

EFFECT OF ADOPTION OF RICE VARIETIES ON INCOME OF FARMERS IN BIRNIN KEBBI LOCAL GOVERNMENT AREA, KEBBI STATE, NIGERIA

¹Alabi, S.I., ²Umar, S. ¹Panwal, E.F. and ¹Taru, B.

¹Department of Agric. Economics and Extension. Federal University of Kashere. Gombe State, Nigeria.

²Department of Agricultural Economics and Extension, Kebbi State University of Science and Technology, Aleiro.

Corresponding Author's email address: alabiibrahim933@gmail.com

Received 14th October, 2021 Accepted 08th January, 2022

ABSTRACT

This study was carried out to assess the effect of improved and local rice variety' adoption on the income of farmers in Birnin-Kebbi Local Government Area of Kebbi State. Specific objectives of the study were to describe the socio-economic characteristics of improved and local rice variety farmers in the study area, determine the annual income attained by improved and local rice variety farmers in the study area and to identify the constraints to improved and local rice variety farming in the study area. The data was collected from 240 rice farmers using stratified random techniques. The study relied mainly on primary data which was achieved via a structured questionnaire. Descriptive statistics and farm budget model were used to determine the cost and returns. The result showed that majority (99.2%) of the improved rice farmers were male and young while 96.7% of non-adopters were male and mostly old. The net farm income of those that adopted improved rice variety were higher ₦ 298,009.54 compared to those who adopts local rice variety, ₦ 181,078.78. The Major challenges farmers faced in the farming of improved and local variety were poor soil fertility, high cost of inputs, climatic factors, pest and disease, lack of opinion leader and lack of communication channel among others. The study recommend that the Kebbi State Government should develop a strategic plan that would influence the local variety rice farmers to adopt improved rice variety farming through intensive extension service. Farmers should continue to explore the advantage of improved technologies to boost their output and income. There is need for farmers to continue to explore the advantages of improved technologies to boost their production.

keyword: Adoption, income, yield, rice, variety

INTRODUCTION

The value of food crops is increased when the quantity of the crop is increased through increase in yield per hectare and when quality is increased to meet basic nutritional and processing requirement to satisfy consumer demand, FAO (2003). Rice (*Oriza sativa* L.), is one of the world's oldest domesticated staple foods. It supplies 2808 calories /person/day which represents 21% of the total calorie supply and it is a source of income to more than 100 million household around the world (IRRI, 2002). Nigeria has a potential land area of between 4.6 to 4.9 million hectares suitable for rice production, but only 1.7 million hectares is being cropped (Ojehomon et al. 2009). Through attaining self-reliance in food production and thus achieving a concrete food security, a country like Nigeria can move towards its ultimate goal of economic development. Nevertheless, in the context of high population growth, intensive food supply through rice production is one of the solutions to food security in Nigeria. The national production of rice increased from 1.45 million ton in 1995 to 3.6 million tons in 2010. The contribution of national

cereal research institute (NCRI) to this increase includes breeding selection of varieties that are high yielding, pest and diseases tolerant, stable, low level management of rice varieties for different ecologies, training and retraining of subject matter specialist (SMS) and farmers in the area of production and processing and provision of extension service to resource poor farmers. (NCRI. 2018).

(Agbamu, 2000) reveals that farmers are cultivating a large number of varieties known principally by their local names. Knowledge of these names is necessary for any research on the characteristics of varieties to ensure that varieties preferred by farmers are chosen. Research has shown that production and processing technologies have not been able to meet the increasing demand for rice (FAO, 2003). In the West African sub region, Nigeria has experienced a well established growing demand for rice caused by rising per capita consumption and consequently the insufficient domestic production had to be complemented with enormous import both in quantity and value at various times (Saka and Lawal, 2009).

According to United State Agency for International Development (USAID) (2010), Nigeria's rice sub sector is dominated by weak and insufficient producer – market linkage due to poor infrastructure and limited efficiency of distribution network which has resulted to low productivity and participation of farmers in the rice field. In order to reduce the rate of rice importation, Saka and Lawal (2009) were of the opinion that disseminating improved varieties and other modern inputs as a composite package to rice farmers is very important. Nwite, Igwe and Wakatsuki (2008) indicated that the adoption of technologies and improved management practices should lead to substantial yield increase in rice production. Adoption of an innovation within a social system takes place through its adoption by individuals or groups. In view of this, Negash (2007) defined adoption as the integration of an innovation into farmers' normal farming activities over an extended period of time. More so, adoption is not a permanent behavior, this implies that an individual may decide to discontinue the use of an innovation for a variety of personal, institutional, and social reasons, one of which might be the availability of another practice that is better in satisfying farmers' need. However, this invariably underscores the important role technology stands to play in attaining the much needed growth in the rice sub sector. As a result of this, International Rice Research Institute (IRRI) 2002 opined that new rice varieties that combine higher yield potential with excellent grain quality, resistance to biotic and abiotic stress and input use efficiency are desperately needed to reduce the importation of foreign rice.

Kebede (2001) indicated that growth in production can be gained through the use of technologies and allocative efficiencies of farmers in response to the changing techniques and production environment. Hence, adoption of technologies should lead to substantial yield increase. Upon the high yield that is recorded by the farmers in Birnin-Kebbi Local Government using improved rice variety, some farmers are still reluctant to adopt this improved variety, in this view, it behooves this study to address some adoption benefits (income) and constraints of these two varieties and the possible yield and income of these two varieties to the farmers. The objectives of this research were; to describe the socio-economic characteristics of improved and local rice variety farmers in the study area, determine the annual income attained by improved and local rice variety farmers in the study area and to describe the major

constraints faces by the rice farmers in the study area.

METHODOLOGY

Study Area

The study was carried out in Birnin-kebbi Local Government Area of Kebbi State. Birnin-kebbi local government is a city located in north/western Nigeria on coordinate 12°27'13"N 4°12'01"E, and it is the capital of Kebbi State and Head Quarter of Gwandu Emirate with land mass of 1037km². The Local Government has a population of about 400,259 inhabitants as at the time of the research. Birnin-kebbi is located along the Sokoto River and is connected by road to Arugungu (45km northeast), Jega (37km southeast) and Bunza (45km southwest). Birnin-kebbi lies at the Sudan savannah vegetation zones. The climate condition of the study area is within the tropical savanna with recorded highest temperature of 42°C and lowest of 15°C during the harmattan, and average annual rainfall of about 750-800mm. The major source of economy is farming (rice farming), the major ethnic groups are Hausa and Fulani and they are mostly Muslims.

Sampling Procedure

In order to achieve the objectives of this study, the sampling for administering questionnaires was distributed in the ten districts of Birnin-Kebbi Local Government Area of Kebbi State. The sampling frame was 22536 farmers, which was adopted from Rice Farmers Association of Nigeria (RIFAN) Kebbi State chapter, thus, 240 respondents were selected using stratified random sampling technique. Sixty respondents for improved variety and sixty respondents for local variety to make a total of one hundred and twenty (120) respondents for each of the improved and local rice variety farmers, that equal a total of two hundred and forty respondents.

Analytical Tools

Only primary data was used for the purpose of the research. The primary data were obtained through field survey with the use of structured and well designed questionnaires in line with the objectives of the study. Objective 1 and 3 were analyzed using descriptive statistics such as frequency and percentage. Objective 2 was analyzed using farm budgeting model.

The farm budgeting model that was used in this study is mathematically expressed as adopted by (Olayide and Heady, 1982)

$$NFI = GI - TVC - TFC$$

Where

NFI = Net farm income

GI = Gross income (total revenue)

TVC = Total variable cost

TFC = Total fixed cost

RESULTS AND DISCUSSION

Socio-economic characteristics of adopters and non-adopters of improved rice varieties which directly or indirectly affect their farming operations in rice production are presented in Table 2. The analysis of results revealed that majority (58%) of adopters of improved rice variety were in the age range of less than 30 years, while non-adopters (66.7%) were in the age range greater than 60 years. This implies that the adopters of the improved rice variety are relatively younger than the non-adopters of the improved rice variety and are more likely to try and adopt new technology. This is in line with findings (Abdullahi, 2012), who also noted that younger farmers are more amenable to new ideas and risk; they are expected to adopt innovation more readily than older ones thereby becoming more efficient in rice production. The results also show that 99.2% of the farmers who adopted improved rice variety were male and only about 0.8% were female. Adoption of improved rice variety could be as a result of enlightenment campaigns by extension agents. The low adoption rate among female farmers (0.8%) may be as a result of domestic activities which keep them indoors, thus inhibiting their contact with extension personnel. The marital status of the respondents revealed that, the majority of the farmers of both local and improved rice varieties were married with 96.7% and 92.5% respectively, 3.3% and 7.5% are single respectively. This implies that both adopters marry early to fulfill their religion right and also to increase the family labour. Respondents in the study area marry early to fulfill their religion (Islam) rites. Results further revealed that about 54.2% of the adopters of improved rice varieties had one form of formal education or the other (especially secondary level of education), while majority (60%) for non-adopters had no formal education (they had Quranic education). Ingye (2005) reported that educational attainment has positive effect on the adoption of

farming techniques because it allows farmers to perceive and implement skills acquired from the extension agents. The size of farm possessed by a particular farm family is believed to determine the extent to which other resources (capital, labour among others) will be utilized for optimum productivity. According to Alamu *et al.* (2002), farmers with more resources including land area are more likely to take advantage of a new technology. The analysis of farmers farm holdings revealed that 42.5% and 51.6% of adopters and non-adopters had farm holdings of between 0.1-1.5 ha respectively. 1.7% of Then non-adopters had farm holdings greater than 3ha while 8.3% of the adopters has farm land greater than 3ha. This indicates that majority of the farmers in the study area were small holders. This situation, where many farmers cultivated only small plots of land, will not promote agricultural production beyond subsistence level. This indicate that, 72.5% farm labor of the local rice variety farmers are done by the members of the family, while only 61.7% family labor are used by the improved rice variety adopters. Also, 25% of the farm labor are hired by the local rice variety farmers as against 38.3% for the improved rice variety adopters. Thus, it shows that most of the farmers especially improved rice variety adopters are now engaging their children in western education instead of the idea of having many children to increased farm labor in the past. The experience in rice farming could influence the level of adoption, the longer a farmer spends in the occupation, the vast his knowledge on new technologies will be. The longer the years of experience in rice farming, the greater chances of learning new innovation. The result in table 8 shows that, majority of the local rice variety farmers 50% has been into the use of the local variety for 30 years, followed by 40% which are into the local rice farming for 20 years as against 33.3% for the improved rice variety farmers. Also, only 9.2% of the local rice farmers are into farming for less than 10 years which is the 66.7% which the improved rice variety adopters has it highest number. Only 7.5% of the local rice variety farmers are into farming for more than 30 years.

Table 2: Socio-Economic Characteristics of Adopters and Non-Adopters of Improved Rice Varieties.

Socio-economic characteristics	Non-adopters Frequency	Percentage	Adopters Frequency	Percentage
Age				
≤30	10	8.3	70	58
≤60	30	25	47	39.2
>60	80	66.7	3	2.5
Total	120	100	120	100
Gender				
Male	116	96.7	119	99.2
Female	4	3.3	1	0.8
Total	120	100	120	100
Marital Status				
Married	116	96.7	111	92.5
Single	4	3.3	9	7.5
Total	120	100	120	100
Level of education				
Quranic	60	50	13	10.8
Primary	34	28.3	25	20.8
Secondary	14	11.7	65	54.2
College	8	6.7	9	7.5
Graduate	4	3.3	8	6.7
Total	120	100	120	100
Farm Size				
≤1.5	62	51.6	51	42.5
≤3	56	46.7	59	49.1
>3	2	1.7	10	8.3
Total	120	100	120	100
Source of Labor				
Family	87	72.5	74	61.7
Hired	30	25	46	38.3
Exchange	3	2.5	-	-
Total	120	100	120	100
Farming Exp.				
≤10	11	9.2	80	66.7
≤20	40	33.3	40	33.3
≤30	60	50	-	-
>30	9	7.5	-	-
Total	120	100	120	100

Source: Computed survey data, 2019

The farm budget modeling was used to achieve the net farm income, table 3 shows the net farm income of the farmers based on the variety they adopted. The result indicates that the net farm income (NFI) per season has grown relatively high because of the adoption of improved rice variety. The farmers who adopted improved variety had ₦ 298,009.54 (NFI) per season, also farmers who used local variety had ₦ 181,078.78 net farm income. This revealed that adoption of improved rice variety leads to increase in income. Comparing the high cost of production and net farm income of

those that did not adopt improved variety, proved that it is favorable and rational decision to sometimes substitute improved variety for local rice variety because of the low net farm income of those that did not use improved variety. The non-adopters had more expenses in the cost of production such as labour, cost of fertilizer and agrochemicals may be because of their low level of education and lack of proper awareness. Abdullahi, 2012 reported that labour contributed more than 50% to the total cost of rice production in Niger state.

Table 3: Net Farm Income (₦) of the Respondents

Net farm income	Improved variety	Local variety
Variable cost	92,012.639	97,129.227
Fixed cost	10,022.173	10,026.667
Total cost	102,034.81	107,155.89
Gross income	400,044.34	288,234.67
Gross margin	308,031.73	191,105.44
Net farm income	298,009.54	181,078.78

Source: Computed survey data, 2019

Table 4 shows that, climatic factors were the most important problem faced, with about 72.1% of the respondents. This increases the cost of production. The result further revealed that with about 71.7% of the respondents identified that cost of inputs (agro-chemicals and fertilizer) constituted a serious problem to the cause of production. For this reason, some farmers reduced their farm size especially those that do not have access to credit. In addition, the figure shows that about 65.4% of the farmers suffer from the problem of poor soil fertility which makes them to purchase much of fertilizer than required. Furthermore, 58.3% of the

respondents faced the problem of pest and diseases which made them to purchase the required agro-chemical to tackle this issue. 20% suffered from lack of opinion leaders from their various villages. 15% of the respondents suffered from inadequate communication channel especially through the opinion leader, information from the extension staff. Homophily and heterophily factors had 10%. It has no too much effect because most of the farmers despite their financial status are willing to communicate with the less privileged in the same area.

Table 4: Constraints Faced by Rice Farmers

Constraints	Frequency	Percentage
Climatic factors	173	72.1
Pest and diseases	140	58.3
Lack of communication channel	36	15
Lack of opinion leader	48	20
Homophily and heterophily	24	10
Cost of inputs	172	71.7
Poor soil fertility	157	65.4
*Total	750	312.5

Source: Computed survey data, 2019

* Multiple response

CONCLUSION AND RECOMMENDATIONS

Conclusively, going by the objectives of the study, it showed that, those farmers who adopts improved variety are making more profits, and they need to continue exploring this improved technology to boost their production. The study also revealed that the income of those who adopted improved rice variety were higher than those that are using local variety even at high expenditure on inputs and hired labour. The net farm income of those who adopted improved rice variety showed that using improved rice variety is more profitable and increases farmers income and output. The Major challenges farmers faced in the farming of improved and local variety were poor soil fertility, high cost of inputs, climatic factors, pest and disease, lack of opinion leader and lack of communication channel among others. Based on the finding of this study, the following suggestions were hereby made;

1. Kebbi State Government should develop a strategic plan that would influence the local variety rice farmers to adopt improved rice variety farming through intensive extension service.
2. Farmers should continue to explore the advantage of improved technologies to boost their output and income.

REFERENCE

- Abdullahi A. (2012), comparative economic analysis of rice production by adopters and non adopters of improved varieties among farmers in Paikoro Local Government Area of Niger State, Nigerian Journal of Basic and Applied Science (June,2012), 20(2): Pp146-157
- Agbamu. Joseph U., 2000. Agricultural research-extension linkage systems: an international perspective. *Agren Network Paper* 106a. London: ODI.
- Alamu, J.F. (2002). Comparative analysis of maize/legume intercropping system in SabonGari Local Government Area, Zaria,KadunaState. *Nigerian Journal of Sustainable Tropical Agricultural Research*, 10(4): 2002 Pp87-93.
- F.A.O (2003), Food and Agricultural Organization Statistical Year Book, FAO, Rome. <http://faosts.fao.org>.
- Ingwe, Y. (2005). The effect of adoption of improved rice variety on the productivity of Small- scale farmers in Hawul Local Government Area of Borno State Nigeria. B. Agriculture project.Department of Agricultural Economics and Extension University of Maiduguri, Nigeria. 84PP. (Unpublished).
- IRRI.(2002) Rice almanac, source book for the most important economic activity on earth.Thirdedition.Maclean JL, Dawe DC, Hardy B, Hettel GP, (Eds). International Rice Research Institute Manila, Philippines. 2002; Pp1-253.
- Kebede, T.A (2001). Farm household technical efficiency. A stochastic frontier analysis: A M.sc thesis submitted to the department of Economics and social sciences. Agricultural University of Norway Pp1-66
- NCRI (2018). Agribusiness and empowerment for rice farmers, youths and women in rice value chain training manual organized by national assembly, Abuja in collaboration with national cereals research institute, badeggi conducted by rice research station (NCRI) brininkebbi, kebbi state. Pp 2-16
- Negash R (2007). Determinants of Adoption of improved Haricot Bean production Package in Naba Special Woreda, Southern Ethiopia. An M.S.C Thesis Submitted to the Department of Rural Development and Agricultural Extension, School of Graduates studies, Haramaya University Pp. 10-12
- Nwite, J. C., Igwe, C. A. Wakatsuki, T. (2008). Evaluation of Sawah rice Management system in Inland Valley in south – eastern Nigeria, Soil Chemical Properties and Yield. *Paddy Water Enviroment* 6 (3): Pp 299 - 307.

- Ojehomon VET, Adebayo SB, OgundeleOO, Okoruwa, et al. Rice data systems in Nigeria: National rice survey 2009. Building a Rice Data System for Sub-Saharan Africa; 2009.
- Olayide, S.O and Heady, E.O (1982). Introduction to Agricultural Production Economics, University Press. Ibadan, P 319
- Saka, J. O. and Lawal, B. O. (2009).Determinants of adoption and productivity of improved rice varieties in south western Nigeria.African Journal of Biotechnology. Vol. 8 (19), Pp. 4923-4932, 5th October 2009.
- Samarpitha A., Wasudev N., Suhasini K. (2016). Socio-economic characteristics of rice farmers in the combined State of Andhra Pradesh. Asian Journal of Agricultural Extension, Economics and Sociology. 13(1): 2016. Pp1-9.
- Tolgbone.D.andWakatsuki.T.(2007).Socio-economic factors influencing the adoption of Sawah Rice Production Technology in Nigeria. J Food Agric. Environ. 5(1): Pp 239-242
- United State Agency for International Development (USAID) (2010). Improved packages of practices for rice production.Pp1-22.