ADOPTION OF RICE PRODUCTION TECHNOLOGIES AMONG WOMEN FARMERS IN THE CENTRAL ZONE OF BAUCHI STATE, NIGERIA

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ABSTRACT

The study analysed the adoption of rice production technologies among women farmers in central agricultural zone of Bauchi State, Nigeria. A multi-stage sampling technique was used to select a total of 138 women rice farmer, structured questionnaires were administered to the respondents that provided the usable data for the analysis. The result revealed that majority (95%) of the respondents, were married. The mean age was 36 years, household size had a mean of 8 persons, the farming experience revealed, 12 years, majority (43.6%) had no formal education, some (32.5%) inherited their farm land and majority (50.4%) hired their labour. Furthermore, high yield, early maturity and marketability were the major factors that influence the adoption of rice production technologies in the study area. On the levels of adoption, seed, harvesting and fertilizer application had 94%, 91.8% and 99.9%, respectively. The major constraint to the adoption of rice production technologies includes inadequate finance (97.7%), high cost of labour (96.2%), and inaccessibility to modern milling machine (95.5%). The study concluded that high yield, early maturity and marketability were the major factors influencing adoption of rice production technologies among the respondents. The study therefore recommended that the women should be encourage to form cooperative societies in order to be able to obtain credit and acquire modern facilities for rice processing and capital for adopting more technologies.

Keywords: Adoption, Production, Rice, Technologies, Women.

INTRODUCTION

Rice is from the family, *Gramineae, Genus; Oryza and species:* sativa **L.** and *Glaberrima*. It was taken to West Africa in the early 19th century (Jirgi *et al*., 2009). The authors further narrated that rice is the most commonly cultivated cereal throughout the world today; and also, an important staple food in Nigeria. The demand for rice in Nigeria is growing faster than any other major staple food with consumption broadening across all socio-economic classes including the poor. Rice has become a staple food in Nigeria such that every household; both the rich and the poor consumes a great quantity. Very significant proportions of the Nigerian population depend on rice for their food needs. Rice is grown in all the States of the federation and Federal Capital Territory, though production varies from State to State and the prevalent types of rice production systems in Nigeria include rain fed upland, rain fed lowland, irrigated lowland, deep water floating and mangrove swamp.

Throughout the world, rural women historically have contributed and played important role in rice farming system. Their roles and those of men are contributed by several interrelated socioeconomic (including class, ethnicity, age, religion), political and environmental factors

and are known as "gender roles". However, these are dynamic and can change over time depending on changes in other factors (Hovio, 2007).

At present, there are improved rice varieties and cultural practices provided through Growth Enhancement Scheme of Federal Government of Nigeria on her Agricultural Transformation Agenda; as well as other associated complementary technologies disseminated by Bauchi State Agricultural Development Programme, Non-Governmental Organizations such as MEDA among others. But, the widespread adoption of these technologies seemed to be below expectation. This underscores the need and relevance of this study. Current situation manifests low output per area which no doubt limits achievement of desirable increase in agricultural productivity and self-sufficiency in food production desired by the Nigerian Government. The rice farmers are expected to use improved cultural practices to enhance their production. However, contemporary observations showed that while some use improved practices, majority of the farmers still use traditional methods thereby subjecting the rice farmers to low yield in central Agricultural zone of Bauchi state. This study therefore aimed at filling this gap in knowledge.

The broad objective was to analyze the adoption of rice production technologies in central Agricultural zone of Bauchi State Nigeria. And the specific objectives were to describe the socio-economic characteristics of the respondent in the study area, examine the levels of rice production technologies adopted by women rice farmer in the study area, identify the available rice production technologies that influenced women farmers in the study area, identify the constraints faced in adoption of rice production technologies by women in the study area.

MATERIALS AND METHODS
The Study Area

The study was conducted in Bauchi central agricultural zone. The zone comprises of four local government areas (LGAs). The area lies along latitude: $11^04'$ N and longitude 9^034, it has a combined area of 5250km^2, Population size of 109,5000 (NPC, 2016), Average annual rainfall of 905mm, average temperature of 26℃, with highest around April of about 40.2℃**,** (BSADP, 2015) the major tribes include the Farawa, Warjawa, Ningawa Miyawa, Denawa, Gerawa and Kariyawa. The area has boundaries from the north with Jigawa and Kano also from the south, with Bauchi LGA and Toro LGA from the west. The residences are engaged in agricultural activities such as crop production and livestock production. The major crops cultivated includes rice, guinea corn, maize, millet, sesame, soyabean and groundnut. The livestock that are kept includes cattle, sheep, goats and poultry. The main occupation of majority of the indigenes in the area is farming and livestock production.

Sampling Procedure

Multi-stage sampling technique was used to select 138 respondents. In the first stage, two (2) local government areas were purposively chosen because of the farmer's high engagement to rice farming. In the second stage, two (2) districts were selected from each of the two (2) local governments. Third stage, two (2) villages were selected from each district, making the total of eight (8) villages. Lungwa, Dansai, Gapaya, Kanmasaya Siri, Gwada, Kafin, zaki, Zakara. Finally, 138 women rice farmers were proportionately (65%) and systematically selected. The total sample size of 138 was drawn from sampling frame of 210. Primary data were employed for this study and were collected through the use of structured questionnaires and analyzed using descriptive statistics.

RESULTS AND DISCUSSION
Socio-economic Characteristics of the Respondents

Table 1 shows that 61.2% of the respondents were at the age range of 20-40 this means that the women are in their active age and therefore can adopt the production technologies in the study area. This agrees with the findings of Omodoma (2016) who reported that 30.8% of the farmers were around 30-39 years in Kogi State, Nigeria. The result of the marital status indicated that majority (71.4%) of the respondent were married. This is in line with Owolade *et al.* (2014) who said that majority 75% of farmers were married in Ogun State Nigeria. The result also indicated that 43.6% had no formal education which means that the farmers may be rigid to adopt more of the production technologies. This indicate that the farmers will be rigid to adopt new technology because Agbamu (2006) asserted that the relationship between formal education and adoption of technologies is inverse. He was of the view that formal education enables farmers to accept new farm technologies more readily to increase their income than those farmers without a formal education. However, educated farmers tend to be more flexible in their decision to adopt new ideas.

Table 1: Distribution of respondents based on Socio-economic Characteristics (n = 138)

Variables	Frequency	Percentage	Mean
Marital status			
Single	13	9.8	
Married	95	71.4	
Widow	12	9.0	
Divorced	13	9.2	
Age (years)			
>20	4	3.0	36 years
20-40	92	69.2	
41-60	36	27.1	
Above60	1	08	
Household size (number			
>5	35	26.3	8 persons
5-10	65	49.0	
11-15	18	13.5	
16-20	10	7.6	
Above 20	5	3.9	
Farming experience (years)			
>5	24	20.0	
5-10	57	41.4	
11-15	11	9.9	
16-20	22	16.5	
Above20	16	12.2	12 years

Source: Field Survey (2021)

Table 1: Distribution of respondents based on Socio-economic Characteristics **Cont'd.**

Variables	Frequency	Percentage	Mean
Educational qualification			
No formal education	58	43.6	
Primary school	21	15.8	
Secondary school	27	20.3	
OND/NCE	16	12.0	
Fist degree/HND	11	8.3	
Source of Land			
Inherited	43	32.3	
Purchased	27	20.3	
Socio-economic characteristics continue			
Rented	41	30.8	
Gifted	8	6.0	
Borrowed	8	6.0	
Source of labor			
Family	21	15.8	
Hired/paid	67	50.4	
Exchange	27	20.3	
Personal	18	13.5	

Source: Field Survey (2021)

Levels of Adoption of Rice Production Technologies

Table 2 indicated the levels of adoption of rice production technologies. The result of land preparation (ploughing and harrowing) indicated that use of tractors was adopted by 48.2%, 34.7% were at interest level. This may be as a result of small-scale size of farm the women operate. This is contrary to Akpokodje *et al.* (2001) revealed that using tractors is profitable and confirmed that the use of tractors can also ensure timely preparation of land to take advantage of the early rains. The result also revealed that majority (94.0%) of the farmers adopted improved seed, which means that the farmers have seen the advantage of improved seed than the traditional seed. Planting method revealed that broadcasting was adopted by 55.7% of the farmers,5.3% were at interest level and 3.2% were at awareness level, the farmers adoption of broadcasting may be because its cost less than other method.

Result (Table 2) of dibbling/drilling revealed that majority (70.5%) of the respondents adopted dibbling/drilling 14.3% were at evaluation level, 10.3% were at awareness level while 2.5%, 2.4% were at interest and trial level, respectively. Dibbling/drilling was adopted more because the respondent mostly practices subsistence agriculture and inadequacy of extension services to the farmers. Transplanting method revealed that majority (75.5%) of the farmers are aware, 3.9%, 8.3% and 5.3% were at interest, adoption and rejection levels, respectively. This may be because of the technical know-how of the technology and also time consuming. This finding is therefore in line with Ellen and Kei (2008) whose result indicated that farmers were less likely to practice this transplanting method if the size of the cultivated land are large, because it is a more labour-intensive way of crop establishment than direct seeding. The result also indicated that fertilizer application was adopted by 99.9% of the respondents this agrees with the findings of Udemeze (2013) which revealed that 90% of the farmers adopted fertilizer application and is contrary to Tooraj and Sahel (2011) which indicated that lack of access to availability and timeliness of fertilizer delivery discourage adoption. The finding also shows that majority (95.5%) adopted mechanical weed control, 4.5% were aware of mechanical weed control. On the other hand, chemical weed control was adopted by 97.4% and 2.6% were aware

of chemical weed control. The reason given by the respondents for adopting the technology was because it is less stressful, and in a day a large area of land can be covered within a short time.   The result also revealed that application of insecticides was adopted by100% of the respondents for insect disease and pest control this is because the farmers can easily get rid of the diseases, pest or insect before its causes any damage. The findings also showed that the use of sickle was adopted by 91.8% of the respondents, 5.3% were aware of the technology, 2.9% were at interest level. The adoption of sickle for harvesting is because of its availability, and accessibility. This in line with Udumeze (2013) which revealed that Sickle is mostly adopted by the farmers in the area because of the accessibility, availability, profitability, and less capital nature of the technologies in Anambra State.

Table 2: Distribution of Respondents Based on Level of Production Technologies

Production technologies	Aware 1	Int. 2	Eva. 3	Trail 4	Adopt 5	Reject 0
Land preparation Ploughing and harrowing						
i)Use of tractors	3.7	34.7	8.9	2.25	48.2	2.25
Seeds:						
i) Improved Var.	3.0	2.5	0.0	0.5	94.0	0.0
ii) Traditional Var**.**	12.3	1.2	0.0	0.0	26.4	0.12
Planting methods:						
i) Broadcasting	3.2	5.1	0.0	0.0	55.7	0.0
ii)Dibbling	10.3	2.5	14.3	2.4	70.5	0.0
iii)Transplanting	75.5	3.9	0.0	0.0	8.3	5.3
Fertilizer application:	0.01	0.0	0.0	0.0	99.9	0.0
Weed Control:						
i) Mechanical	4.5	0.0	0.0	0.0	95.5	0.0
ii) Chemical	2.8	0.0	0.0	0.0	97.4	0.0
Insect/disease and pest control						
i) Apply cultural practices such as field pulling and destroying infested plants	0.0	0.0	0.0	0.0	0.0	
ii) Apply insecticides	0.0	0.0	0.0	0.0	100.0	
Bird control						
i) Use of bird scares	57.3	6.7	0.0	3.3	32.7	0.0
ii) Use of disused video tape	5.8	0.8	1.1	0.0	92.3	0.0
Harvesting						
i) Cut the stem with sickle	5.3	2.9	0.0	0.0	91.8	0.0
ii) Use of harvester	65.3	8.2	1.5	0.0	25.0	0.0

Source: Field Survey, 2021

Factors that Influence Rice Production Technologies
        Table 3 revealed that the high yielding factor influenced the adoption of rice production technologies such as improved varieties, planting method, fertilizer application, timely planting and pest and diseases control by 98.2%, 90.5% 98.0%, 95.1% and 50.6%, respectively. This result is in line with Mustapha *et al.* (2012) which revealed that adoption of rice production technologies is largely influenced by factors such as high yield and early maturity.

Table 3: Factors Influencing Rice Production Technologies

Variables	High yield %	Early maturity %	Palatability %	Tillering %	Resistance to pest/disease %	Marketability %	Drought resistance %	Even maturity %
Improve rice var.	98.2	75.3	70.1	25.2	26.7	92.8	6.2	5.1
Traditional rice var.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Planting method	90.5	12.3	11.2	70.9	35.8	9.5	8.7	6.7
Use of agrochemicals	95.0	16.3	7.3	6.4	75.0	14.9	18.5	16.3
Fertilizer application	98.0	21.6	32..3	78.3	22.3	32.3	28.9	17.3
Harvesting	15.3	11.2	12.6	18.7	70.4	12.3	15.7	14.6
Timely planting	95.1	98.4	15.9	80.2	84.3	12.2	70.1	12.8
Modern rice milling	0.0	3.1	5.3	5.9	6.2	4.2	8.3	2.1.
Land preparation	89.6	2.3	12.3	51.3	4.2	3.8	5.5	57.5
Weed control	97.3	5.9	5.8	65.2	13.3	16.4	21.5	57.3
Pest and disease control.	50.6	11.4	12.6	65.6	9.4	6.3	5.2	32.6
Optimum Seed Rate	90.3	21.3	19.2	12.6	7.5	8.3	11.9	6.5

Source: Field Survey 2021.

Constraint to the Adoption of Rice Production Technologies

Table 4 revealed the major adoption constraint of the respondent which includes inadequate finance (97.7%), high cost of labour (96.2%) inadequate fertilizer (93.2%), inaccessibility to modern milling machine (95.5%), low level of extension visits (90.2%). This result is in line with the study of Udemeze (2013) which revealed that the major constraint to the adoption of rice production in Anambra state were poor access to credit facilities, high cost of input, and inadequate extension agent contact.

Table 4: Constraints on the Adoption of Rice production Technologies by Women Farmers

Constraints	*Frequency	Percentage
Inadequate land	99	74.4
Proximity	63	47.4
Topography	93	69.9
High cost of tractor	123	92.5
Unsorted seeds	53	39.8
High cost of labour	123	96.2
Inadequate fertilizer	124	93.2
Inadequate finance	130	97.7
Climate change related problem	109	82.5
Scarcity/shortage of improved rice var.	107	80.5
Low level of extension visits	120	90.2
Pest and disease	109	82.0
High cost of pesticides	115	86.5
High cost of transportation	121	91.0
Poor local market	116	87.2
Inadequate storage facility	68	51.1
Inaccessibility to modern milling machine	127	95.5

*Multiple choice exists
Source: Field Survey, 2021.

CONCLUSION AND RECOMMENDATIONS

The study concluded that high yield, early maturity and marketability were the major factors influencing adoption of rice production technologies among the respondents. It was therefore recommended that the women should be encourage to form cooperative societies in order to obtain credit and acquire modern facilities to help in rice processing and capital for adopting more technologies.

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