.1Ha
7 – 9	5	3.82		0	0.00	
> 9	9	6.87		0	0.00	
Income (₦)						
≤ 100,000	3	2.29		35	26.52	
101,000 – 500,000	82	62.59	₦48,794.66	90	68.18	₦23,152.27
501,000 – 1,000,000	44	33.59		7	5.30	
> 1,000,000	2	1.53		0	0.00	
Farming Experience						
1 – 10	31	23.66		43	32.58	
11 – 20	58	44.27	19years	53	40.15	16years
21 – 30	25	19.09		27	20.45	
> 30	17	12.98		9	6.82	

Source: Data Analysis, 2019.

Table 2: Productivity of sorghum farmers

Variables	Users	Non Users
Production (Kg)	895,445	232,720
Area (Ha)	469.5	276
Productivity Index (Kg/Ha)	192,977	120,725
Difference	72,252	

Source: Data Analysis, 2019.

Table 3: Poverty status of sorghum farmers based on poverty lines

	Non Poor		Poor		Core Poor	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Users	83	62.88	28	21.21	21	15.91
Non Users	80	61.07	28	21.37	23	17.56

Source: Data Analysis, 2019.

Table 4: Incidence, depth and severity of poverty among sorghum farmers

Categories	Incidence	Depth	Severity
Users	0.1603	0.0075	0.0003
Non Users	0.1742	0.0076	0.0003

Source: Data Analysis, 2019.