

## Adoption of BRRI Dhan47 in the Coastal Saline areas of Bangladesh

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**Abstract:** The main objective of this study was to determine the extent of adoption of BRRI dhan47 (A saline resistant High Yielding Variety (HYV) of rice have been developed very recently by Bangladesh Rice Research Institute (BRRI) suitable for cultivation in coastal area) in Satkhira district. Data were collected from randomly selected 90 households' heads using pre-tested interview schedule during June to August, 2010. After collection, data were coded for processing and analysis. SPSS was used to perform the data analysis. Statistics like frequency counts and percentages as well as mean and standard deviation were calculated. Coefficients of correlation (r) was computed to find out the relationship between adoption of BRRI dhan47 and their selected socio-economic characteristics. Majority of the respondents were young aged (47.8%) having primary level education (45.6%), small family size (60%), medium farm size (51.1%), medium (75.6%) annual income, medium (63.3%) extension contact, poor (50%) training experience, high (38.9%) innovativeness, medium (70%) level knowledge on rice cultivation. Majority (52.3%) of the respondents had low adoption of BRRI dhan47 whereas 44.4% medium and only 3.3% under high adoption category. Farmer's education, farm size, innovativeness, extension contact, knowledge on rice cultivation and annual family income showed significant and positive relationship with adoption of BRRI dhan47. Shattering, unavailability of salinity testing equipments and lack of rain water or irrigated water at tillering stage to escape salinity were the major problems faced by the farmers in cultivating BRRI dhan47. GO and NGOs should take immediate steps to disseminate salt tolerant rice varieties to bring the uncultivated areas under intensive cultivation as well as to ensure better livelihood of coastal farmers.

**Key words:** Adoption, BRRI dhan47, salinity, coastal farmers, farm size, Bangladesh

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### INTRODUCTION

The coastal saline areas of Bangladesh are distributed unevenly in 64 upazilas of 13 districts, covering eight Agro-Ecological Zones (AEZ) of the country. Out of 2.85 million ha of the coastal and offshore areas about 0.83 million ha are arable lands which cover >30% of the total cultivable lands of Bangladesh. The larger portions of saline land fall in the districts of Shatkhira, Khulna, Bagerhat, Barguna, Patuakhali, Pirojpur and Bhola in the West of Bangladesh. Saline or salt affected soils are common in coastal areas. The cultivable areas in coastal districts are affected with varying degrees of soil salinity. Salinity causes unfavorable environment restricting normal crop production throughout the year (Petersen and Shireen, 2001).

BRRI dhan47, new saline-resistant paddy has been introduced in the coastal districts of Bangladesh

in 2006-2007. This has the potential to withstand 12-14 dS m<sup>-1</sup> of soil salinity at the initial stages as compared to the conventional HYV that are <4 dS m<sup>-1</sup>. The rice grown on soil with high salinity levels is of poor quality and is therefore sold at a lesser price than the conventional rice in the coastal community markets, i.e., <50 US cents kg<sup>-1</sup>.

However, the saline resistant rice variety is enabled enable poor farmers to sell their produce at the same price as conventional rice, thereby providing them with sustainable incomes in the future. In addition, the saline resistant rice variety is allowed poor farmers to secure their landholdings that have been leased at cheap prices to large shrimp farmers. According to the BBS (2003) census, there were around 37 million people living in the coastal districts of Bangladesh. A large percentage of the farmers from these districts migrate to cities and work as day labourers. The coastal population is expected to

increase to approximately 44 million in 2015. Adoption of saline resistant paddy will generate employment opportunities as compared to shrimp farming and thereby limit the migration of poor and landless farmers to urban centre (Suryanarayanan, 2010).

In Bangladesh, the deficit of food grain is a chronic problem as the pressure of increased population. So to ensure adequate food supply, it is necessary to give thrust to increase food production using modern agricultural technologies. Agricultural intensification, to minimize food shortage and maximize self sufficiency in food production is possible only when adoption of HYV rice cultivation technologies and their application skills create positive impact on the behavior of ultimate users. However according to Rogers (1995), adoption is a decision to make full use of an innovation as the best course of action available. Adoption is a decision to continue full use of an innovation. Adoption involves decision-making with respect to certain ideas, concepts, objectives or situations. When an individual takes up a new idea as the best course of action and practices the phenomenon is known as adoption (Ray, 1991). Considering these aspect present study has conducted with the following objectives: to determine the extent of adoption of BRRI dhan47 in the selected study area; to find out the relationships between socio-economic profile of the respondents and their adoption of BRRI dhan47 and to identify the major problems faced by the farmers in adopting of BRRI dhan47.

## MATERIALS AND METHODS

The present study is a descriptive and diagnostic type research. The study was conducted in Sadar Upazila of Satkhira district. Total number of BRRI dhan47 cultivators in the three unions was 334 which constituted population of the study of which 90 farmers were selected randomly. A pre-tested interview schedule was used to collect data from the respondents during June to August, 2010. Age, education, family size, farm size, annual income, extension contact, innovativeness, training experience and knowledge on modern rice cultivation technologies of the respondent was considered as independent variable whereas adoption of BRRI dhan47 was considered as dependent variable of this study. The independent variable was measured following standard procedure. Extent of adoption of BRRI dhan47 was calculated by using the following equation (Kashem, 2004):

$$\frac{\text{Area under BRRI dhan47 cultivation by a respondent}}{\text{Total area under rice cultivation by a respondent}} \times 100$$

Also, farmers faced different problems in cultivating of BRRI dhan47 described, of which 10 problems were identified as hindrance in adopting the variety. For clear understanding of the fact, a Problem Confrontation Index (PCI) was used.

After collection, data were coded for processing and analysis. The SPSS was used to perform the data analysis. Statistics like frequency counts and percentages as well as mean and standard deviation were calculated. Coefficients of correlation (r) were computed to find out the relationship between adoption of BRRI dhan47 and their selected socio-economic characteristics.

## RESULTS AND DISCUSSION

**Socio-economic characteristics of the respondents:** The socio-economic characteristics included age, education, family size, farm size, annual income, extension contact, innovativeness, training experience and knowledge on modern rice cultivation technologies are shown in Table 1.

The majority (47.8%) of the respondents were young aged followed by 38.9% were middle aged and 13.3% were old aged, respectively. Highest portion (45.6%) of the respondents had primary level education, 32.2% respondents had secondary level education and 3.3% respondents had higher secondary level education compared to 18.9% respondents were illiterate. The highest proportion (60%) of the respondents had small family size while 38.9% had medium family size and only 1.1% had large family. The highest proportion (51.1%) of the respondents possessed small farm size while 44.4 and 4.4% possessed medium and large farm size, respectively. The majority (75.6%) of the respondents had medium income while 12.2% for low and high income. The majority (63.3%) of the respondents had medium extension contact while 23.3% had high extension contact and 13.3% had low extension contact. Most of the respondents (50%) had poor training experience whereas about 18% did not receive any training at all in compare with about 32% had medium to high training experience. The highest proportion (38.9%) of the respondents had high innovativeness and 33.3% had medium innovativeness, 16.7% had low innovativeness and 11.1% had very high innovativeness. The majority (70%) of the farmers had medium knowledge compared to 16.7% low and 13.3% high level of knowledge on BRRI dhan47 cultivation (Table 1).

**Extent of adoption of BRRI dhan47:** The possible range of extent of adoption of BRRI dhan47 by the respondents ranged from 0-100 while the observed range was

Table 1: Distribution of the respondent according to their socio-economic characteristics (N = 90)

Characteristics	No. of respondents	Percentage	Mean
<b>Age</b>			
Young aged (>35 years)	43	47.8	37.70
Middle aged (36-50 years)	35	38.9	-
Old aged (≥51 years)	-	12.0	13.3
<b>Education</b>			
No education (0)	17	18.9	4.66
Primary level education (class I-V)	41	45.6	-
Secondary level education (class VI-X)	29	32.2	-
Higher secondary and above (above class X)	3	3.3	-
<b>Family size</b>			
Small family (<5)	54	60.0	4.34
Medium family (5-7)	35	38.9	-
Large family (>7)	1	1.1	-
<b>Farm size</b>			
Small farm size (0.02-1.01 ha)	46	51.1	1.20
Medium farm size (>1.01-3.03 ha)	40	44.4	-
Large farm size (>3.03 ha)	4	4.4	-
<b>Annual income</b>			
Low income (>TK 110000)	11	12.2	176977
Medium income ( TK 110001-TK 240000)	68	75.6	-
High income (>TK 240000)	11	12.2	-
<b>Extension contact</b>			
Low extension contact (>11)	12	13.3	15.78
Medium extension contact (12-19)	57	63.3	-
High extension contact (≥20)	21	23.3	-
<b>Training experience</b>			
No training (0)	16	17.8	2.61
Poor training (1-3)	45	50.0	-
Medium training (4-5)	23	25.6	-
High training (>5)	6	6.7	-
<b>Innovativeness</b>			
Low innovativeness	15	16.7	-
Medium innovativeness	30	33.3	-
High innovativeness	35	38.9	-
Very high innovativeness	10	11.1	-
<b>Knowledge</b>			
Low level of knowledge (>20)	15	16.7	29.73
Medium level of knowledge (21-30)	63	70.0	-
High level of knowledge (>30)	12	13.3	-

7.69-76.92. The mean adoption score was 31.67 and the standard deviation was 14. Based on observed range of extent of adoption, the respondents were classified into three categories as shown in Table 2.

Information shown in Table 2 revealed that majority (52.3%) of the respondents had low adoption of BRRI dhan47 followed by 44.4% medium and 3.3% high adoption. The finding clearly indicated that the farmers had low to medium adoption of BRRI dhan47 cultivation in the study area. Rahman (2003) found that about half (47%) of the growers had medium adoption, 44% had low adoption and 9% had high adoption of year-round homestead fruit cultivation practices. Aurangozeb (2002) conducted a study on adoption of integrated farming technologies by rural women of RDRS in Lalmonirhat district found that highest proportion (71%) of rural women had high, 21% medium and 8% had low adoption of integrated farming technology. Haider (2010)

Table 2: Distribution of the respondents according to adoption of BRRI dhan47

Categories	Respondents (N = 90)		
	Number	Percentage	Mean±SD
Low adoption of BRRI dhan47 (>33)	47	52.3	31.67±14
Medium adoption of BRRI dhan47 (>33-66)	40	44.4	-
High adoption of BRRI dhan47 (>66)	3	3.3	-
<b>Total</b>	<b>90</b>	<b>100.0</b>	<b>-</b>

conducted a study to describe the adoption of technology by the IPM club members found that 65% of the IPM club member had high to very high level of technology adoption, about 23% had medium level and remaining 12% had low level of adoption. Hoque *et al.* (2010) conducted a study on adoption of farming technology by the charland farmers found that highest portion of respondents (41.7%) had medium adoption of farming technologies whereas 40% respondents had low adoption and only 18.3% had high adoption. Though the introduction of BRRI dhan47 in the area is new and its expansion is not still satisfactory. This indicated that farmers are very careful in introducing the crops for while adoption processes of the BRRI dhan47 were slowly progressing.

**Relationship between the selected characteristics of the farmers and their adoption of BRRI dhan47:**

Findings indicated that age of the coastal farmers was not an important indicator concerning the adoption of BRRI dhan47 but the level of education and adoption of BRRI dhan47 were significant and positively correlated (Table 3). Hoque *et al.* (2010), Aurangozeb (2002), Akter (2007) and Sardar (2002) found the same results in their respective studies. Although, BRRI dhan47 cultivation does not require any special knowledge compare to other HYVs, it requires some basic knowledge as the variety is new one for instance. The variety has shattering problem. However, the farmers who were cultivating HYVs/MVs/Hybrid were tended to migrate towards BRRI dhan47 cultivation.

Therefore, educational attainment of the farmers could influence their adoption behavior regarding BRRI dhan47 cultivation. Farm size of the farmers and their adoption of BRRI dhan47 was found significant and positively correlated. The similar findings were also observed for adopting of sugarcane (Pal, 1995), cotton (Rahman, 1995), potato (Sarker, 1997; Hasan, 2003) and mungbean (Islam, 2008). Innovation always involves some sorts of risks. BRRI dhan47 cultivation on the area not exception to this. Sometimes new technology used to fail in coping with new areas hence; there is a risk of failure.

The farmers having large farm size can take this risk as trial basis and if they fail they can compensate through other rice varieties. On the other hand, small farmers have no scope of taking risk for which they have to wait for a while in adopting new technology. Another fact is that the farmers could not always produce the quality seeds of modern rice varieties and depend on the seeds to be supplied from other sources. When the supply of seeds is limited, the farmers hardly continue its cultivation. It is obviously a risky situation especially for the small farmers. However, the medium and large farmers could take risk easily because of their diversified income source which compensate the losses. It is assumed that the farmers having more farms land likely to adopt quickly BRR1 dhan47 in their cultivation practice. Annual family income and adoption of BRR1 dhan47 was found significant and positively correlated. Hussien (2001) found that the annual family income of the cane growers had a positive significant relationship with their adoption sugarcane varieties. Khan (1993), Chowdhury (1997) and Aurangozeb (2002) found the similar results in their respective studies. It may be concluded that annual family income of the farmers had a positively significant relationship with their adoption of BRR1 dhan47. Cultivation of BRR1 dhan47 requires risk bearing ability as because there is a risk of crop failure due to high salinity.

Table 3: Relationships between of the selected characteristics of the farmers and their adoption of BRR1 dhan47

Independent variables	Dependent variable	Coefficient of correlation (r)
Age of farmer	Adoption of BRR1 dhan47	-0.081
Farmers education		0.232*
Family size		-0.023
Farm size		0.221*
Extension contact		0.279**
Training		0.144
Innovativeness		0.237*
Knowledge		0.263*
Annual income		0.257***

\*\*Correlation is significant at 0.01 level of probability; \*Correlation is significant at 0.05 level of probability

Therefore, the farmers having more annual family income could able to take the risk to a considerable extent. Thus, with the increase of annual family income of the farmers, their adoption of BRR1 dhan47 cultivation tended to be increased.

Extension contact and adoption of BRR1 dhan47 was found significant and highly positively correlated. Hussien (2001), Hosain (2006), Sardar (2002) and Aurangozeb (2002) found the similar results in their respective studies. Using more number of information sources means accumulating more information, empowering with higher level of knowledge and technologies. Farmers innovativeness and their adoption of BRR1 dhan47 varieties were found significant and positively correlated. Similar finding was reported by Hossain (2003). Higher innovativeness in an individual inspires to adopt new technology and help them to overcome various problems. For this reason innovative small farmers face less problems in adopting BRR1 dhan47 practices.

**Problem faced in cultivation of BRR1 dhan47:** The results indicated that among the problems in cultivating BRR1 dhan47 shattering habit of the variety was ranked first (Table 4). Shattering habit might be the major hindrance in harvesting maximum yield of the variety. Hence, it may be recommended to harvest at optimum period to escape the problem. Unavailability of salinity testing equipments for testing salinity level at initial stage of crop growth was another major problem. Hence, government should take initiative to distribute EC meter among the farmers or informed them about the tolerable level of soil salinity for the variety.

Lack of rain water or irrigated water at tillering stage to escape salinity were considered important for up scaling of the variety. Besides, susceptibility to high salinity is also considered as a problem for rapid adoption of the variety.

Table 4: Ranking of the problems faced by the BRR1 dhan47 growers

Nature of problem	Degree of problem (N = 90)					PCI	Rank
	Too much (4)	Much (3)	Medium (2)	Low (1)	Not at all (0)		
Shattering problem	82	8	0	0	0	352	1st
Lack of rain or proper irrigation at tillering stage	29	33	28	0	0	271	3rd
Unavailability of salinity testing equipments	63	27	0	0	0	333	2nd
Less yield than other popular varieties	7	30	36	8	9	198	10th
Unable to tolerate salinity at mature stage	10	48	30	2	0	246	8th
Unable to cope higher level of salinity	11	68	9	2	0	268	4th
Lack of proper land management technologies	10	64	16	0	0	264	5th
Losses due to natural calamities	10	41	33	6	0	235	9th
Less profitable in compare to shrimp cultivation	15	52	14	9	0	253	6th
Higher price and inadequate supply of inputs	18	35	37	0	0	251	7th

## CONCLUSION

The highest proportion (52.3%) of the farmers had low adoption of BRRI dhan47 and average adoption was 31.67. Hence, it could be concluded that there is ample scope to improve farmers' level of adoption of BRRI dhan47. Based on the findings it may be concluded that with the increasing of extension contact and innovativeness of the farmers their adoption of BRRI dhan47 will also be increased. Hence, necessary steps should be taken by the concerned GOs and NGOs to increase extension contact and innovativeness of the farmers of coastal saline area. Most of the respondents faced shattering problem in connection with BRRI dhan47 cultivation. Hence, concern authorities, especially BRRI should take necessary and immediate steps to solve the aforesaid problem as soon as possible.

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