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Factors affecting the adoption of upland nerica rice in the EJURA sekyeredumase district in the Ashanti region of Ghana

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ABSTRACT

The study was to investigate the factors affecting the adoption of upland NERICA rice in the Ejura-Sekyeredumase District in the Ashanti Region. The simple random sampling technique was used to select 100 rice farmers in the district. About 20% of the farmers had fully adopted the upland NERICA rice. It was found that adoption of upland NERICA rice was dependent on NERICA farm size, accessibility and income level at 5% significant level. The main challenge associated with the production of upland NERICA rice is low rainfall causing total loss of yield. Farmers should form groups to make accessibility to incentives and other benefits easy. They should also cultivate the local rice alongside NERICA to supplement their income and finally, extension agents should increase their contacts with the low adopters of NERICA rice.

Introduction

Rice is the main staple food for millions of people in West Africa and this has created the need to improve its genetic characteristics for the better establishment in the sub-region. West African Rice Development Association (WARDA) conducted thorough research in solving the problems that local rice farmers face in rice production. One major solution was the introduction of the New Rice for Africa (NERICA) (Brown, 1984). The NERICA project was introduced into Ghana in 2005 and it is expected to end in 2010. The objective of the NERICA rice project was to increase yield substantially, increase the income of rice farmers, help overcome some of the existing problems faced by farmers and cut down the country's import bills. In this regard, NERICA was introduced into three main regions, namely Volta, Ashanti, and Northern, which now have better adoption to NERICA rice even though there are still some problems arising from their acceptance. Thus, meeting the objectives of the project has not reached its highest peak or expectation (Oscar, 2003).

NERICA rice is an upland one and therefore can be grown where maize and cowpea can do well. This has made it more acceptable in the project regions. It has an early maturity period, which makes its cultivation easier as the farmer can have 3 to 4 harvests in a year, while its ready market too is always assured. It is resistant to most diseases and pests, especially blast, and even birds as some have thorns, which make it difficult for the birds to chew or feed on. WARDA, the major rice research institution in West Africa, made a tremendous breakthrough in NERICA rice research through the development of stable and fertile progenies from inter-specific crosses between Asian rice and African rice called the NERICA varieties. Organoleptic tests in West African countries have shown that the taste, aroma and cooking characteristics of NERICA compare favourably with those of imported rice (Obeng, 2000).

Due to the problems associated with rice production, (including prolonged maturity period, low yield and high incidence of diseases), farmers find it difficult to produce it as a sole crop. These problems militate against its production and adoption. The situation has increased the importation of rice to feed the country. In Ghana nowadays, rice has taken the upper hand in terms of its consumption in various households. FAO estimates that current rice imports into the sub-region have grown to more than 4 million metric tonnes per year, costing over US$1 billion in scarce foreign exchange each year. This has worrying consequences for the balance of payment of these countries. Imports of this magnitude represent a major break in broader development and poverty reduction efforts. Thus, as the consumption rate rises so is its importation, which makes the local rice not able to meet the demands of the consumers. The local rice has a longer maturity period which factors into the problem faced by the consumers such that at the time of its need or demand, its supply is limited (Awuni, 2005).

The NERICA rice came into the scene to eradicate this problem and make rice available at all times for consumers, but its adoption and dissemination into the African setting has been risked due to different soil types, climatic conditions as well as personal factors such as the educational level of the farmers. Upland NERICA rice varieties introduced on trial basis in all West African countries have been enthusiastically accepted by the farmers to grow more, but are constrained by inadequate supply of seeds and other farm inputs, which makes the willingness of the farmers to fully adopt the rice at a very critical peak (Oscar, 2003). The adoption of a variety is defined here as its use at the individual level or at the aggregate population level (WARDA, 2008). Even though there is increasing rate of adoption, intake abilities of consumers and free acceptance of the rice into the community, there is the need to take into consideration the rate at which this adoption is taking place in

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order not to violate the set objectives of the project. In view of the aforementioned issues or concerns, the following research objectives have been considered in this study.

- To examine some demographic features of farmers involved in the NERICA rice project
- To determine the factors affecting the adoption of upland NERICA rice in the study area,
- To identify the challenges associated with upland NERICA rice production.

Methodology

The target population for the research was rice farmers in the study area. One hundred (100) farmers were interviewed. These farmers were selected and interviewed from five operational units of the Ejura- Sekyeredumase District. Twenty (20) farmers were interviewed from each of the unit with the help of the respective unit AEA's. The five units were randomly sampled from the existing 31operational units. The questionnaire was pre-tested in three of the centres to refine the questions and information gathering process before the final interview, to obtain information and to check for any additional information to be added. Tools of analysis used in this study were descriptive and inferential statistics (chi square test of independence).

Results and Discussions

Distribution of Respondents by their Cost of Input

Table 1 shows the cost of inputs that respondents incur in their farming production in two (2) groups. Of the hundred respondents interviewed, 92% incurred costs of traction (GH¢ 25), weedicides (GH¢ 7), fertilizer (GH¢ 36 with coupon and GH¢ 52 without coupon) per acre (group 1) while the remaining 8% incurred costs of traction (GH¢ 25), weedicides (GH¢ 7), fertilizer (GH¢ 36 with coupon and GH¢ 52 without coupon), and hired labour (GH¢ 22) per acre (group 2).

Distribution of Respondents by Farm sizes

In terms of the normal rice farms being cultivated by the farmers, majority of the respondents (52%) had farm sizes of more than 5 acres while the least (7%) was made up of farmers with farm size less than 2 acres. When asked the farm sizes being used in the cultivation of the Upland Nerica, it was realised that majority (68%) cultivated less than 2 acres. What this means is that, the farmers were too scared to take risk in cultivating the new variety. So even though the farmers have land sizes that were big enough to accommodate other crops they still did not want to be affected by the uncertainties that upland NERICA rice might cause or bring up. This situation is founded on the diffusion of innovations theory by Rogers (1995) which has it that the innovation-decision is made through a cost-benefit analysis where the obstacle is uncertainty. People will adopt an innovation if they believe that it will, all things considered, enhance their utility. So they must believe that the innovation may yield some relative advantage to the idea it supersedes.

Respondents' Adoption of Upland NERICA Rice

Out of the 100 farmers interviewed, 20% were full adopters, 48% were partial adopters whiles 32% were low adopters. Although the innovation had been introduced in the study area, some of the farmers had still not adopted the innovation. The farmers who had adopted receive seeds free of charge and other packages (traction, weedicides, fertilizer and free consultations on any challenge they face in their farming activities). According to Rogers (1995), for most members of a social system, the innovation-decision depends heavily on the innovation-decisions of the other members of the system. In fact, empirically the successful spread of an innovation follows an S-shaped curve. There is, after about 10-25% of system members adopt an innovation, relatively rapid adoption by the remaining members and then a period in which the holdouts finally adopt.

Adoption was found to be dependent on the following variables: Accessibility, income levels and NERICA farm size. Accessibility is significant since $0.05 > 0.00$; this implies that Adoption is dependent on accessibility. This agrees with Onasanya *et al.,* (2006) who stated that accessibility affects the adoption of innovation by farmers in Ogun State. Farmers that have access to upland NERICA rice constitute 96% of the total number of respondents. Those who are in farmer groups get easy access to the NERICA seeds than those who are not as the project (NRDP) recognises and serves grouped farmers first before any other individual. Income level is significant since $0.05 > 0.00$; thus making adoption dependent on income level. The higher the income of a farmer the higher the possibility of adopting an innovation.

Out of the total number of adopters (74%), 88% said that their income level was higher than the local rice compared to 12% saying that their income was lower, 26% non-adopters have their incomes being lower. In general, NERICA producers get higher incomes (GH¢ 60.00 per 50kg bag) as against GH¢ 40.00 that the local rice is sold. Also NERICA rice can be harvested thrice in a year, thus increasing the income level of the farmers. NERICA farm size is significant thus making adoption dependent on NERICA farm size. Out of the 74% adopters, 65% have farm sizes of 1 acre, 21% with 2 acres, 9% with 3 acres, 3% with 4 acres and 1% being for 5 acres and more respectively. This is so because it is a new technology and the farmers need time to fully accept it, thus the smaller sizes of farm lands for NERICA rice.

Challenges Associated with the Production of Upland Nerica Rice

From Table 5, the main challenge associated with the production of upland NERICA rice is low rainfall causing total loss of yield (21%) followed by difficulty in threshing and breakages in milling (20%). High cost of inputs especially fertilizer (18%) is followed by rodent and bird damage which has the lowest percentage of 9%.

Conclusions and Recommendations

Farmers should form groups to make accessibility to incentives and other benefits easy. Farmers should practice irrigation to substitute natural rainfall when the need arises to prevent total loss of yield. The farmers should also cultivate the local rice alongside NERICA to supplement their income. Extension Agents should increase their contacts with the non adopters of NERICA rice and also encourage the farmers to inform their friends about NERICA in order to help eradicate poverty from the country.

The adopters of the upland NERICA rice should make it a point to increase their NERICA farm sizes in order to gain more income through increased production of the NERICA rice.

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Table 1- Respondents costs of inputs

Grouped cost of inputs	Frequency	Percent
Traction-GH¢25, Weedicides-GH¢7, Fertilizer-GH¢36 with coupon and GH¢52 without coupon /acre	92	92.0
Traction-GH¢25, Weedicides-GH¢7, Fertilizer-GH¢36 with coupon and GH¢52 without coupon, hired labour-GH¢22 /acre	8	8.0
Total	100	100.0

Table 2- Respondents' farm sizes

Farm size	Rice Farm Sizes		Upland NERICA Rice Farm Sizes	
	Frequency	Percent	Frequency	Percent
< 2 acres	7	7.0	68	68.0
2-3 acres	20	20.0	10	10.0
4-5 acres	23	23.0	2	2.0
> 5acres	52	52.0	20	20.0
Total	100	100.0	100	100.0

Table 3- Adoption of upland NERICA rice

Category of Adopters	Frequency	Percentages (%)
Full Adopters	20	20.0
Partial Adopters	48	48.0
Low Adopters	32	32.0
Total	100	100

Table 4 - Chi-square test of independence

Factors	Attributes	Value	Df	Asymp. Sig.(2-sided)	Comments
Age	Pearsons Chi-Square	6.986[a]	8	0.538	Independent
	Likelihood Ratio	5.712	8	0.679	
	No. of Valid Cases	100			
Educational Level	Pearsons Chi-Square	14.819[a]	10	0.139	Independent
	Likelihood Ratio	10.092	10	0.432	
	No. of Valid Cases	100			
Marital Status	Pearsons Chi-Square	1.592[a]	6	0.953	Independent
	Likelihood Ratio	2.577	6	0.860	
	No. of Valid Cases	100			
Cost of Inputs	Pearsons Chi-Square	2.257[a]	4	0.689	Independent
	Likelihood Ratio	2.481	4	0.648	
	No. of Valid Cases	100			
Accessibility	Pearsons Chi-Square	92.517[a]	4	0.000	Dependent
	Likelihood Ratio	112.746	4	0.000	
	No. of Valid Cases	100			
Income Level	Pearsons Chi-Square	56.127[a]	4	0.000	Dependent
	Likelihood Ratio	68.700	4	0.000	
	No. of Valid Cases	100			
NERICA Farm Size	Pearsons Chi-Square	1.111E2[a]	12	0.000	Dependent
	Likelihood Ratio	123.043	12	0.000	
	No. of Valid Cases	100			

Table 5 - Challenges associated with NERICA rice production

Challenges	Frequency	Percentage (%)
Difficulty in threshing and breakages in milling	20	30.0
High cost of inputs especially fertilizer	18	23.0
Low rainfall causes total loss of yield	21	35.0
Rodent and bird damage	9	12.0
Total	100	100.0

SOURCE: Author's computation, 2010