



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
www.agronomyjournals.com
2019; 2(2): 41-44
Received: 14-05-2019
Accepted: 16-06-2019

Okeke MN
Department of Agricultural
Economics & Extension,
Chukwuemeka Odumegwu Ojukwu
University, Igbariam Campus,
Nigeria

Nwoye II
Department of Agricultural
Economics & Extension,
Chukwuemeka Odumegwu Ojukwu
University, Igbariam Campus,
Nigeria

Osegbue EG
Department of Agricultural
Economics & Extension,
Chukwuemeka Odumegwu Ojukwu
University, Igbariam Campus,
Nigeria

Corresponding Author:
Okeke MN
Department of Agricultural
Economics & Extension,
Chukwuemeka Odumegwu Ojukwu
University, Igbariam Campus,
Nigeria

Adoption level of improved rice production technologies among rural women rice producers in ayamelum local government area of Anambra State, Nigeria

Okeke MN, Nwoye II and Osegbue EG

Abstract

The study analyzed the adoption level of improved rice production technologies among rural women rice farmers in Ayamelum Local Government Area of Anambra state, Nigeria. Multistage and simple random sampling techniques were used to select 50 respondents used for the study and questionnaire was administered among the respondents using personal interview. According to the survey, 58% of the rural women rice farmers were between 19 and 48 years of age with mean age of 54.6 years, majority (82%) were married, 56% had secondary education while 64% had household size of between 6 and 10 persons with mean years of farming experience of 10.1 years. The result indicated that more than half (80%) of the respondents' cultivated improved varieties while 90% financed their rice farming activities through their personal savings. The study revealed that majority of the women rice producers were fully aware of rice production technologies such as: land preparations (\bar{X} =2.00), pesticide application (\bar{X} =1.92), fertilizer application (\bar{X} =1.86), herbicide application (\bar{X} =1.84), use of improved varieties (\bar{X} =1.80) and seed selection (\bar{X} =1.60). Whereas, on the farmers' level of adoption of the improved rice production technologies, fertilizer application, land preparations, herbicide application, use of improved varieties, pesticide application, seed selection, planting space and planting depth were highly adopted. However, herdsman attack (\bar{X} =2.72), poor irrigation technology (\bar{X} =2.70), lack of credit facilities (\bar{X} =2.66), pest and diseases attack (\bar{X} =2.64), high cost of labour (\bar{X} =2.58), high cost of inputs (\bar{X} =2.52) and flooding (\bar{X} =2.48) were the major constraints to adoption of improved rice production technologies as indicated by the rural women rice producers. Amongst other recommendations in the study, government at different levels should create implementable policies that will checkmate the activities of the herdsman. This will enable the vulnerable women rice producers to carry out their farming activities without fear of their live and crop damage.

Keywords: Adoption, rice, production, technology, rural, women

Introduction

Agriculture is considered as a catalyst for the overall development of many nations. It is a critical sector that drives the economic development and industrialization of the developing nation, and has the capacity to reduce unemployment. Hence, its' development is essential for ensuring food security, income and employment generation, and for stimulating industrialization and overall economic development of the country [1]. A developing country such as Nigeria is blessed with lots of natural and human resources with large expanse of fertile land and friendly agricultural climate for agricultural activities and with different sectors such as solid minerals, tourism, sports and entertainment [2]. Nigeria's diverse climate from the tropical areas of the coast to the arid zone of the north; made it possible to produce virtually all agricultural products that can be grown in the tropical and semitropical areas of the world [3].

In an agrarian environment such as Nigeria, agriculture remains the chief support of the economy, employing about 65-70% of the labor force. Agricultural holdings are generally small and scattered; farming is often of the subsistence type, which is often characterized by simple tools usage and shifting cultivation [2]. These small scale farms produce about 80% of the total food as a result of the wide range of climate variations which allows it to produce a variety of food and cash crops. The staple food crops produced in Nigeria include cassava, yam, maize, cocoyam, cowpeas, beans, sweet potatoes, millet, plantains, bananas, rice, sorghum, and a variety of fruits and vegetables. Rice is the seed of the grass species *Oryza sativa* or *Oryza*

glaberrima of the grass family *Gramineae*, a large monocotyledonous family of some 600 genera and around 10,000 species^[4]. It is a staple food in Nigeria and it is grown in all the States of the Federation; although production varies from State to State. As a cereal grain, it is the most widely consumed; and as agricultural commodity, it is the third highest worldwide agricultural commodity produced after sugarcane and maize.

Rice is a staple food in several African nations and constitutes a bigger portion of the diet on a regular basis^[5]. Rice cultivation is the principal activity and source of income for millions of households around the globe^[6]. It is cultivated virtually in all agro-ecological zones of the country, as it constitutes one major cereal crop produced by Nigeria farmers. In terms of comparative advantage^[7], noted that rice can be grown in flooded and non-flooded soils because it has both lowland and upland varieties that can adapt to different agro-climatic and soil conditions. However, aside a handful of nations that enjoy self-sufficiency in rice production, rice consumption surpass production and substantial amount of the crop are imported to sustain local demand. Hence, the need to step up rice production activities through the adoption of improve rice technologies.

Adoption refers to the stage in which an innovation is selected for use by an individual or an organization. It is the integration of a new technology into existing practice and is usually proceeded by a period of *trying* and some degree of adaptation^[8]. Technology adoption is essential since it is a means that allows people to participate in a rapidly changing world where technology has become critically important to their lives. Technology adoption consists of five steps^[9]; first, technology adoption requires awareness. At this step, the potential users get adequate information about the benefits of the technology. The second step is evaluation. At this level, the expected users assess the usefulness and usability of the technology, and the ease or difficulty of adopting. This is followed by acceptance or rejection of the users. At this stage, they decide to acquire and use the technology, or not. The fourth stage is learning. If they decide to use the technology, the users need to develop the skills and knowledge required to use the technology effectively. Finally, application or usage comes. Here the users show appropriate and effective use of the technology.

The domestic production of rice is below the demand in Nigeria and rising per capita is now being complemented with huge imports^[10]. Similarly, the production of rice in Nigeria is no longer the question but rather, how to meet the growing demand, reduce importation and be self-sufficient^[11]. More so,^[12] noted that the limited capacity of the Nigerian rice sector to meet the domestic demand has been attributed to several factors; notable among them is the declining productivity due to low adoption of improved production practices. Hence, the need to assess the level of adoption of improved rice production technologies among rural women rice producers in Ayamelum Local Government Area of Anambra State, Nigeria. The broad objective of the study is to assess the level of adoption of improved rice production technologies among rural women rice producers in Ayamelum Local Government Area of Anambra State, Nigeria. The specific objectives were to:

- i. Describe the socio-economic characteristics of the rural women rice producers.
- ii. Ascertain the awareness of improved rice production technologies available for adoption in the study area.
- iii. Determine the level of adoption of improved rice production technologies among the rural women.
- iv. Identify constraints to adoption of improved rice production technologies by the rice farmers.

Materials and methods

The study area is Ayamelum Local Government Area of Anambra State, Nigeria, which is located in Southeastern part of Nigeria with headquarter at Anaku. The towns that make up the local government are Omor, Umueje, Omasi, Igbakwu, Umumbo, Anaku, Umuerum, and Ifite Ogwari. It lies between longitude 6° 36'E and 7° 21'E and latitude 5° 38'N and 6° 47'N. Rice production is observably the predominant enterprise among most households in the area. Population for the study was delimited to all rural women rice farmers in the study area. Multistage and simple random sampling techniques were used to select 50 respondents for the study. Stage I involved random selection of five communities (Omor, Umueje, Omasi Anaku, and Umumbo) out of the eight communities in existence in the study area. Stage II involved random selection of ten^[10] rural women rice producers from each of the five communities selected. Data were collected through primary source using pre-tested questionnaire that was administered to the respondents through personal interview while descriptive statistics such the mean score, frequency and percentages were used to analyze the data collected.

Results and Discussion

Socioeconomic Characteristics of the Respondents

The age distribution of the rural women rice producers (Table 1) indicated that 26% of the farmers were between the ages of 49 and 58 years, 22% between 39 and 48 years, 20% between the ages of 29 and 38 years, 16% fell within 19-28 years while another 16% fell between the ages of 59 and above with mean age value of 54.6 years. The result shows that the rural women in the study area were within their productive age and as such, they have the capacity to continue with rice production in the next 5-10 years come. The finding is in line with^[13], who indicated that the majority of the respondents were within age range of 41-50 years of age. More than half (82%) of the rural women rice producers in the study area were married, 14% were widows while 4% of them were single. The implication of this result is that majority of the rural women rice producers are into rice production because of their family responsibilities towards their children, and relatives at large.

The result of the study further revealed that majority (56%) of the women rice producers had secondary education, 26% had primary school education while 10% had tertiary education. From the pooled result, 92% of the rural women rice producers went through one form of education or the other. The implication is that most of the women having attained certain level of education can read, write and digest any training given to them on adoption of improved rice technologies. Thus, education is expected to increase the learning capacity of the rural women in comprehending and adopting recommended improved rice production technologies and best agronomic practices. On the distribution of the farmers according to their household size, the result indicated that thirty-two (32) women accounting for 64% of the respondents had household size of between 6-10 persons, 34% had between 1-5 persons while the remaining 2% had between 11 and above persons. It is pertinent to note that in agriculture, household size of a farmer's family plays an indispensable role, especially in strenuous farming activity such as rice farming in terms of provision of workforce for farming activities; hence, large number of household size will bring about decrease in the cost of production. In order words, the larger the household size, the greater the volume and rate of farming activities that will be accomplished by the farmers' household.

Furthermore, the result shows that the mean years of farming was 10.1 years with many (34%) of the women rice producers falling between 6-10 years. This is an indication that the farmers have spent reasonable years in rice production. Hence, it is expected that such significant years of farming experience would reflect on their level of expertise and production yield. More so, the more experience the rice producers acquires, the more meticulous they become to take up risks relating to rice farming activities and adoption of improved rice production technologies. On the varieties of rice cultivated by the rural women rice producers, the result indicated that the majority (80%) cultivated improved rice varieties while only 20% cultivated the local varieties. Personal savings was the major source of fund identified by significant percentage (90%) of the rural women rice producers in the study area. The result of the analysis further revealed that only few (10%) of the respondents financed their rice production activities through credits obtained from their friends and relatives. This implies that more than half of the women financed their farming activities with their personal savings.

Table 1: Percentage distribution of the respondents according to their Socioeconomic Characteristics

Socio-economic characteristics	Frequency	Percentage (%)	Mean (\bar{x})
Age (years)			
19-28	8	16	54.6 years
29-38	10	20	
39-48	11	22	
49-58	13	26	
59 and above	8	16	
Marital status			
Single	2	4	
Married	41	82	
Divorced	0	0	
Widowed	7	14	
Education level			
No formal education	4	8	
Primary education	13	26	
Secondary education	28	56	
Tertiary	5	10	
Household size			
1-5	17	34	7.5 persons
6-10	32	64	
11 and above	1	2	
Farming experience			
1-5	14	28	10.1 years
6-10	17	34	
11-15	8	16	
16-20	7	14	
21 and above	4	8	
Variety of rice			
Local variety	10	20	
Improved variety	40	80	
Sources of fund			
Personal savings	45	90	
Friends, families and relatives	5	10	
Commercial bank/cooperative society	0	0	

Table 2 indicates that the women rice producers are fully aware of the improved rice technologies such as land preparations (\bar{x} =2.00), pesticide application (\bar{x} =1.92), fertilizer application (\bar{x} =1.86), herbicide application (\bar{x} =1.84), use of improved varieties (\bar{x} =1.80), seed selection (\bar{x} =1.60), planting space

(\bar{x} =1.56) and planting depth (\bar{x} =1.51). However, the result further revealed that the farmers were unaware of irrigation system (\bar{x} =1.28), use of combined harvester (\bar{x} =1.18), modern storage system (\bar{x} =1.16) and new tillage operation (\bar{x} =1.14). The pooled result of the survey indicates that the farmers are aware of seven improved rice production technologies out of the twelve as listed in Table 2. The decision was based on a 2 point Likert-type scale with a mean cut of mark of 1.5.

Table 2: Farmers awareness on the improved rice technologies

Improved rice technologies	Mean score	Remark
Land preparations	2.00	Aware
Pesticide application	1.92	Aware
Fertilizer application	1.86	Aware
Herbicide application	1.84	Aware
Use of improved varieties	1.80	Aware
Seed selection	1.60	Aware
Planting space	1.56	Aware
Planting depth	1.51	Aware
Irrigation system	1.28	Unaware
Use of combined harvester	1.18	Unaware
Modern storage system	1.16	Unaware
New tillage operation	1.14	Unaware

Adoption level of improved Rice Production Technologies

The result of the survey indicated that fertilizer application (\bar{x} =2.94), land preparations (\bar{x} =2.90), herbicide application (\bar{x} =2.84), use of improved varieties (\bar{x} =2.82), pesticide application (\bar{x} =2.46), seed selection (\bar{x} =2.00), planting space (\bar{x} =1.76) and planting depth (\bar{x} =1.64) were highly adopted by the rural women rice producers. Whereas, irrigation system (\bar{x} =0.74), modern storage system (\bar{x} =0.58), water management (\bar{x} =0.46) and use of combined harvester (\bar{x} =0.00) were not paid attention to, by the rural women rice producers. The result indicates that the rural women rice producers highly adopted most of the basic improved rice production technologies available in the study area. As such, the production yield of the women rice producers is expected to scale up if only they can fully adopt most of the existing improved rice production technologies in the area. The high adoption level as recorded in the study could be attributed to the compatibility of the improved rice production technologies to the rural women's community norms and educational level. More so, years of farming experience and trainings could be some of the probable reasons for the high adoption level in the study area. The finding of this study aligns with ^[14] who reported a relatively high level of adoption of land preparation practices among lowland rice farmers in Levun local government area of Niger state, Nigeria.

Table 3: Farmers level of adoption of improved rice technologies

Improved rice technologies	Mean score	Rank
Fertilizer application	2.94	1 st
Land preparations	2.90	2 nd
Herbicide application	2.84	3 rd
Use of improved varieties	2.82	4 th
Pesticide application	2.46	5 th
Seed selection	2.00	6 th
Planting space	1.76	7 th
Planting depth	1.64	8 th
Irrigation system	0.74	9 th
Modern storage system	0.58	10 th
Water management	0.46	11 th
Use of combined harvester	0.00	12 th

Constraints to adoption of improved rice production technologies by the farmers

Based on a 3 point Likert type scale with a mean cut of mark of 2.0, the result of the constraints to adoption of improved rice production technologies indicated that herdsman attack (\bar{x} =2.72), poor irrigation technology (\bar{x} =2.70), lack of credit facilities (\bar{x} =2.66), pest and diseases attack (\bar{x} =2.64), high cost of labour (\bar{x} =2.58), high cost of inputs (\bar{x} =2.52) and flooding (\bar{x} =2.48) were the major constraining factors to adoption of improved rice production technologies. In addition, the rural women were constrained by inadequate extension services (\bar{x} =2.36), high cost of agro-chemicals (\bar{x} =2.34), poor storage facilities (\bar{x} =2.30), weed infestation (\bar{x} =2.24), high cost of rice technology (\bar{x} =2.22) and farmers low level of education (\bar{x} =2.18). However, the rural women rice producers objected low level of participation of women in rice production (\bar{x} =1.24) and unfavorable market (\bar{x} =1.22) as part of the major constraints. The finding is in agreement with ^[15] who highlighted poor irrigation technology, poor storage facilities, high cost of labour, high cost of inputs and inadequate extension services as major constraints to adopters.

Table 4: Distribution of the respondents based on constraints to adoption of improved rice technologies in the study area

Constraints	Means Score	Rank
Herdsman attack	2.72	1 st
Poor irrigation technology	2.70	2 nd
Lack of credit facilities	2.66	3 rd
Pest and diseases attack	2.64	4 th
High cost of labour	2.58	5 th
High cost of inputs	2.52	6 th
Flooding	2.48	7 th
Inadequate extension services	2.36	8 th
High cost of agro-chemicals	2.34	9 th
Poor storage facilities	2.30	10 th
Weed infestation	2.24	11 th
High cost of rice technology	2.22	12 th
Farmers low level of education	2.18	13 th
Low participation of women in rice production	1.24	14 th
Unfavorable market	1.22	15 th

Conclusion and Recommendation

Adoption of improved rice production technologies among the rural women rice producers in Ayamelum Local Government Area of Anambra State, Nigeria revealed that majority of the women rice producers were aware of the various improved rice production technologies in the area and has adopted most of them for their rice production activities. However, majority of the farmers indicated that they were constrained by several factors. Hence, if these constraining factors are taken care of, it will definitely bring about a boost in the women's production yield, capacity and income. Based on the findings of the study, there is an urgent need for the stakeholders, Local, State, Federal government and nongovernmental organizations to checkmate the activities of the herdsman by creating achievable policies, laws and grazing routes. This will enable the vulnerable women rice producers to reduce crop damages. Regulatory bodies such as the National Emergency Management Agency (NEMA) should intensify efforts in tackling disaster related issues such as flooding through prior weather forecast and construction of concrete structures. In addition, the women should form, belong and participate actively in agricultural cooperatives in order solve the problem of credit facilities and benefit from subsidized inputs as offered by the cooperative groups.

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