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Assessment of the level of adoption of improved rice production technologies among Farmers in Lau Local Government Area of Taraba State, Nigeria

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Abstract
The study assessed the adoption of rice production technologies among farmers in Lau Local Government Area of Taraba State, Nigeria. Rice farmers in Lau, Local Government Area constituted the population of the respondents. Structured questionnaires were used for data collection. Purposive and random sampling techniques was employed where a total of 120 respondents were selected. Data were analyzed using descriptive and inferential statistics. The result indicated that 58.3% of the respondents were aged between 31-40 years, 70.2% of the respondents were dominated by males while 60% of the respondents were married, and 71.0% had attended tertiary institution. The result further showed that, 37.5% of the respondents had farming experience 1-5 years, 55% had household size between 6-10 persons. About 53.3% of the respondents belong to one association or the other. The findings revealed that, for the level of adoption of improved rice production technologies, timely application of fertilizer, herbicide application and spacing had their mean above the cutoff point (mean=2.5). The result of the constraints of improved rice production technologies showed that 65% of the respondents indicated that, inadequate access to credit, 55.5% inadequate information 54.25 inadequate facility and 69.2% poor power supply were the major constraints facing the adoption of improved rice technologies. Result of the ordinary least square revealed a negative and significant relationship between Gender and the adoption of rice production technologies at 10% ($p<0.1$) level of significance. Furthermore the result showed a negative and significant relationship between Household size and the adoption of improved rice production technologies at 5% ($p<0.05$) level of significances. There was positive and significant relationship between the adoption of improved rice production technologies at 1% ($p<0.01$) level of significance and the educational level of the respondents, the result also showed positive and significant relationship between the adoption of improved rice production technologies at 1% ($p<0.01$) level of significance and the membership of association. Based on these the following recommendation were made. Government should set up farm-based need assessment unit that will tackle the farmers needs in terms of provision of facilities, and other necessary farm input. Research institute, extension organization and nongovernmental organization should strengthened their monitoring and evaluation units to monitor, and encourage the adoption of improved technologies of farmers from the grass root.
Keywords: *Adoption, improved rice, production technologies, Farmers, Lau LGA*

INTRODUCTION

Agriculture contributes a lot to the economy of Nigeria. Not less than 70% of Nigerians earn their living from agriculture and it provides among others, food, employment, income, foreign exchange and raw materials for manufacturing sectors (Food and Agriculture Organization of the United Nations, 2011). Rice is a unique crop grown virtually all over the country, because it requires a wide range of temperature between 20 and 38^0c during growth, and a long period of sunshine. It can be grown over a wide range of ecological conditions. The prevalent types of rice production system in Nigeria are the rain fed highland, rain fed lowland, and the irrigated lowland rice (Singh *et al,* 2010). In Nigeria, demand for rice has been increasing at much a faster rate than in any other African country, since the mid 1970 (Food and Agriculture Organization of the United Nations,

2011). Production of rice in Nigeria is mainly in the hands of small scale farmers who are using unimproved farming techniques. Actual yields of rice differ significantly from potential yield and this has been attributed to low productivity due to use of primitive farming techniques (Federal Ministry of Agriculture, and Rural Development 2011)

Singha and Baruah (2011) reported that farmers were averse to adoption of recommendations of those relatively complex practices in nature such as seed treatment, application of manure and fertilizers, and plant protection measures under different farming systems. However, there are opportunities for ameliorating the complexity of certain practices through the deployment of appropriate extension methods. Agricultural technologies are the various new technical know-how put in place to improve agricultural production. According to Loevinsohn *et al.* (2012), farmers' decisions about whether and how to adopt new technology are conditioned by the dynamic interaction between characteristics of the technology itself and the array of conditions and circumstances. In a study on adoption of improved rice production technologies in Jere Local Government Area of Borno State, Mustapha, Undiandeye, Sanusi, and Bakari (2012) revealed that majority of the respondents adopted rice production technologies with respect to high yielding varieties (77.5%), early maturing varieties (69.37%), use of herbicides (93.75%) and broadcasting method (55%). Adopters of improved technologies increase their productions, leading to constant socio-economic development. Adoption of improved agricultural technologies has been associated with: higher earnings and lower poverty; improved nutritional status; lower staple food prices; increased employment opportunities as well as earnings for landless laborers (Kasirye, 2010).

Statement of the Problem

According to Mbanaso (2010) technologies released by research institutes are not likely to be accepted by the farmers if they are not compatible with the farmers' conditions. These conditions are accessibility to the technologies either in the form of availability of resources to purchase needed inputs or in the form of the relevance and appropriateness of the technologies to their needs, capabilities and environmental conditions

Rice is a dominant staple food in Taraba State in particular and in Nigeria in general. As a result, rice production has received substantial research and extension attention. This also calls for the need to intensify efforts on adoption of improved rice production technologies among farmers to improve their productivity and ensure food security. Even though several adoption studies explored technology adoption decision in developing countries. However, studies by Ani and Undiandeye (2001) Okwu and Obinne (2000) have stressed the importance of farmers adopting technologies to improve their farm production. Empirical studies have shown the relationship between adoption of agricultural technologies and increase agricultural productivity, these studies have shown the various categorization of the adoption of agricultural technologies and their extent of awareness of these technologies (Umar et al. 2006: Hamidu et al. 2006).

Although several authors had worked on the adoption of Rice production technologies among farmers, little or nothing has been done on the adoption of improved rice production technologies among farmers in Lau Local Government area of Taraba State, Nigeria. For example, Udemeze, 2016 examined the adoption of FARO -44 (Sippi) rice production and processing technologies by farmers in Anambra State, Nigeria, while Abubakar ,2015 worked on factors influencing adoption of Faro 52 Rice Package by farmers **i**n selected Local Government Areas of Niger State, Nigeria. In view of these, it has become imperative to assess the adoption of rice production technologies in Lau L.G.A of Taraba State Nigeria. The study describes the socio-economic characteristics of the respondent in the study area; determine the level of the adoption

of improved rice production technologies by the respondent in the study area. Identify the constraints experienced by the respondents in the adoption of improved rice production technologies in the study area.

METHODOLOGY

The study was conducted in Lau Local Government Area of Taraba State. Lau Local Government was created in 1991. It shares border to the North with river Benue and Karim Lamido Local Government, Yorro Local Government to the South East and Jalingo to the South. It also shares boundary with the neighboring Local Government of Numan, Demsa, and Mayo Belwa all in Adamawa State. Lau Local Government has a land mass of 135.89 km^2 and a projected population of 3,066,834 (National Population Commission Census, 2016). Generally, the climate is favorable with the soil consisting of sandy, loamy and clay features thereby making it very suitable for cultivation of many types of crops such as rice, yam, sugarcane, maize, guinea corn millet, groundnut etc.

Lau Local Government consist of ethnic and tribal setting which include Hausa, Shomo, Fulani, Yandang, Mumuye, Jenjo, Kunini and Bandawa. Most are farmers with others mostly engaged in fishing, hunting, trading, cattle rearing and blacksmithing. Apart from these agricultural unique, diverse and cultural features, Lau Local Government is also a home to various mineral endowments such as lead, ore, limestone etc.

Rice farmers in Lau, Taraba State of Nigeria constituted the population of this study. Purposive and random sampling techniques were employed for selection of the respondents. Five out of the ten wards in the study Area were purposively selected based on their prominence in rice production. Then two villages were

randomly selected from each ward making ten villages. A total 120 rice farmers were randomly chosen based on the proportion of their population in the village to form the sample size.

RESULTS AND DISCUSSION

Gender Distribution of Respondents

The finding on Table 1 revealed that, 72.5% of the respondents were males, while 30.8% were females. This indicates that, majority of the respondents are dominated by males. This is in line with the findings of Abdullahi (2012) who discovered that 84% of the farmers who adopted improved rice variety were male and only 16% were female.

Age Distribution of the Respondents

The result in Table 1 indicated that 58.3% of the respondents where within the age range of 31-40 years, 13.3% falls within 21-30 years of age. These findings implied that most of the respondents are within active economic age of productivity. This correspond to the finding of Abdullahi (2012) who opined that adopters of improved rice variety were relatively younger than the non-adopters of the improved rice variety and were more likely to try new technology.

Level of Education

The result in Table 1 revealed that, 71.1% of the respondents had attended tertiary education, 16.9% had attended primary school, about 6.6% had attended secondary school and 5.6% had attended non-formal education. According to Balarabe (2012), farming experience is expected to boast crop production through knowledge acquired from years of farming. Level of education does not only increase productivity, but also increase ability to understand and evaluate the information on new techniques and processes being disseminated through extension services, Balarabe (2012).

Marital Status

The result in Table 1 showed that, 60% of the respondents were married, 33.3% were single, about 1.7% were divorced and 5% were widowed. This implied that majority of the respondents were married. This findings falls in line with that of Akinbile (2007), who discovered that majority of rice farmers' population were dominated by married people.

Farming Experiences

The findings in Table 1 showed that 37.5% of the respondents had between 1-5 years of experience while 25% of the respondents had 6-10 years' experience while 15.8% had farming experiences between 11-15 years while 18.3% had farming experiences between 16-20 years and 3.3% had faming experiences 21 and above. This implied that farming experiences influences adoption of new technologies. This is in tandem with the findings of Tiamiyu (2009) who reported that farmers who have more years of rice production experience are more likely to be innovators and technically skillful to demonstrate new technology with or without minimum assistance from extension agents.

Household Size

The results in Table 1 revealed that, 55% of the respondents had 6-10 household size about 31.7% of the respondents had 1-5 per household, 10.8% had household size of 11-15 while 2.5% had house hold size of 15 and above. This implied that there is availability of labour force for farming in the study area. This correspond to the findings of Negash (2007) who revealed that large household size had positive influence on the adoption of improved technologies.

Membership of Cooperatives

The findings in Table 1 indicated that 53.3% of the respondents belong to a cooperative while 46.6% indicated that they do not belong to any cooperative. This implied that most of the respondents belong to cooperatives. This could be advantageous to farmers because farmers' social organization offer an effective channel for extension contact with large numbers of farmers as well as opportunities for participatory interactions with organization (Mbanaso 2010). This could increase farmers' uptake of new practices of agricultural technologies.

Farm Size

The result in Table 1 indicated that, 60.8 % of respondents had 1-5 hectares while 4.2% had about 11-15 farm size and 35% 6-10 farm size. This findings agrees with that of Ajiberfun (2006) who reported that the size of farm generally portrays the size of operation as it has major impacts on the level of resources use efficiency of small scale farming.

Table 1: Distribution of respondents based on Socio-economic characteristics of the respondents(n=120)

Variables	Frequency	Percentage
Gender		
Male	50	63.3
Female	29	36.7
Age		
Below 20	3	3.8
21-30	15	19
31-40	48	60.8
41-50	3	3.8
51 and above	10	12.6
Level of education		
Non-formal	6	7.6
Primary	10	12.7
Secondary	11	13.9
Tertiary	52	65.8
House-hold size		
1 – 5	25	31.6
6 – 10	47	59.5
11 -15	5	6.3
16 and above	2	2.5
Marital Status		
Single	20	25.3
Married	54	68.4
Window	3	3.8
Divorced	2	2.5
Farming experiances		
Less than a year	7	8.9
1-5	49	62.02
6-10	4	5.06
11-15	10	12.7
15 and above	9	11.4
Income Range (₦)		
> N200,000	5	6.3
201,0000-300,000	6	7.6
31,0000-400,000	10	12.7
41,000– N500,000	7	8.9

Source: Field Survey, 2019

Level of adoption of improved rice production technologies

Result in Table 2 showed the level of adoption of improved rice production technologies analyzed on 4 point likert scale, through obtaining their mean. The findings revealed that, for the level of adoption of improved rice production technologies, timely application of herbicide, herbicide application and spacing had their mean above the cut off point (mean=2.5). This implied that, they were the most adopted improved rice production technologies among the respondents in the study area. This result is in line with that of Ojohomon *et al* of (2006) who observed that farmers who adopted the improved rice variety in low land also adopted the used of fertilizer rate. This is because these two inputs are complementary. Moreover, Hussein (2000) has reported that there was adequate compliance with the recommended spacing for low land rice across rice growing communities in Niger State.

Table 2: Distribution respondents according to adoption level of rice production technologies (n=120)

Technologies	N	Minimum	Maximum	Mean	Standard deviation
Improved seed	120	1.00	4.00	2.2583	1.20570
Timely application of fertilizer	120	1.00	4.00	2.8750*	.68051
Herbicide application	120	1.00	4.00	2.6917*	.85794
Seed treatment	120	1.00	4.00	2.0417	1.01581
Establishment of bed	120	1.00	4.00	2.2083	1.01993
Spacing	120	1.00	4.00	2.7000*	1.04198
Insect pest control	120	1.00	4.00	2.3417	.90280

Source: filed survey, 2019. Cut off point=2.5

Constraints to adoption of innovation

The result in Table 3 revealed that, 65% indicated that they have inadequate access to credit, 55.5% showed they have inadequate information towards the adoption of the improved rice technologies, about 54.2% indicated they have inadequate facility, 37.42% revealed that illiteracy is one of their constraint to the adoption of technology, 69.2% indicated that poor power supply is one of their constraints, 39.2% indicated inadequate professionals and 32.5% indicated improper awareness. This finding showed that, majority of the respondents indicated inadequate access to credit, inadequate information, inadequate facility and 69.2% poor power supply were the constraint facing the adoption of improved rice production technologies.

Table 3: Distribution of respondents based on the constraint to adoption of improved rice technologies (n=120)

Constraint	Frequency	Percentage
Inadequate access to credit	78	65
Inadequate information	67	55.8
Inadequate facility	65	54.2
Illiteracy	45	37.5
Poor power supply	83	69.2
Inadequate professional	47	39.2
Improper awareness	39	32.5
Total	424*	

Source: Field Survey, 2019
Multiple responses

REGRESSION: **Ordinary Least Square regression**

The result of ordinary least square in Table 4 showed that, R-squared 0.816 shows the highest predictive power of the exogenous variables. This implies that the variables included in the model were able to explain about 81.6% variation in the explanatory variables, by virtue of its association with them. The unexplained variation can be attributed to random errors and other uncertainties. Each regression coefficient shows the extent to which variation in the independent variable explains the variation in the adoption of improved rice production technologies.

The value of the F- statistic (0.00000) is significant at 1% showing a high fit for the model. Thus, at least one of the exogenous variables significantly explains the variation in the adoption of improved rice production technologies. From Table 4, the significant variables explaining the adoption of improved rice production technologies were gender, education, household size and membership of association. The result indicates a negative and significant relationship between Gender and the adoption of rice production technologies at 10% ($p<0.1$) level of significance. This implies that single farmers adopts more improved rice technologies than the married. This could be because, those who are single can easily cope with risk, since they have less responsibilities to carter for. The result also showed a negative and significant relationship between Household size and the adoption of improved rice production technologies at 5% ($p<0.05$) level of significances. This implies that the less household size of the respondents the more the adoption of rice production technologies. This could be because, since the respondents have small farm family size to feed, they have the chance to manage any loss that will emanate as a result of the risk for adopting the technologies. However, this finding is contrary to that of Danstop and Digne (2010) who observed that large household had propensity towards technological adoptions which count on availability of labour force for family, 31.7% of the respondents had 1-5 members of the household. ($p<0.1$)

There was positive and significant relationship between the adoption of improved rice production technologies at 1% ($p<0.01$) level of significance and the educational level of the respondents. This could be so because, those who are educated have the capability to assimilate things easily than the non-educated. This result is in line with that of Balarabe (2012), who reported that, farming experience is expected to boast crop production through knowledge acquired from years of farming. Level of education does not only increase productivity, but also increase ability to understand and evaluate the information on new techniques and processes being disseminated

through extension services. Furthermore, there was also positive and significant relationship between the adoption of improved rice production technologies at 1% ($p<0.01$) level of significance and the membership of association. This implied that the more the respondents belong to an association the more they adopt the innovation. This could be because, as the respondents belong to an association, they tend to gain more information on new technologies leading to positive impact which could be their point of motivation to adopt the technologies.

Method: Least Squares
Date: 12/15/19 Time: 15:32
Sample: 1 120
Included observations: 120

Table 4:Least Square regression (OLS) shows the adoption of improved rice production technologies

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.469427	0.182142	2.577258	0.0113
AGE	0.000475	0.002421	0.196376	0.8447
GENDER	-0.094216	0.050828	-1.853606	0.0665***
MARTS	-0.044859	0.031152	-1.439989	0.1527
HOUSZ	-0.040221	0.020763	-1.937107	0.0553**
FARMEP	0.002717	0.006735	0.403378	0.6874
FARMSZ	-0.025800	0.026479	-0.974378	0.3320
EDU	0.010881	0.004604	2.363279	0.0199*
MEM	0.910538	0.046457	19.59951	0.0000*
R-squared	0.815844	Mean dependent var		1.383333
Adjusted R-squared	0.802571	S.D. dependent var		0.537397
S.E. of regression	0.238781	Akaike info criterion		0.045502
Sum squared resid	6.328835	Schwarz criterion		0.254563
Log likelihood	6.269909	Hannan-Quinn criter.		0.130403
F-statistic	61.46864	Durbin-Watson stat		0.831843
Prob(F-statistic)				0.00000*

significance level. Field Survey, 2019 *, **, * denotes 1, 5, and 10%**

CONCLUSION

From the findings of this study, the following conclusion were made: Most of the respondents were within their youthful and active age, had attended tertiary institution. Result also indicated that majority of the respondent were dominated by males and married having a long period of farming experience. furthermore, most of the respondents had average household size of 5 members, this imply that they are mostly small scale rice framers, highly enthusiastic of increasing their production capacity through the adoption of improved rice production technologies.

The result of the constraints of improved rice production technologies showed that of the respondents indicated that, inadequate access to credit, inadequate information inadequate facility and poor power supply were the major constraints faced on the adoption of improved rice technologies.

The findings revealed that, for the level of adoption of improved rice production technologies, timely application of herbicide, herbicide application and spacing had their mean above the cutoff point (mean=2.5). From findings the significant variables explaining the adoption of improved rice production technologies were age, education, household size and membership of association. Result of the ordinary least square revealed a negative and significant relationship between Gender and the adoption of rice production technologies at 10% ($p<0.1$) level of significance. Furthermore, the result showed a negative and significant relationship between Household size and the adoption of improved rice production technologies at 5% ($p<0.05$) level of significances. There was positive and significant relationship between the adoption of improved rice production technologies at 1% ($p<0.01$) level of significance and the educational level of the respondents, the result also showed positive and significant relationship between the adoption of improved rice production technologies at 1% ($p<0.01$) level of significance and the membership of association.

Recommendation

1. The extension agents should collaborate with the village leaders to ensure adequate communication and dissemination of innovation within the host communities.
2. Research institute, extension organization and nongovernmental organization should strengthen their monitoring and evaluation units to monitor, and encourage the adoption of improved technologies of farmers from the grass root
3. Village leaders and the extension agents should organize annual awards programs that will encourage farmers who had extra ordinary performance during the adoption stages, this will enable those who are laggards to gear up towards adopting the innovation.
4. Government should set up farm-based need assessment unit that will tackle the farmers needs in terms of provision of facilities, and other necessary farm input.

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