Bangladesh Journal of Extension Education *ISSN 1011-3916*
Volume 21, No. 1&2, 2009: 55-61 *Research Article*

Adoption of Hybrid Rice by the Farmers of Fulphur Upazila of Mymensingh District

S. Mondal[1], M.H. Rahman[2] and M.J. Hoque[3]

Abstract

The major purposes of the study were to determine extent of adoption of hybrid rice by the farmers of Fulpur upazila under Mymensingh district and to explore relationships between the farmers' adoption behaviour and their nine selected characteristics. The characteristics of the farmers namely age, education, family size, farm size, annual income, extension media contact, innovativeness, cosmopoliteness, farmers' knowledge constituted independent variables. The study was confined to two villages namely Bagunda and Panihori under Kakni union of Fulphur upazila in Mymensingh district. Population of the study was constituted by 200 farmers who were cultivating hybrid rice in the selected villages. From the population 50 percent was purposively selected to obtain a sample containing 100 respondents. Data were collected using pre-tested interview schedule during March 10 to April 15, 2009 through personal interview. Simple correlation (r) was computed to explore the relationships between the dependent and nine independent variables. Thirty eight percent of the farmers had medium adoption of hybrid rice cultivation followed by 37 percent had low and 25 percent had high adoption. The main reasons of hybrid rice adoption were (i) higher yield of hybrid rice than the HYV rice, (ii) higher profitability, (iii) non-complexity of cultivation procedure, (iv) availability of quality seeds, and (v) inspiration by extension agents for hybrid rice. Among the nine characteristics of farmers, three namely farm size, annual family income and innovativeness showed significant positive relationships with their adoption of hybrid rice cultivation.

***Keywords**: Adoption, adoption quotient, hybrid rice, Fulpur, innovation.*

Introduction

Rice is one of the most important cereal crops in the world. More than half of the world's population intake rice as staple food. It is also a staple food of the people of Bangladesh. Major advances have occurred in rice production as a result of the wide-scale adoption of improved rice varieties. However, demand for rice in low-income countries increases continuously because of increases in the population of rice consumers and improvements in living standards. It is estimated that the world will have to produce 50 percent more rice by 2050 (IRRI, 2004). To meet this challenge, it is necessary to find rice varieties with higher yield potential. Several approaches are being employed for developing rice varieties with increased yield potential such as population improvement, ideotype breeding, heterosis breeding, wide hybridization, genetic engineering, and molecular breeding.

At present, hybrid rice technology for large scale production has a yield advantage of 15-20 percent or more than 1 t/ha, over the best inbred varieties. Despite the yield advantages of hybrid rice, a few farmers are cultivating hybrid rice in least developed countries. Thus, the increased demand for rice is

[1]Scientific Officer, On-Farm Research Division, Bangladesh Agricultural Research Institute, Rajshahi and [2&3]Professor and Assistant Professor, Dept. of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

expected to exceed production in many countries in Asia, Africa and Latin America. World rice production therefore, needs to increase to meet the growing demand of rice. In such situation, more adoption of hybrid rice by the farmers can fulfil the demand of rice. Moreover, hybrid rice has a great impact on rural employment and income generation. The labour-intensiveness of F_1 seed multiplication and production for the hybrid rice programme has created rural employment opportunities and increased farmer's incomes. Hybrid rice seed production requires about 30 percent more labour (or 100 workdays/ha) than the seed production of improved varieties (IRRI, 2004). Thus, considering the above facts, the present study was undertaken in order to (i) determine the extent of adoption of hybrid rice cultivation by the farmers and (ii) explore the relationships between farmers' selected characteristics and their extent of adoption of hybrid rice cultivation.

Methodology

The study was confined to two villages of Fulphur upazila under Mymensingh district. Fulpur upazila was selected for the study having the fact in mind that many private seed companies have been engaged in promoting hybrid rice in this upazila for several years in one hand, the Department of Agricultural Extension (DAE) had also the policy to disseminate the rice among the farmers of the area. The specific study areas were Bagunda and Panihori villages under Kakni union as selected randomly from nine villages. Population of the study was constituted by 200 farmers who were cultivating hybrid rice in the selected villages. From the population 50 percent was purposively selected to obtain a sample containing 100 respondents. Data were collected using pre-tested interview schedule during March 10 to April 15, 2009 through personal interview. Farmers' extent of adoption of hybrid rice cultivation was the dependent variable and nine selected characteristics of the farmers were selected as independent variables.

According to Chattapadhyay (1963) the adoption is the ratio scale designed to quantify the adoption behaviour of an individual. The method of adoption quotient involves all the related concepts like potentiality, extent, time consistency and weightage. Therefore, the adoption quotient in this study was computed by using the following formula of Chattapadhyay (1963):

Adoption quotient (AQ) =

$$\frac{T_3-(T_3-T_2)}{T_3} \times \frac{T_3-(T_3-T_1)}{T_3} \times \frac{A_1}{A_2} \times 100$$

Where,

T_1 = Introduction year of hybrid rice in area
T_2 = Awareness year
T_3 = Adoption year
A_1 = Actual area (ha) under practice (A_1) season
A_2 = Potential area (ha) under practice (A_2) season

The adoption quotient was expressed in percentage. Hence, the adoption of the farmers' hybrid rice cultivation could range from 0 to 100 where 0 indicated no adoption and 100 indicated highest adoption (full adoption).

The farmers gave their opinion on the major reasons for their adoption of hybrid rice in a

four point rating scale. Ten reasons were identified for this purpose after discussion with local extension agents and officers of DAE. For each of the reason, a respondent was asked to indicate the degree of agreement by checking one answer from five options such as "most appropriate," 'moderately appropriate," "less appropriate" and "not appropriate" reasons. Scores were assigned to these responses as 3, 2, 1 and 0, respectively. The reasons were ranked on the basis of average scores computed from the responses of all respondents.

Findings and Discussion

Farmers' Extent of Adoption of Hybrid Rice

The possible range of adoption quotient for computing adoption of hybrid rice by the farmers ranged from 0 to 100, while the observed range was 5 to 100. The average adoption quotient was 50.16 and the standard deviation was 28.31. On the basis of observed range of the adoption quotient, the respondents were classified into three categories as shown in Table 1.

Table 1. Distribution of farmers according to their extent of adoption of hybrid rice varieties

Categories of farmers and score range	Respondents' percentage (n = 100)	Mean	Standard deviation
Low adoption (up to 33)	37	50.16	28.31
Medium adoption (> 33 -66)	38		
High adoption (> 67)	25		

The findings presented in Table 1 clearly indicate that the extent of adoption of hybrid rice among the respondents showed a relatively normal distribution. However, a medium mean value (50.16) and the fact that a clear majority (63 percent) of the farmers had medium to high adoption of hybrid rice cultivation indicate that dissemination of hybrid rice was showing a increasing trend in the study area. This result might be considered as a desirable progress for dissemination of hybrid rice in the study area. However, a significant portion of the farmers (37 percent) had low adoption. As only the hybrid rice producers in the study area were included in the sample, the actual adopters would be lower than the present study. Study of Rahman (2001) also showed an increasing trend of adoption of hybrid rice among the farmers of Mymensingh district. As not many literatures were available to the researcher on this issue, a cautions conclusion should be made. However, it could be concluded that through proper motivation it is possible to change the adoption behaviour of the low adoption farmers for higher adoption of hybrid rice production in the study area.

Reasons for adoption of hybrid rice

The major reasons for adopting hybrid rice by the farmers in the study area have been summarised in Table 2.

Data furnished in Table 2 show that major reasons for adopting hybrid rice were related to direct observable benefits of they perceived. On the other hand, the extension agents and other locally available information sources were also the reasons for the adoption. Such types of observation also understand by the farmers who adopted system of rice intensification as reported by Khan (2004).

Table 2. Reasons for adoption of hybrid rice as perceived by the farmers

Reasons for adoption of hybrid rice	Mean score (possible range: 0-3)	Rank order
Higher yield of hybrid rice than other HYV rice	2.72	1
Higher profitability than the HYVs	2.28	2
Non-complexity of cultivation procedure	2.07	3
Availability of quality seed	2.02	4
Inspiration from extension agents (SAAOs)	1.97	5
Early maturity than other HYVs	1.70	6
Inspiration from other farmers	1.21	7
Inspiration from seed traders and agents of seed marketing companies	1.15	8
Improved livelihood status by the increased income of hybrid rice	0.88	9
For taking leadership regarding adoption of innovations	062	10

Selected Characteristics of the Farmers

Distribution of the farmers according to their selected characteristics has been shown in Table 3. The majority (50 percent) of the respondents was of middle aged and equal proportions (25 percent) of them were young and old. Majority (40 percent) of the respondents fall under the category of 'secondary education' compared to 32 percent 'primary education', and only 8 percent had above secondary education. The highest proportion (48 percent) of the respondents had large family size where only 20 percent had small family size. Data indicate that average family size (6.67) of the respondents in the study areas was higher than the national average of 4.9 (BBS, 2008).

The highest proportion (73 percent) of the respondents possessed small farm while 21 percent possessed medium farm and only 6 percent possessed large farm. The highest proportion (58 percent) of the respondents had medium high income while 26 percent, 13 percent and 3 percent had medium, high and low income, respectively. The majority (58 percent) of respondents had low extension contact while 41 percent had medium the extension contact and only 1 percent had low extension contact. The highest proportion (63 percent) of the respondents had medium innovativeness while 29 percent and 8 percent had low and high innovativeness, respectively. The majority (59 percent) of the respondents were medium cosmopolite while 37 percent and 4 percent were high and low cosmopolite, respectively. The majority (78 percent) of the farmers had medium knowledge compared to 14 percent having low knowledge and only 8 percent high knowledge. The characteristics of farmers in relation to other adoption related studies were also same as reported by Chowdhury (1997), Rahman (2001), Aurangazeb (2002), Hasan (2003) and Khan (2004).

Table 3. Salient features of the individual characteristics of the hybrid rice growers.

Characteristics	Scoring system	Range		Categories	Respondents' percentage (N = 100)	Mean	SD
		Possible	Obser-ved				
Age	Years	-	16-78	Young (up to 30)	25	43.1	13.46
				Middle aged (31-50)	50		
				Old (> 50)	25		
Education	Year of schooling	-	0-15	Illiterate (0)	32	5.27	4.27
				Primary (1-5)	20		
				Secondary (6-10)	40		
				Above secondary education (≥11)	8		
Family size	Numbers	-	2-12	Small (2-4)	20	6.67	2.37
				Medium (5-6)	32		
				Large (≥7)	48		
Farm size	Hectares	-	0-8	Small (0.08-1 ha)	46	1.23	0.97
				Medium (1.01-3 ha)	48		
				Large (≥3)	6		
Annual family income	'000 Tk.	-	33-610	Low (up to 48)	3	170.90	91.68
				Medium (49-120)	26		
				Medium high (121-240)	58		
				High (> 240)	13		
Extension media contact	Scale score	0-33	1-25	Low (up to 11)	58	10.56	4.54
				Medium (12-22)	41		
				High (> 22)	1		
Innovativeness	Scale score	0-32	0-27	Low (up to 0-10)	29	12.04	5.30
				Medium (11-19)	63		
				High (> 19)	8		
Cosmopoliteness	Scale score	0-21	4-21	Low (up to 7)	4	13.14	3.37
				Medium (8-14)	59		
				High (> 14)	37		
Agricultural knowledge	Scale score	0-36	14-35	Low (up to 14-20)	14	25.65	4.53
				Medium (21-30)	78		
				High (above 30)	8		

Relationship Between Selected Characteristics and Extent of Adoption of Hybrid Rice

The summary of the results of the correlation analysis between the selected characteristics of the respondents and their adoption of hybrid rice varieties has been shown in Table 4. Findings reveal that farm size of the farmers had a positive significant relationship with their adoption of hybrid rice varieties. The farmers cannot produce the seeds of hybrid rice. This is why they always have to depend on the outsiders for seed supply. When the seed availability is a limitation, the farmers cannot continue hybrid rice cultivation. It may be a risky situation especially for the small farmers. But the medium and large farmers can take the risk more easily because they have more diversified income sources which are effective to compensate the loss of any sources. Thus, the farmers having more farm

land likely to adopt more easily hybrid rice cultivation. Therefore, farm size of the farmers had greatly positive effect on their adoption behaviour regarding hybrid rice cultivation. The similar findings were also observed by many researcher like Pal (1995), Sarker (1997), Hasan (2003) and Khan (2004).

Annual family income of the farmers had a positively significant relationship with their adoption of hybrid rice varieties. The farmers having more annual family income can provide fund for this purpose to a considerable extent. Thus, with the increase of annual family income of the farmers, their adoption of hybrid rice cultivation tended to be increased. Hussen (2001) found that the annual family income of the cane growers had a positive significant relationship with their adoption of hybrid rice varieties. Khan (1993), Chowdhury (1997), Aurangozeb (2002) found the similar results in their respective studies.

The innovativeness of the farmers had a positive significant relationship with the adoption of hybrid rice varieties. Higher innovativeness in an individual inspires farmers to adopt new technology and help them to overcome various problems. The rest of the characteristics i.e., age, education, extension media, cosmopoliteness and agricultural knowledge did not show any significant relationships with the farmers' extent of adoption of hybrid rice.

Table 4. Relationship between the selected characteristics of the farmers and their extent of adoption of hybrid rice

Independent variables	Computed value of correlation coefficient (r)
Age	-0.08
Education	0.057
Family size	-0.053
Farm size	0.340**
Annual family income	0.277**
Extension media contact	-0.064
Innovativeness	0.235*
Cosmopoliteness	-0.101
Agricultural knowledge	0.065

*Correlation is significant at 0.05 level of probability (2 tailed test)

**Correlation is significant at 0.01 level of probability (2 tailed test)

Conclusion

The findings of the study revealed that more than 60 percent of the farmers had medium to high adoption of hybrid rice cultivation. This might be considered as a desirable progress for dissemination of hybrid rice in the study area. However, 75 percent of the farmers had low to medium adoption of hybrid rice. Thus, through proper motivation and providing necessary services by the Department of Agricultural Extension (DAE), it is possible to increase the rate of hybrid rice adoption by the farmers with low and medium adoption behaviour in the study area. Among the nine selected characteristics of farmers, three namely farm size, annual family income, and innovativeness showed significant positive relationships with their adoption of hybrid rice cultivation. So, to increase the extent of adoption of hybrid rice by the farmers in the study villages above mentioned characteristics may be considered during motivational period of the farmers. Thus, the Department of Agricultural Extension should prepare such pragmatic programmes those can incorporate proper judgment of farm size of the farmers, their annual income and innovativeness for increasing adoption of hybrid rice in the study villages.

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