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ACCEPTABILITY OF IMPROVED UPLAND RICE PRODUCTION PRACTICES AMONG FARMERS IN BALANGA LOCAL GOVERNMENT AREA OF GOMBE STATE, NIGERIA

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ABSTRACT
The study investigated acceptability of improved upland rice production practices among farmers in Balanga local government area of Gombe State, Nigeria. Multi stage sampling procedure was used to determine the sample of the study. Primary data were collected from 154 samples of rice farmers through the use of structured questionnaire. Descriptive statistics such as percentages, means and adoption index were used to achieve objectives of this study. The study revealed that farmers in the study area have an average age of 36 years and 1.8 ha of farm size which implies that farmers were young and smallholders. The result further showed that the level at which farmers accepts upland rice production practices was low (3.9%). It was recommended that public and private extension services should be provided by agricultural stakeholders in the area. Also, young farmers should be motivated to form cooperative societies for easy access to farm inputs such as fertilizer, agro-chemicals.

Keywords: Acceptability, Balanga, Production, Rice, Upland.

INTRODUCTION
Rice is a staple for some 4 billion people worldwide and provides 27% of the calories in low and middle income countries (International Rice Research Institutes [IRRI], 2016). However, due to the over dependence of the world population on rice and expected population growth and acreage on rice, global demand for rice will continue to increase from 479 million tons (MT) milled rice in 2014 to 536-551 MT in 2030 with little scope for easy expansion of agricultural land or irrigation except for some areas in Africa and South America (IRRI, 2016). This means there is need for revolution in rice production. Hence, there is need to follow the strategies of Green Revolution that made Asia self-sufficient in rice production through adoption of improved technologies (Huy, 2007). This implies that rice productivity could on be improved through adoption of improved agricultural technologies.

Rice production is one of the major agricultural enterprise which provides employment, food and income to a large proportion of farmers in Gombe State in particular and Nigeria in general. The crop is being produced under different production systems which include rain-fed lowland or upland, irrigated, mangrove and deep water in all agro-ecological zones. The annual consumption of rice per capita was 32 Kg (Bala *et al*., 2019). Rice demand in Nigeria is high and meeting this demand is among the food security priorities (National Rice Development Strategy [NRDS], 2009). In 2017 the rice consumption was 6.4 MT (United State Department of Agriculture [USDA], 2017) while domestic production was about 3.7 million tons of milled rice (Bayo, 2018). Thus, there is a shortage of 2.7 MT. As a result, there has been a growing gap between the demand for rice and its supply arising from low productivity. This made rice demand to be high leading to need for importation to supplement the gap between demand and supply of the commodity, because the stronger the force of demand for rice in relation to supply

the higher the frequent rise in the price of rice and therefore has great implication on food security status and economic development of the nation.

According to Kerk (2017), adoption is the decision (that is, acceptance or rejection) and the subsequent implementation, discontinuance, and/or modification by an individual or an organization. Therefore, adoption is an individual or organizational process that leads to diffusion as a systemic process. On the other side, Dube and Gumbo (2017) defined adoption rate as the relative speed with which an innovation is adopted by members of a social system and is generally measured by the number of individuals who adopt the innovation in a specified period, such as each year. The authors also, stated that Rogers (1995) classified adopters of new technology in to five (5) types based on their timing of adoption. Their usual distributions are indicated by the percentages after the categories, based on the percentages associated with standard deviations of the normal curve of innovation adoption: innovators (2.5%), early adopters (13.5%), early majority (34.0%), late majority (34.0%), and laggards (16.0%).

The area under rice cultivation in Nigeria expanded from about 2.4 million harvested ha in 2010 to 3.2 million harvested ha in 2017 (Olushola, 2018). 77% of the farmed area of rice is rain-fed, of which 30% is upland and lowland 47% (Cadoni and Angelucci, 2013). Despite the increase in the area under production, rice productivity remains low in the Nigeria, as production could not meet the demand. This led to introduction of various improved upland rice production practices which have been disseminated by extension personnel's in the country. These improved technologies have been studied in Gombe State as a whole but no empirical study carried out in Balanga as a Local Government Area (LGA) to determine the level at which farmers accepted these practices. Therefore, the current study on acceptability of improved upland rice production practices (IURPPs) in Balanga was necessary with specific objectives of were to: describe the socio-economic characteristics of farmers and examine the level of acceptance of improved rice production practices.

MATERIALS AND METHODS

The Study Area

Balanga LGA was located on Latitudes and Longitudes $9^0$58'N, $11^0$41'E, respectively (Omorogbe *et al.*, 2017). Balanga LGA is in the south east of Gombe State, bordering Shongom to the East, Kaltungo to the West, Adamawa State to the South and Yamaltu-Deba to the North. It has an area of 1, 626 Km^2 and a projected population of 170,926 males and 162,265 females with a total of 333,191 in 2020 at growth rate of 3.3%. It has two distinct climatic conditions which were dry and rainy seasons. Balanga has an annual mean temperature of about 40-42°c during hot season (March-April) and a minimum temperature of about 20-22°C during cold season (December-February). The area received the mean annual rainfall of 321.4 mm/annum (Gombe State Metrological Station, 2012). The major tribe in Balanga was Waja, other tribes were Dadiya, Fulani, Hausa, Tangale. Balanga LGA is another important area where food and cash crops were produced in Gombe State, the crops being produced in the area were: rice, maize, sorghum, groundnut, cowpea, sweet melon, pepper, onions, tomatoes (Gombe State, 2017).

Sampling Procedure

Multi-stage sampling procedure was used to determine the sample for the study. First stage, Balanga LGA was purposively selected because of the concentration of large number of rice farmers. Second stage, 10 rice producing communities were randomly selected using random numbers. Lastly, 154 rice farmers were randomly selected and used as sample.

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Analytical Techniques

Descriptive statistics such as percentages, means and adoption index were used in the study to achieve the objectives. Acceptability index (AI) is equal to number of production practices accepted by the farmer divided total number of improved upland rice production practices.

Mathematically AI = $\sum \frac{B}{A}$

where;
A = total number of improved upland rice production practices
B = number of improved upland production practices adopted by farmer

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

Table 1 shows the result of socio-economic characteristics of respondents. The finding showed that majority (95%) of the respondents was males with only 5% females. This implies that upland rice farming was dominated by males in the study area. This could be associated with tedious activities in IURPPs. This is concurrent with Ojo *et al.* (2018) that majority (80.4%t) of the *nerica* rice farmers in Ekiti State were males, while less than 20% were females. Farmers in the study area had an average age of 36 years with a minimum of 18 years and maximum of 64 years. This implies that farmers in the study area were active enough to handle IURPPs. The result varies with Adejoh *et al.* (2017) who reported a mean age of 43 years of rice farmers in Federal Capital Territory, Abuja, Nigeria. On the other side the result is similar to Ojo *et al*. (2018) who discovered that the average age of the *nerica* rice farmers in Ekiti State was observed to be 40 years, as some of them (39%) falls within age's 40-49 years.

The result also revealed that farmers have an average of 11 years of formal school. The minimum and maximum years of schooling among farmers were 5 years and 18 years respectively. The finding indicated that farmers were literate because most of them were secondary school holders. This could help them understand the value of IURPPs even if it is complex which may encourage acceptance. The finding differs with Abdulrahman *et al.* (2018) discovered that the mean years of schooling of the respondents were 5 years and largely skewed towards the non-formal education. The finding showed that farmers have average household size of 7 persons which is equivalent to national average. This may be cheap source of labour for the farmers. This is in line with Ojo *et al*. (2018) who established in their study in Ekiti State Nigeria that the average household was 7persons. On the other side, the result differs with Bassey (2016) who discovered that 38% of the respondents in Abi LGA Cross River State, Nigeria have household size of 6-10 persons.

The mean farm size of farmers in the study area was 1.8 hectares (ha) with minimum of 0.3 ha and maximum of 4.3 ha. This means that farmers in the study area were smallholders. The implication is that, probably it would be difficult for them to access credit from lending institutions. This could negatively affect the acceptance of IURPPs in the area. The findings of this study is dissimilar with Abdulrahman *et al.* (2018) who observed in their study that 76% of the rice farmers have farm size ranging from 0.1-5 ha with an average of 4 ha. However the result concurs with Onyeneke (2017) who found that average farm size of the farmers in Imo State, Nigeria was 1.8 ha. The result in Table 1 revealed that farmers in the study area have an average annual income of about ₦ 384, 654. The minimum farmers' income was ₦ 50, 000 and a maximum of ₦ 615, 000. This indicated that farmers in the study area were generating ₦ 1, 069 per day. This implies that farmers probably were not living on poverty line of 1.9 USD/day.

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The result is in contrast with Alarima *et al.* (2018) who found that the average annual income of rice farmers in Kebbi State, Nigeria was ₦786,000 (2,043 USD at the rate of ₦385 = 1 USD).

Table 1: Socio-economic Characteristics of Respondents

Variable	Minimum	Maximum	Mean
Age	18	64	36
Years of School	5	18	11
Household Size	1	29	7
Farm size	0.3	4.3	1.8
Household Income	50,000	615,000	384, 653.7
Farming Experience	2	43	24.9
Output	280	760	4498.8
Amount of credit access	11,000	110,000	69984.1
Number of Cooperatives belong	0	2	1.5

Source: Field survey, 2018

The result further shows that farmers in the study area have a minimum of 2 years of experience and maximum of 43 with an average of 25 years. This indicated that farmers were experienced enough to accept new practices like IURPPs. The finding corroborated with Abubakar *et al.* (2019) who reported in their study that most (75%) of adopters of the rice production practices had more than 20 years of farming experience. This implies that rice production experience and ability to perceive effectiveness of improved practices over the traditional methods endear farmers to be receptive of innovative ideas. On the other side, the result varies with Abdulazeez *et al.* (2018) who observed that the farming experience of the respondents had a mean of 8 years, minimum and maximum of 5 and 15 years, respectively. The result from Table 1 showed that farmers average output were about 2189 Kg with a minimum and maximum of 160 Kg and 8240 Kg, respectively. The finding indicated that farmers have about 21 bags of paddy rice. When these output milled it could turn to about 10 bags. This implies that famers need to diversify. The diversification probably will aid them to be food secured.

Larger portion (60%) of the farmers have no accessed to credit. On the other side, 40% of the farmers accessed the credit. The minimum and maximum amounts of credit accessed by farmers were ₦ 11, 000 and ₦ 110, 000, respectively, with a mean of ₦ 69984. This may reduce the chance of acceptance of improved upland rice production practices because some of the techniques (weeding, fertilizer and herbicide just to mention but a few) could be capital intensive. The finding varies with Adenuga *et al*. (2016) who examined that none of the non-adopters of improved rice varieties had access to credit while only 11% of the adopters had access to credit and more than 60% of those that had access to credit obtained it from informal sources. The result of membership of cooperative society revealed most (52%) of the farmers was not member of any cooperative while 48% of them belong to farmer groups. The finding furthers showed that the maximum number of cooperative groups farmers belong was 2. This implies that there could be need to enlighten farmers on the importance of cooperatives. Cooperatives help farmers in securing some farm inputs such as fertilizer, herbicides and credit which facilitate the adoption of improved upland rice production practices. The result is related to Onyeneke (2017) who reported that majority (74%) of the rice farmers in Imo State, Nigeria were members of cooperative societies. On the other side, the finding of this study differs with Bassey (2016) who found that 94% of the respondents in Abi LGA, Cross River State, Nigeria

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were members of local organizations available in the study area. This stresses the importance of local organizations in the rural Nigeria setting as a major platform for social mobilization, enforcing discipline, community work, rural development.

The result further revealed that half (50%) of the farmers have accessed to extension service with about 2%, 41% and 7% visited by extension agents monthly, quarterly and yearly, respectively. Probably this can be the reason of low participation in cooperatives in the study area. The implication was that, farmers would not receive adequate information regarding improved rice production practices hence, may leads to low output. This result varies with Abdulazeez *et al*. (2018) who revealed in their study that the Kogi accelerated rice production programme participants had 100% access to extension services while about 17.6% of the non-participants reported they had access to extension services. Also, Ojo *et al*. (2018) revealed that over 70% of the *nerica* rice farmers in Ekiti State had contact with ADP officials more than 10 times in a year. This shows that rice farmers had robust access to extension services which enables them to understand technical and agricultural information about NERICA rice technologies.

Level of Acceptance

Result of level of acceptance was presented in Figure 1. The finding of the level of acceptance follows the Rogers five categories of adoption as reported by (Dube and Gumbo, 2017). The finding revealed that very few (3.9%) of the farmers accepted the IURPPs in the study area. This indicated that farmers in this category could bear the risk of accepting new innovations. This implies that farmers were innovators. About 9.7% of the farmers were early adopters. This may be happen after careful observation from fellow farmers. On the other side, 10.4% and 37% of the farmers were early majority and late majority, respectively. Similarly, about 39% of the farmers were laggards. This implies that such categories of farmers were conservative and not ready to accept changes (IURPPs).

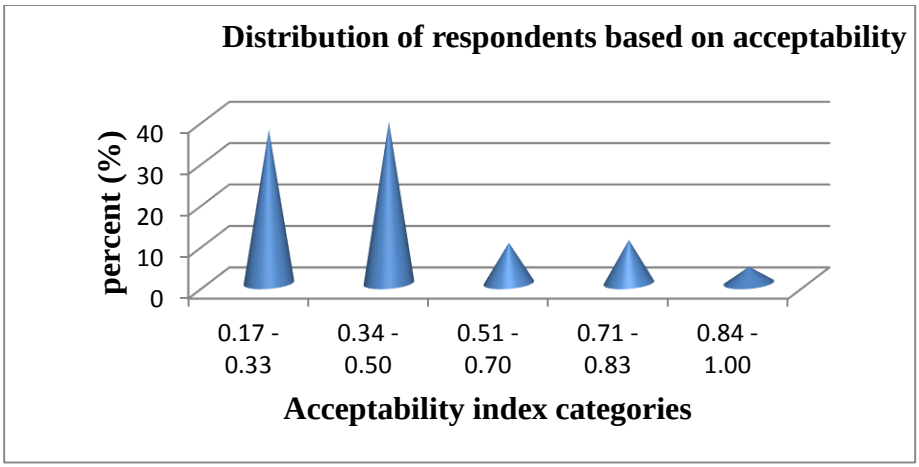

Figure 1: *Level of acceptance of upland rice production practices*
Source: Field survey, 2018

CONCLUSION AND RECOMMENDATIONS

The study revealed that farmers in the study area have an average age of 36 years and 1.8 ha of farm size which implies that farmers were young and smallholders. On the other side, the level at which farmers accept upland rice production practices was low (3.9%). Therefore the following recommendations were made:

i. Public and private extension services should be provided by agricultural stakeholders in the area. So that young farmers should be motivated to form cooperative societies for easy access to farm inputs such as fertilizer, agro-chemicals.
ii. Government and other stakeholders as well as non-governmental organizations should provide credit to farmers. This will go a long way in helping farmers to accept IURPPs which were capital intensive.
iii. Land should be made available to farmers at lower rent. This will encourage commercial production of rice in the study area.

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