Acta Sci. Pol. Agricultura 20(1) 2021, 25–37
www.agricultura.acta.utp.edu.pl pISSN 1644-0625 eISSN 2300-8504 DOI: 10.37660/aspagr.2021.20.1.3

ORIGINAL PAPER

Received: 15.10.2020
Received in revised form: 27.05.2021
Accepted: 28.05.2021

DETERMINANTS AND ADOPTION OF WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME (WAAPP) IMPROVED RICE PRODUCTION TECHNOLOGIES IN GIREI LOCAL GOVERNMENT AREA, ADAMAWA STATE, NIGERIA

Abdulhameed A. Girei[1]✉, Ibrahim S. Usman[2], E. Ogezi[1], Andeshongtso K. Ayuba[2]

[1]Department of Agricultural Economics & Extension, Faculty of Agriculture, Nasarawa State University, Keff, **Nigeria**
[2]Department of Agricultural Economics & Extension, School of Agriculture and Agricultural Technology, Modibbo Adama University of Technology, Yola, Adamawa State, **Nigeria**

ABSTRACT

Background. The demand for rice is increasing at this time when rice importation has been banned in Nigeria. This study investigated the Adoption of Improved West African Agricultural Productivity Programme improved rice production technologies in Girei Local Government Area of Adamawa State, Nigeria.
Material and methods. Semi-structured questionnaire was used for data collection from seventy-two farmers who were randomly selected and interviewed.
Results. The result showed that 85.7% of the rice farmers were male with mean age of about 42 years, 73.6% were married. The mean household size is five persons. About 18% of the respondents had no formal education; a good number of farmers adopted the improved technologies. Education level, Marital Status and Farming Experience influenced adoption of the technologies, and were positive and statistically significant at 5%. This implies that as the rice farmer increase the tendency to adopt improved technologies, their propensity to farming also increase. Double log was choosing as the lead equation and the result revealed an R^2 value of 0.754, which implies that 75% variation in the adoption of WAAPP rice technologies is explained by the variables included in the model, and F ratio was also significant at 1%, indicating goodness of fit.
Conclusion. Major constraints include disease and pest; scarcity and high cost of inputs; inadequate rural road network; Lack of mechanization on rice production. Efforts should be made to link farmers to agro-input dealers for adequate, quality, and timely input supplies.

Key words: adoption, agriculture, determinants, productivity, programme, rice seed, technologies

INTRODUCTION

Rice belongs to the family "Gramineae" and the genus "Oryza". There are about 25 species of Oryza. Out of these only two species are cultivated, namely *Oryza sativa Linus and Oryza glaberrima Stead* (Zemba, 2015) Rice (*Oryza sativa*) has become an important economic crop, rich and cheap source of carbohydrate to both man and animals and the major staple food for millions of people in Sub Sahara Africa in general and Nigeria in particular (Saka and Lawal, 2009). Africa has become a big player in international rice markets, accounting for an average of 26.4 million tons of rough rice (17.4 million tonnes, milled) in 2012, Food and Agriculture Organization (FAO, 2013). Africa's emergence as a big rice

✉agirejo@gmail.com, ibrogirei1@gmail.com, ernnieethereal@gmail.com, kitauseaaa@gmail.com

importer is explained by the fact that during the last decade, rice has become the most rapidly growing food source in sub-Saharan Africa (Dontsop *et al.*, 2010). Due to population growth (4% per annum), rising incomes and a shift in consumer preferences in favour of rice especially in urban areas, the relative growth in demand for rice is faster in this region (Africa) than anywhere in the world (West Africa Rice Development Association WARDA, 2005).

In Nigeria, the demand for rice has been increasing at a much faster rate than in other West African countries since the mid-1970s. For instance, during the 1960's, Nigeria had the lowest per-capita annual consumption of rice in the sub-region (average of 3 kg). Since then, Nigerian per-capita consumption levels have grown significantly at 7.3% per annum. Consequently, per-capita consumption during the 1980's averaged 18 kg and reached 22 kg in 1995–1999; by 2007 it was estimated at 27 kg and during this period, self-reliance had decreased from 87.4% to 71% (National Bureau of Statistics, NBS, 2007). Estimated annual rice demand for Nigeria in 2009 was said to be 5 million tons, while the average production was 2.21 million tonnes thereby creating a supply-demand gap of 2.79 million tonnes which is expected to be bridged by importation (National Rice Demand Supply, NRDS, 2009). This has constituted serious drain on the nation's foreign exchange. Notwithstanding, in recent years, rice production has been expanding at the rate of 6% per annum in Nigeria, with 70% of the production increase due mainly to land expansion (Dontsop, 201). Much of the expansion has been in the rain fed systems, particularly the two major ecosystems that make up 78% of rice land in West and Central Africa (WCA): are the upland and rain fed lowland systems (Dingkuhn *et al.*, 1997) One of the major reasons attributed to the low growth of the Nigeria economy is the slow growth of the agricultural sector, which is characterized by rising food prices, increase in food import and inadequate raw material which is attributed especially to the use of inappropriate technology (Central Bank Nigeria, CBN, 1997).

Nigeria which is blessed with massive land and good climatic conditions coupled with abundant manpower is still experiencing gross insufficiency in food production. Due largely to exponential increase in population, high depletion of Nigeria's foreign reserve associated with massive rice importation and as a result of the current policy on embargo on the importation of rice and consumer's preference in favour of rice, the Federal Government of Nigeria through the West Africa Agricultural Productivity Programme (WAAPP) introduce improved rice production technologies in 2015 to rice farmers in Nigeria, Girei Local Government Area inclusive to aid their production.

Statement of Problem

There is need for improvement in Agricultural production through appropriate transfer of technologies to farmers supporting the farmers with improved varieties, the use of advanced farm equipment and farming practices, among others. Various efforts were made by governments to improve and increase rice production among which is the introduction of improved rice seed variety through the West Africa Agricultural Productivity Programme (WAAPP) in May 2008, to farmers to improve rice production in the rural communities so as to reduce poverty and boost agricultural production in the country. The programme also aimed at helping to provide enabling conditions for Nigeria to cooperate with countries in the West African sub-region in technology generation and dissemination as well as providing access to improved agricultural technology generation and dissemination in the country (WAAPP, 2012). Since the introduction of the WAAPP seed, no known research has been carried out to assess it adoption. Therefore, it has become important to conduct an empirical study to analyze the adoption of WAAPP improved rice production technologies in the study area. This study seeks to;

i. describe the socio-economic characteristics of the respondents;
ii. examine the adoption of improved rice variety (WAAPP seed) in the study area;
iii. ascertain the relationship between socio-economic characteristics and adoption of improved rice varieties (WAAPP seed) in the study area;

and identify the constraints to the adoption of improved rice varieties (WAAPP seed) in the study area.

MATERIAL AND METHODS

Study Area

The study was conducted in Girei Local Government Area (LGA) of Adamawa State Nigeria (Fig. 1). The LGA is bordered to the North by Song LGA, Fufore to the East and Yola North and Demsa to the South and West respectively. The area has a land mass of about 2,186 squares kilometres with total population of 129,995 people (NPC, 2006). The study area lies between Latitude 90°11'–90°39' North and longitude 120°21'–120°49' East of the Greenwich Meridian. The area falls within the Northern Guinea Savannah Zone and has a tropical wet and dry climate. The dry season lasts for a minimum of five months (November–March) while the wet season ranges from April to October with an annual rainfall of about 700 mm. The LGA host many ethnic groups who by nature are farmers, fishermen, and traders. The major tribes in the area are the Fulani, Kanuri, and Bwatiye. Some of the crops grown in the study area include rice, maize, cowpea, vegetables, pepper, tomatoes. Livestock production is also practiced.

Sources of data

Semi-structured questionnaire was used for the collection of primary data. Personal interview was also employed.

Sample Size and Sampling Techniques

Multi-stage sampling technique was used for this study to select the villages and farmers who were supplied with improved WAAPP rice seed. In the first stage, four villages were selected purposively base on their involvement in WAAP rice seed. In the second stage, the list of the 226 benefited WAAP farmers was obtained from their chairman. From the list, a total of 72 farmers representing 32 percent were randomly selected in proportion to the number of registered farmers in each village (Table 1).

Table 1. Sampling Frame and Sample size

Villages	Sample frame (Registered farmers)	Sample size
Vunokuland	50	16
Ruwo Amsani	52	17
Multi-purpose corps	54	17
Damare	70	22
Total	**226**	**72**

Source: Field survey, 2019

Method of Data Analysis

Both descriptive and inferential statistics were used for this study. Descriptive statistics such as mean, frequency and percentage were used to analyze objective I, II and IV while Inferential statistics (Logit regression model) was used to achieve objective III. The logit model is a model developed based on the cumulative logistic probability function. The model assumes that the probability is:

$$P_1 = F(Z_i) = 1/1 + e^{-zi} = e^{zi}/e^{zi} + 1$$

Pi = 1 if the farmer is willing to adopt WAAPP improved rice technologies and 0, for otherwise;
Xi = is a vector of explanatory variables.

Where:
Y = adoption of WAAPP improved rice seed technologies measured by the individual farmer's adoption score (1 adoption and 2 non adoption);
X_1 = age (year);
X_2 = gender (male = 1, female = 0);
X_3 = education level (formal and no-formal education);
X_4 = marital status (1 = married and 2 = not married);
X_5 = household size (number of people living in household);
X_6 = membership of association (1 = member and 0 = not member);
X_7 = Extension contact (number of times visited by extension agent in the last (one year);
X_8 = Farming experience (years);
X_9 = Farm size (Ha).

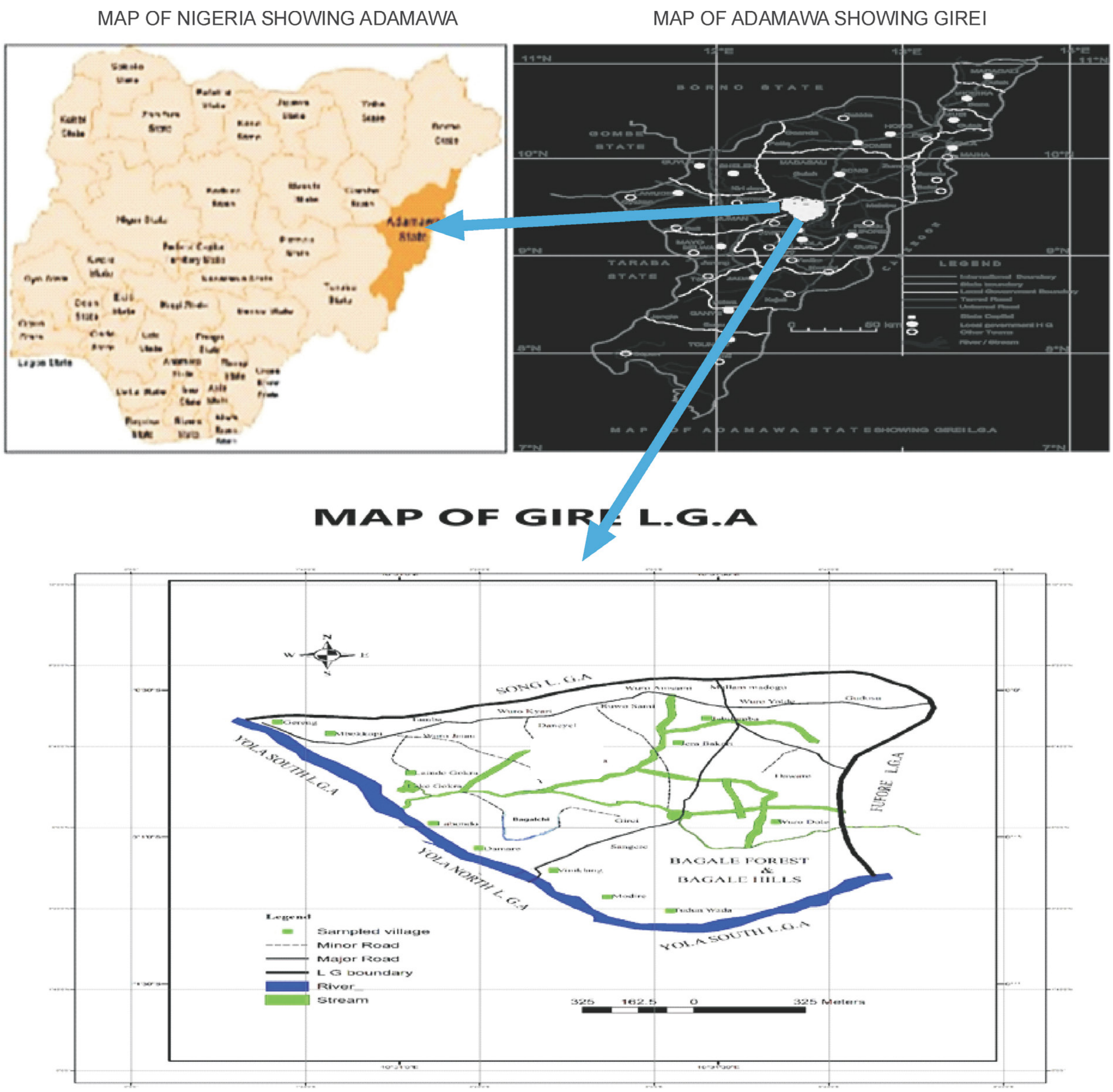

Fig. 1. Map of Gire L.G.A; source: Ateh *et al.* (2020)

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents

Fig. 2 show that 30.6% of respondents were within the age range of 20–30 years while 20.8% were within the range of 31–40 years. Those who were within the age range of 41–50 years accounted for 22.6%; those who were within the age of 51–60 years accounted for 15.3.6%, while those who were above 60 years' accounts for 11.1%. This indicates that young people of economic active age dominate the study area possibly because of young farmers' exposure and level of education alongside their interest in making agriculture to be a business rather than occupation. In line with the above, Abdullahi

(2012) indicated 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. More so, Saka *et al.* (2005) indicated that adopters of improved rice varieties were younger in age than non-adopters.

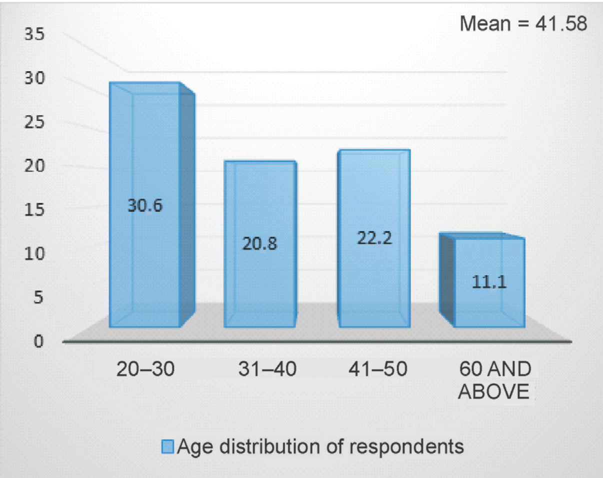

Fig. 2. Age distribution of respondents; source: Field survey, 2019

Fig. 3 indicates that about 86% of the respondents were males while 14.3% were females. This implies that the sex distribution of the rice farmers skewed towards male respondents. This finding agreed with Kanu (2016), who found out that 84% of the farmers who adopted improved rice variety were male and only 16% were female.

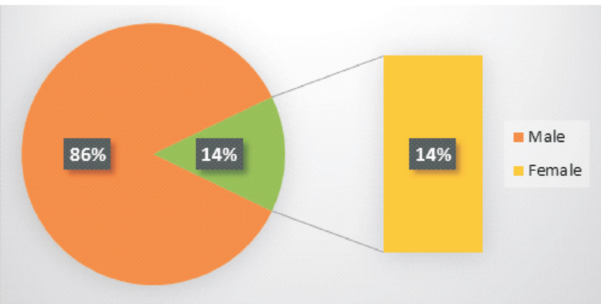

Fig. 3. Respondents distribution base on sex, source: Field survey, 2019

Data in Fig. 4 also shows that majority (73.6%) of the respondents were married, while 26.4% were single. The high number of married respondents could increase the magnitude of family labour, thus making more hands available for productive activities on respondents' rice farms. This result is similar to the result obtained by Akinbile (2007) in his study on determinants of productivity level among rice farmers in Ogun State, Nigeria who indicated that married people account for majority of rice farmers' population.

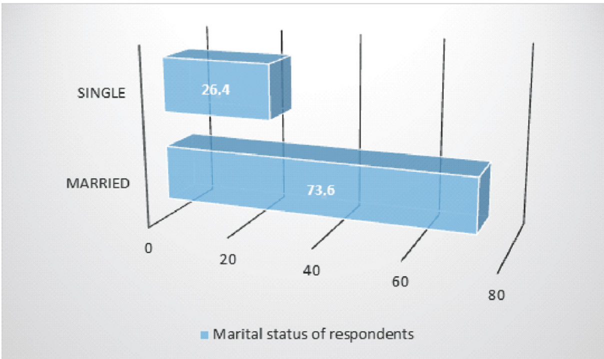

Fig. 4. Marital status of respondents; source: Field survey, 2019

Fig. 5 further shows that 23.6% of the respondents had less than 5 people in their household. Those with 5–10 persons constituted 55.6% of respondents, while those households with 11–15 persons accounted for 1.7% of the respondents. The mean household size was 5. This means that the farmers had relatively large-sized households and this may give them the opportunity to farm since it will enable the farmers to use family labour and therefore tend to reduce the cost of hiring labour for WAAPP rice productions. The result agrees with the study of Negash (2007) who indicated that large household size had positive influence on the adoption of improved technologies. More so, this could have both positive and negative effect on households' welfare. The positive effect could arise if the large household size were used as a source of farming labour, thereby reducing the cost of labour, and cutting down production expenditure. On the other hand, a large household size could also worsen the poverty situation of farming household particularly if it were composed of many dependants, which means the family had more mouths to feed.

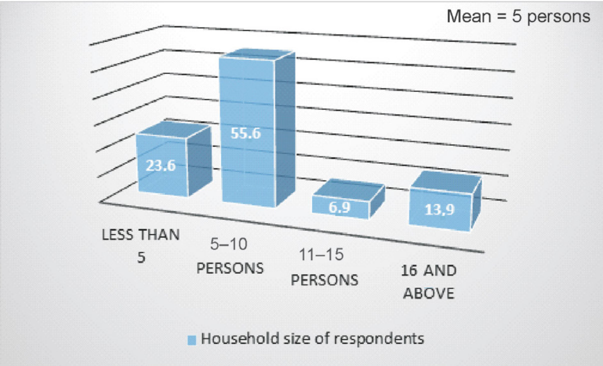

Fig. 5. Household size of respondents; source: Field survey, 2019

Fig. 6 shows that 50.0% of the respondents had 1– 10 years of farming experience, while 22.2% of the respondents had between 11–20 years of experience. Those that had 21–30 years of farming experience constituted 13.9% of the respondents, while those that had 31–40 and 41–50 years of farming experience were 8.3% and 5.6% respectively. The mean years of farming experience was 15 years. This implies that farmers had long period of farming experience. This could increase their knowledge, experience, and subsequent adoption of WAAPP production technologies. The result agrees with the study of Getahun *et al.* (2000). It was assumed that long farming experience was an advantage for increased farm productivity since it encourages rapid adoption of farm innovations. The higher the number of years a farmer works on the farm, the more he develop technical know-how which is useful to adoption of new technologies.

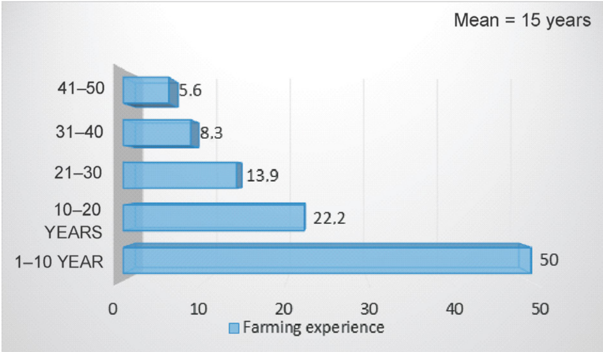

Fig. 6. Farming experience; source: Field survey, 2019

Fig. 7 also shows that 5.6% of the respondents cultivated less than 1ha, majority (94.4 %) of the respondents cultivated less than 5 ha. The average farm size was 2.56 ha (Shaib *et al.,* 1997) grouped farm holdings in Nigeria into three broad categories; small-scale (less than 6 hectares in farm size), medium-scale (6–9.99 hectares) and large-scale (10 hectares and above). This implies that all the rice farmers in the study area were small-scale farmers. This finding is therefore in consonance with Mbanaso (2010) who found small-scale farmers predominant in the south-East of Nigeria.

Entries in Fig. 8 show that 18.1% of the respondents had no formal education, 18.0% of the respondents completed primary school education, while 26.4 % of the respondents completed Secondary school, and 12.5% of the respondents had National Diploma or National Certificate of Education. Also, 25% of the respondents had first degree education, respectively. The high number of literate people among the farming population indicates that majority of them are in a better position to adopt new technologies available to them. Education has always been known to play a positive role in the adoption of improved technologies among farmers (Negash, 2007). High percentage of formal education among farmers meant that they can be easily mobilized to adopt new technologies. Similarly, a literate household head will be relatively less technophobic to adopt new agricultural practice than one headed by an illiterate (Saka, 2009).

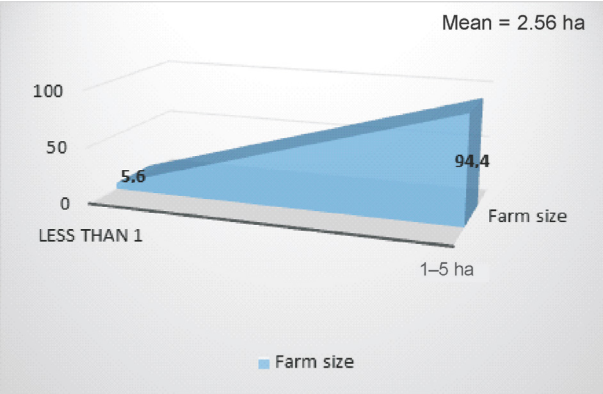

Fig. 7. Farm size; source: Field survey, 2019

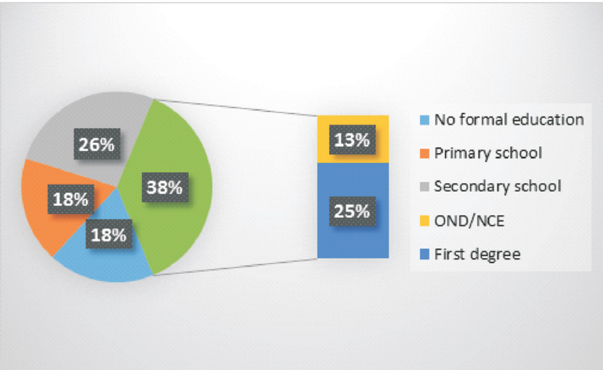

Fig. 8. Educational qualification; source: Field survey, 2019

Fig. 9 shows that 4.2% of the respondents earned between ₦90,000–100,000 annually from WAAPP, 23.6% of the respondents earned between ₦ 101,000–200,000 annually, 12.5% of the farmers earned between ₦ 201,000–200,000 per a year, 16.6% of the respondents got between ₦ 301,000 – 400,000 per annum. Also 8.4%, 6.9% 8.4%, 2.7%, 9.8% and 6.9% of the respondents earned between ₦401,000–500,000; ₦501,000–600,000; ₦601,000–700,000; ₦701,000 –800,000; ₦801,000–900,000; ₦901,000–1,000,000 annually respectively from WAAPP rice production.

The average annual farm income from WAAPP rice production farmers was ₦459,083.33. This finding showed that farming constituted the major share of the respondents' income in the area and this implies that from the revenue obtained, more farmers may be willing to participate in the programme as to improve their standard of living.

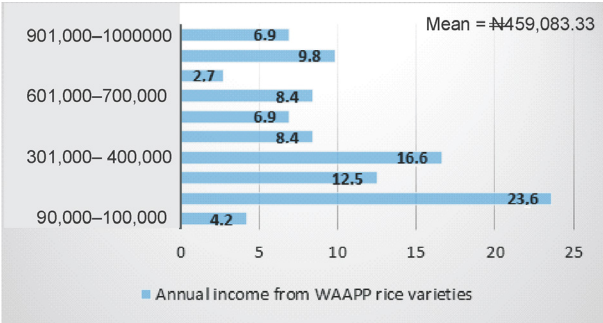

Fig. 9. Annual income from WAAPP rice varieties; source: Field survey, 2019

Entries in Fig. 10 show that majority (52.8%) of the respondents belonged to farmers group/cooperatives (production cooperative, marketing cooperative, farmer cooperative, etc.) while 47.2% of the respondents were not members of any farmers' group/cooperative. 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 interaction with organizations (Mbanaso, 2010). This could increase farmers' uptake of new practices such as WAAPP rice variety and production technologies.

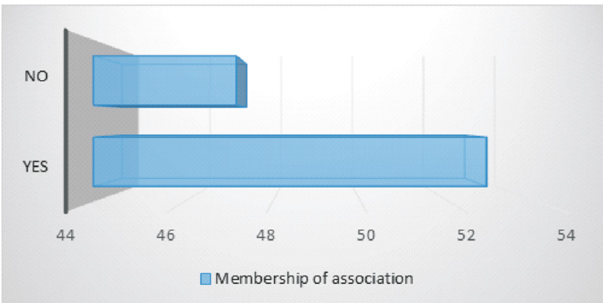

Fig. 10. Membership of association; source: Field survey, 2019

Fig 11 indicates that 56.6% of the farmers had no contact with the extension agents during their two years of participation while 36.4% of the farmers had between 1 and 5 times contact with extension agents in their two years of participation while 7% had 6 to 10 times contact with extension agents. Overall, 43.4% had contacts with extension agents during their participation periods. This implies that greater percentage of the farmers had no contact with extension agents. The higher percentage of extension contacts will help in playing central role in boosting and increasing agricultural productivity, increasing food security thereby helping in improving rural livelihoods, and promoting agriculture in general as an engine of pro-poor economic growth. Therefore the more the frequency of contact will mean more technologies and good working relationship between the farmers and the extension agents.

Fig. 11. Contact with extension agents; source: Field survey, 2019

The Adoption of WAAPP Rice seed Technologies

Site selection: Table 2 indicated that site selection was the most adopted technology and this infers that respondents selected land based on specific quality rather than arbitrarily. About 98.6% of the respondents adopted site selection technology while 1.4% of the respondents rejected it. This was ranked 1st.

Land preparation technology by tractor-mounted implements: the distribution of the respondents according to their stages in the adoption of WAAPP rice ploughing and harrowing using tractor is shown on Table 2. Majority (90.3%) of the respondents adopted the use of tractor for ploughing and harrowing in their farms while 9.7% of the respondents did not adopt the technology. High percentage adoption of tractor for ploughing and harrowing by the farmers in the study areas confirmed that using tractors is profitable and can make them cultivate large areas of land. Akpokodje *et al.* (2001) confirms that using tractors is not only profitable but ensures timely preparation of land to take advantage of the early rains.

Harvesting technologies (Adoption of sickle and harvesting machine): Table 2 indicates that 83.3% of the respondents adopted use of sickle for harvesting rice. Also, 16.7% of the respondents rejected the use of sickle. Sickle was observed to be the most adopted harvest technology by the farmers in the area because of the accessibility, availability, profitability, and less capital nature of the technology.

The adoption of broadcasting methods and drilling methods with recommended plant spacing by farmers: Table shows that 75% of the respondents adopted broadcasting seed method while 25% of the respondents rejected the technology. One of the reasons proffered by the respondents for adopting broadcasting method was that it is less time consuming, and less capital intensive, as well as, giving more space for bringing large hectares of land into cultivation.

Weed control: Table 2 shows that majority (69.4%) of the respondents applied propanol plus 2,4-D (e.g. ORYZO plus) chemical for controlling weeds. About 30.6% of the respondents rejected the use of propanil plus 2, 4-D in their farm. Respondents adopted weeding at least 2 times manually after transplanting. On the other hand, the adoption of insect/disease and pest control measures using agro-chemicals showed that majority (62.5%) of the respondents adopted pesticides (Lambda – cyhalothrin) while 37.5% of the respondents did not adopt the technology and this may be because of their financial constraint or belief that the use of such chemicals can be hazardous. This result agrees with Akande (1994) who highlighted that high cost attached to an innovation positively influenced dis-adoption of the technology.

Adoption of fertilizer for lowland and upland rice varieties: Entries in Table 2 show that majority (61.1%) of the respondents adopted fertilizer (NPK 20:10:10; and urea) for their lowland rain fed and irrigated rice while 38.9% of the respondents rejected fertilizer application on their farm. Since majority

(61.1%) of the respondents had access to fertilizers, this could increase their propensity to adopt the technology. This result is consistent with Tooraj and Sahel (2011) who indicated that lack of access in terms of availability and timeliness of fertilizer delivery discourage adoption.

The Adoption of bird scares and damaged video tape as a measure for controlling birds: Table 2 further explained that majority (55.6%) of the respondents adopted use of bird scares (masquerades) as a measure for bird control in their farm, while 44.4% of the respondents rejected the technology. The Table also depicted that majority (55.6%) of the respondents adopted use of old video tape in their farms respectively, while 44.4% of the farmers rejected the use of spoilt video tape as a means of scaring birds away from their rice farms.

Adoption of rice threshers: Table 2 indicates that 54.2% of the respondents adopted the use of different threshing techniques while 45.8% of the respondents did not possibly to speed up the process by reducing the time and handling more at a time and invariably reducing the labour requirement. Similarly, adoption of electric fan and folded empty bag for winnowing as computed in Table 2 indicated that most (54.2%) of the respondents adopted the technology, while 45.8% of the respondents did not. The non-adoption of some of these technologies might be attributed to many factors namely, being a new technology which may take time to be convinced, trying to maintain their traditional ways of handling such, likely cost that may be involved, among others.

Table 2. Distribution of Respondents Based on Level of Adoption of WAAPP Rice seed Technologies

Production technologies	Frequency		Rank
	Adopt	Reject	
Site selection	71 (98.6)	1 (1.4)	1st
Land preparation (tractor use)	65 (90.3)	7 (9.7)	2nd
Harvesting technologies	60 (83.3)	12 (16.7)	3rd
Recommended broadcasting and drilling seeds methods	54 (75.0)	18 (25.0)	4th
Weed Control	50 (69.4)	22 (30.6)	5th
Insect/Disease and Pest Control	45 (62.5)	27 (37.5)	6th
Fertilizer Application	44 (61.1)	28 (38.9)	7th
Bird Control	40 (55.6)	32 (44.4)	8th
Threshing	39 (54.2)	33 (45.8)	9th
Winnowing	39 (54.2)	33 (45.8)	9th

Source: Field survey, 2019

Determinants of Adoption of Improved Rice Variety

The logit regression was chosen as the lead equation based on econometric and statistical criteria. The result revealed that R square (0.686) value implies that about 69% variation in the output of the analysis was explained by the independent variables included in the model. The findings revealed that out of nine explanatory variables investigated, only four variables were found to be statistically significant.

Age (3.167) was significant at 10% implying that 1 unit increase in age will increase the adoption of improved rice seed technology by 3.167%. Udimal *et al*. (2017) found age to be a significant factor for technology adoption on both probit and logit regression analysis conducted in the study.

Education level (3.962) was significant at 5%, this implies that 1 unit increase in Education level of the respondents will increase the adoption of improved rice seed technology by 3.962%. This finding agrees with finding of Onuekwusi (2005) who observed that increased level of education increases the involvement of people in development programme.

Similarly, Marital Status (5.549) was significant at 5% which implies that 1 unit increase in Marital Status of the respondents will increase the adoption of improved rice seed technology by 5.549%. This agrees with the finding of Agwu and Uche-Mba (2010), married families are likely to be involved in innovative practices because they have more family labour at their disposal.

Farming Experience (11.544) was significant at 1% level of probability and implies that 1% increase in Farming Experience of the respondents will increase the adoption of improved rice seed technology by 11.544%. Thus, the study concludes that there is significant relationship between level of adoption of improved rice seed technology and socio-economic characteristic of the respondents.

Table 3. Multiple Regression Model for the Determinants of Adoption

Variables	B	Std. Error	Wald	Df	Sig.	Exp (B)
Age	-0.060	0.034	3.167	1	.075*	0.942
Gender	0.943	0.880	1.148	1	.284	2.567
Membership of association	0.027	0.036	0.540	1	.463	1.027
Extension contact	0.074	0.065	1.322	1	.250	1.077
Farm size	0.010	0.045	0.047	1	.828	1.010
Household size	0.061	0.053	1.324	1	.250	1.063
Marital Status	0.000	0.000	5.549	1	.018**	1.000
Farming experience	0.500	0.147	11.544	1	.001***	1.649
Education level	-1.131	.568	3.962	1	.047**	.323
Constant	.986	2.136	.213	1	.644	2.681
$R^2 = 0.686$	68.6%					

Source: Field survey, 2019
***significant at 1%; **significant at 5%; *significant at 10%

Perceived Constraints to Adoption of WAAPP Rice seed Technologies

The result on Table 4 reveals the perceived constraints to adoption of WAAPP rice seed technologies. The major constraints include; disease and pest infestation on cultivated rice crop (M = 2.1111); the scarcity and high cost of inputs (M = 2. 5139); inadequate rural road network (M = 2.5278); Lack of mechanization on rice farming (M = 2.3333) Lack of access to land for rice cultivation (M = 2.1806); Low level of farming technicalities (M = 2.1250); and Inadequate extension agent contact (M = 2.4583).

Scarcity and high cost of inputs restricts farmers from procuring necessary farm inputs in timely manner and adoption of improved varieties may be delayed in due course. Also, the high cost and scarcity of inputs discourages farmers and makes them grow alternative crops like maize, cassava, yam, okra, and vegetables in the area. To this regard, Singh *et al*. (1997) reported that difficulty in procuring agricultural inputs at the right time had discouraged the use of agricultural inputs among rice farmers. The farmers also reported that due to the scarcity and high cost of agro-inputs, some farmers did not make sufficient use of the limited inputs available which in turn affected production.

Table 4. Constraints to Adoption of WAAPP Rice seed Technologies

Constraints	Mean	SD
Disease and pest infestation on cultivated rice crop	2.111	0.640
Scarcity and high cost of inputs	2.514	0.628
Lack of access to land for rice cultivation	2.181	0.845
Inadequate extension agent contact	2.458	0.730
Bad rural road network	2.528	0.712
Low level of farming technicalities	2.125	0.670
Low output quality of the variety	1.361	0.564
Lack of mechanization on rice farming	2.333	0.769
Age of the farmer	1.750	0.707
Poor health status of rural farmers	1.889	0.797
Lack of nutritional knowledge of the variety	1.472	0.671
Poor income realized from the variety	1.292	0.542
Poor soil fertility	1.667	0.557
Drought factors such as rain fall, temperature and solar radiation	1.944	0.648
Weeds infestation on WAAPP rice variety	1.903	0.675
Short life cycle of the variety	1.167	0.411

Source: Field survey, 2019
(Decision rule: mean ≤2 is not a constraint and ≥ 2 is a constraint)

Inadequate rural road network had also been identified as constraints by the respondents to adoption of WAAPP rice production technologies. Damola (2010) reports that inadequate road network effectively hinders the development of efficient trucking and transport systems for agricultural marketing and agro-business development thereon.

Lack of access to land is also a critical constraint for the farmers in the study area. Utilizing new technologies in agricultural production often requires suitable land. Rice farmers who have more access to suitable land for the cultivation of rice are likely to adopt modern practices.

The standard deviation values were less than one in all the variables. This shows that the responses of the respondents on these variables did not vary much from the mean.

CONCLUSIONS

The study observed that there is a high level of adoption of the WAAPP technologies and adopters are mostly small-scale farmers. There were various technologies that were adopted by the farmers based on their locational peculiarities. It is recommended that; farmers should be encouraged to participate actively in farmers group and co-operatives societies in order to strengthen their group action, since such organization act as effective channels for extension information delivery system to farmers, efforts should be made to provide adequate input to the farmers to eschew competitiveness among input users, government should put efforts towards increasing the number, availability, and accessibility of extension agent at both Federal, State and Local Government level so as educate farmers on the proper use of herbicides in order to reduce weeds infestation in their farm through self-help effort.

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DETERMINANTY PRZYJĘCIA PROGRAMU „WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME" (WAAPP) – UDOSKONALONYCH TECHNOLOGII PRODUKCJI RYŻU W GIREI REGION SAMORZĄDU LOKALNEGO, STAN ADAMAWA, NIGERIA

Streszczenie

Popyt na ryż w Nigerii rośnie, a w tym samym czasie jego import został zakazany. Badanie dotyczyło wdrożenia programu poprawy wydajności rolnictwa w Afryce Zachodniej, ulepszenia technologii produkcji ryżu na obszarze samorządu lokalnego Girei w stanie Adamawa w Nigerii. Do zebrania danych wykorzystano częściowo ustrukturyzowany kwestionariusz od siedemdziesięciu dwóch rolników, których wybrano losowo i przeprowadzono z nimi wywiady. Wyniki badań wykazały, że 85,7% hodowców ryżu to mężczyźni w średnim wieku – około 42 lat, a 73,6% było w związku małżeńskim. Średnia wielkość gospodarstwa domowego to pięć osób. Około 18% respondentów nie miało formalnego wykształcenia, ale i tak wielu rolników przyjęło ulepszone technologie. Poziom wykształcenia, stan cywilny i doświadczenie rolnicze wpłynęły na przyjęcie technologii i były istotnie pozytywne na poziomie 5%. Oznaczało to, że wraz ze wzrostem przyjmowania ulepszonych technologii przez hodowców ryżu ich chęć do uprawy również wzrastała. Jako wiodące równanie wybrano Double log, a uzyskana wartość R2 = 0,754 oznacza, że 75% zmienności w przyjęciu technologii uprawy ryżu WAAPP jest zmienną zawartą w modelu. Stosunek F był również istotny na poziomie 1% i wskazywał na dobre dopasowanie. Główne ograniczenia w poprawie wydajności rolnictwa to: występowanie chorób i szkodników, wysokie koszty nakładów, nieodpowiednią sieć dróg wiejskich i brak mechanizacji w produkcji ryżu. Należy dołożyć starań, aby połączyć rolników z dostawcami środków produkcji rolnej w celu zapewnienia odpowiednich, wysokiej jakości i terminowych dostaw środków.

Słowa kluczowe: determinanty, produktywność, program, przyjęcie, rolnictwo, ryż, technologie