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Research Article

Extent of Adoption of Bangladesh Rice Research Institute (Brri) Recommended Boro Rice Varieties

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Abstract

The study was carried out with the aim to determine the extent of adoption of BRRI recommended boro rice varieties by the boro farmers. Data were collected from randomly selected 80 respondents through personal interview method during January-February, 2019. The findings of the study revealed that majority (77.5%) of the respondents belonged to high adoption category while 16.3% of the respondents of were medium and low (6.3%) adoption categories. Adoption of BRRI dhan28 occurred to greater extent in the study area due to its early maturity, less water requirement, high market price, non- complexity of cultivation procedure. Correlation analysis indicated that among the selected socio- economic characteristics, exposure to communication media and cosmopoliteness of the respondents showed a significant positive relationship with their extent of adoption while educational qualification, family size, farm size, innovativeness and attitude showed positive non-significant relationship with their extent of adoption. On the other hand, age, farming experience, experience in rice cultivation, experience in boro rice cultivation, family education, annual income and organizational participation showed negative non-significant relationship.

Keywords: Extent of Adoption; BRRI, Boro Rice Varieties; Farmers'

Introduction

Bangladesh has an agrarian economy in which rice is the dominant crop. In Bangladesh, about 76% of the people live in rural areas, and 47.5% of the total manpower is involved in agriculture [1]. Water stagnation, salinization, erosion and human settlements lead to the loss of rice fields in an alarming speed in many countries. Densely populated country like Bangladesh desperately needs substantial increases in crop production to provide her teeming millions with food. In Bangladesh, agriculture contributes 19.3% of the gross domestic product (GDP) of the country [2]. There are three rice-growing seasons in Bangladesh: aus, aman, and boro. Some areas under aus cultivation have shifted to irrigated boro rice because of the high yield potential of boro rice. Boro is the dry-season irrigated rice planted from December to early February and harvested between April and June. Nearly 91.77% of the 4.08 million hectares of boro is planted with modern varieties [1]. The precondition for growing high yielding varieties in boro season is proper water management. Bangladesh Rice Research Institute (BRRI) was established in October, 1970 in Joydebpur, Gazipur. The Institute has an outstanding contribution to the food security of Bangladesh. So far it has developed 67 high yielding rice varieties including four hybrid ones. Moreover, these varieties are cultivated in about 80 percent of the total rice areas and contribute almost 91 percent of total rice production of the country [3]. Since

1973, the Bangladesh Rice Research Institute (BRRI), in partnership with IRRI, has been engaged in adaptive research to evaluate elite genetic lines under the IRRI-managed International Network for Genetic Evaluation of Rice (INGER). Under the brand name BR, and later BRRI dhan, it has released varieties that suit the agro-ecological conditions in Bangladesh [4]. BRRI had developed some salt tolerant boro rice varieties for coastal area because the coastal saline soils are distributed unevenly in 64 upazila of 14 districts, covering 8 agro-ecological zones (AEZ) of the country. But this vast area of land could not have contributed in agricultural production or development due to increasing salinity. Salinity is a year-round problem in the coastal Bangladesh but its intensity reaches peak during the dry season (January- May) and for that reason boro rice crop suffers the most [5]. There has been tremendous change in adoption of boro variety in the south-western part of Bangladesh. Farmers are eagerly adopted BRRI recommended boro rice varieties because of its higher production than traditional. In this study, an effort has been made to identify the existing popular BRRI recommended boro rice variety as well as their extent of adoption and measure the influence of selected characteristics of the farmers' on extent of adoption of BRRI recommended boro rice varieties in the selected study area.

Materials and Methods

Design and locale of research

The study was a descriptive and diagnostic type of research. The study was conducted at four selected villages namely Raingamari, Dorgatola, TheraBand and Shoilmari of Jalma union under Batiaghata upazila of Khulna district of Bangladesh which were selected following multistage random sampling method.

Population and sampling design

The sample was drawn by following multistage random method. All the boro rice growers of selected four villages of Jalma union under Batiaghata upazila of Khulna district of Bangladesh constituted the population of the study. For data collection, 10% upazilas out of total upazilas in Khulna district were selected and then 10% union from each upazila and 10% villages from each union were selected. A total of 80 farmers were selected randomly as sample taking 20 farmers from each of the villages irrespective of their population size.

Data collection

Data were collected through personal interview method by the researcher herself using an interview schedule during January-February, 2019. Both open and closed form, simple and direct questions were included in the interview schedule. The questions were systematically arranged to help the respondents to comprehend the consequence easily. Before final collection of data, the interview schedule was pre-tested. Necessary correction, addition, alteration and rearrangements were made after pre-testing. In survey research specification and measurement of the variables constitute an important task. A well organized research hypothesis consists of at least two elements-

1. Independent variable and
2. Dependent variable

Fifteen selected characteristics of the respondents were treated as independent variable for this study. The selected characteristics were age, education, farming experience, experience in rice cultivation, experience in boro cultivation, family size, family education, farm size, annual income, organizational participation, cosmopoliteness, exposure to communication media, training exposure, attitude towards boro cultivation and innovativeness. Extent of adoption of BRRI recommended boro rice varieties was considered as dependent variable of the study.

All the qualitative data were converted into quantitative form by means of suitable code and score whenever necessary. In several instances indices and scales were constructed through simple accumulation of scores assigned to individual or pattern of attributes. Indices and scales are considered the efficient instrument for data collection and analysis.

Measurement of selected characteristics (Independent Variables)

The measurement of selected characteristics (independent variables) is shown in table 1.

Extent of adoption of BRRI recommended boro rice varieties of the respondents

Adoption is a decision to make full use of innovation as the best course of action available [6]. When an individual takes up a new idea as the best course of action and practices it, the phenomenon is known as adoption. BRRI has recommended some varieties such as BRRI dhan47, BRRI dhan28, BRRI dhan29, BRRI dhan50, BR - 26 etc. for cultivation in the coastal region. But unfortunately, the respondents adopted only BRRI dhan28 as boro rice for cultivation. So, the extent of adoption of BRRI dhan28 is shown in subsequent

section rather BRRI recommended all varieties for coastal region. The extent of adoption of BRRI recommended boro rice varieties was measured by percentage of area covered by BRRI recommended boro rice varieties by using the following formula:

Extent of Adoption = A_a / P_a ×100

Where, A_a = Actual area of adoption of BRRI recommended boro rice varieties.

P_a = Potential area for adoption of boro rice varieties.

Adoption of BRRI recommended boro rice varieties was expressed in percentage. Based on the adoption score, the respondents were also classified into three categories as shown in Table.

Selected characteristics (independent variables)	Measuring Unit
Age	Actual year
Educational qualification	Years of schooling
Farming experience	Years
Experience in rice cultivation	Years
Experience in boro cultivation	Years
Family size	Number
Family education	Years of schooling
Farm size	Hectare
Annual income	'000'BDT
Organizational participation	Score
Cosmopoliteness	Score
Exposure to communication media	Score
Training exposure	Score
Attitude towards boro cultivation	Score (following Likert scale)
Innovativeness	Years

Table 1: Measurement of selected characteristics (independent variables).

Categories	Score (%)
Low adoption	≤60
Medium adoption	60-80
High adoption	>80

Table

Data analysis

After collection, data were analyzed and tabulated for interpretation. Statistical treatments such as number, mean, standard deviation, range, rank order etc. were used to interpret data. To explore relationship between any two variables Pearson's product correlation coefficient (for interval and ratio type data), Spearman rank correlation coefficient (for ordinal type data) were employed. For analysis of data Statistical Package for Social Science (SPSS) version 20 was used.

Results and Discussion

Characteristics of the respondents

Data presented in table 2 indicate that most (92.5%) of the respondents were middle to old aged. The majority of the respondents had secondary level of education (53.8%), medium farming experience (58.8%), medium experience in rice cultivation (53.8%). Highest proportion of the respondents were highly experienced in boro rice cultivation (40%) and had medium income (46.3%), About three-fourth of the respondents belonged to the small sized family (75%) and secondary level of family education (72.5%). Most of the respondents possessed small farm size (91.3%), had low level of organizational participation (86.3%) and had moderately favorable attitude (96.3%). Majority of the respondents had high cosmopoliteness (55.0%) and received training on farming activities (65%). Besides, more or less three-fourth of the respondents had medium scale exposure to communication media (78.8%) and were early majority in adopting BRRI recommended boro rice varieties (71.3%).

Identification of boro rice as cultivated by the farmers of study area

BRRI has recommended some varieties such as BRRI dhan47, BRRI dhan28, BRRI dhan29, BRRI dhan50, BR-26 etc. for cultivation in the coastal region. But unfortunately the respondents adopted only BRRI dhan28 as boro rice for cultivation. So, the extent of adoption of BRRI dhan28 is shown in subsequent section rather BRRI recommended all varieties for coastal region.

Characteristics	Categories	Score	Respondents(N=80)		Mean	SD	Range	
			Number	Percentage (%)			Min	Max
Age(Year)	Young	≤35	6	7.5	51.31	10.1	30	75
	Middle aged	36-50	38	47.5				
	Old	>50	36	45				
Education (Year of schooling)	Illiterate	0	0	0	6.05	3.7	1	12
	Primary	1 to 5	34	42.5				
	Secondary	6 to 10	43	53.8				
	Higher secondary	11 to 12	3	3.8				
	Graduate or above	>12	0	0				
Farming experience(Year)	Low experience	up to 20	22	27.5	29.88	13	5	62
	Medium experience	21-40	47	58.8				
	High experience	>40	11	13.8				
Experience in rice cultivation(Year)	Low experience	up to 20	26	32.5	29.1	13	5	60
	Medium experience	21-40	43	53.8				
	High experience	>40	11	13.8				
Experience in boro rice cultivation (Year)	Low experience	up to 12	17	21.3	20.94	8.8	5	40
	Medium experience	13-24	31	38.8				
	High experience	>24	32	40				
Family size	Small	up to 4	60	75	4.16	1	3	7
	Medium	5 to 6	17	21.3				
	Large	≥7	3	3.8				
Family Education (Year of schooling)	Illiterate	0	0	0	7.42	2.27	2.8	13
	Primary	1 to 5	16	20				
	Secondary	6 to 10	58	72.5				
	Higher secondary	11 to 12	5	6.3				
	Graduate or above	>12	1	1.3				
Farm size(ha)	Landless	<0.02	0	0	0.41	0.2	0.1	1.1
	Marginal	0.02-0.20	5	6.3				
	Small	0.21-1.00	73	91.3				
	Medium	1.01-3.00	2	2.5				
	Large	>3.00	0	0				
Annual income (000'BDT)	Low income	Up to 50	18	22.5	88.8	49	22	284

	Medium income	51-100	37	46.3				
	High income	>100	25	31.3				
Organizational participation	No participation	0	11	13.8	1.28	0.8	0	3
	Low participation	1–3	69	86.3				
	Medium participation	4–6	0	0				
	High participation	≥7	0	0				
Cosmopoliteness	No	0	0	0	15.58	4.0	7	21
	Low	1–8	6	7.50				
	Medium	9–16	30	37.50				
	High	>16	44	55.00				
Exposure to communication media	No exposure	0	0	0	24.41	6.4	10	41
	Low	1–24	43	53.8				
	Medium	25–48	37	46.3				
	High	>48	0	0				
Training exposure	Yes		52	65				
	No		28	35				
Attitude	Less favorable	up to 16	1	1.2	28.03	3.7	0	34
	Moderately favorable	17–32	77	95.1				
	Highly favorable	>32	3	3.7				
Innovativeness(Year)	Innovator	<0.5	0	0	3.25	1.6	1	9
	Early adopter	0.5–1.75	9	113				
	Early majority	>1.751–4.25	57	71.3				
	Late majority	>4.251–5.50	6	7.5				
	Laggard	>5.50	8	10				

Table 2: Socio-economic characteristics of the respondents.

Extent of adoption of BRRI recommended boro rice varieties of the respondents

The scores on extent of adoption score of the respondents varied from 50 to 100 with a mean of 90.64 and standard deviation 14.46. Based on extent of adoption, the respondents were classified into low (up to 60), medium (60 - 80) and high (> 80) categories as shown in table 3.

Table 3 reveal that majority (77.5%) of the respondents had high adoption followed by medium (16.3%) and low (6.3%) adoption. The findings also indicate that most (93.8%) of the respondents of the study area had high to medium to low level of adoption. Islam [7] also found that that the highest proportion (74%) of the farmers fell under the high adoption category with adoption of BRRI dhan29 production technologies by the farmers.

Categories	Score	Respondents (N=80)		Mean	SD	Range	
		Number	Percentage (%)			Min	Max
Low	up to 60	5	6.3	90.64	14.46	50	100
Medium	60–80	13	16.3				
High	>80	62	77.5				
Total		80	100				

Table 3: Distribution of the respondents according to their extent of adoption of BRRI recommended boro rice varieties.

Causes of adoption of BRRI recommended boro rice varieties

BRRI has recommended some varieties such as BRRI dhan47, BRRI dhan28, BRRI dhan29, BRRI dhan50, BR-26 etc. for cultivation in the coastal region. However, the farmers of the study area adopted only BRRI dhan28 as boro rice for various causes.

Serial no	Causes of Adoption	Respondents (N=80)		Rank order
		Citation	Percentage (%)	
1.	Early maturity	65	81.25	1st
2.	High market price and good quality	60	75.00	3rd
3.	Non-complexity of cultivation procedure	62	77.50	2nd
4.	Less water requirement	55	68.75	4th

Table 4: Causes of adoption of BRRI recommended boro rice varieties.

Among these four causes, early maturity was the major reason for adopting BRRI dhan 28. Another important reason from the farmers' perspective was non- complexity of cultivation procedure. It indicates that from seed sowing to harvesting farmers' have to face less difficulty than other varieties. Farmer explained high market price and good quality as 3rd reason as well as less water requiring as 4th reason for adoption of BRRI dhan28.

Relationship between the selected characteristics of the respondents and their extent of adoption of BRRI recommended boro rice varieties

This section deals with the relationship between fifteen selected characteristics of the growers (farmers') and their extent of adoption of BRRI recommended boro rice varieties. To explore the relationships between the selected characteristics of the respondents and their extent of adoption Pearson's product moment co-efficient of correlation (for interval and ratio type data) as well as Spearman rank correlation co-efficient(for ordinal type data) were used. The relationship of the selected characteristics of the respondents with their extent of adoption appears in table 5.

Characteristics (Independent variable)	Dependent variable	Correlation coefficient	Remark
Age	Extent of adoption	-0.128NS	PPCC
Educational qualification		0.024NS	PPCC
Farming experience		-0.116NS	PPCC
Experience in rice cultivation		-0.135NS	PPCC
Experience in boro rice cultivation		-0.150NS	PPCC
Family size		0.022NS	PPCC
Family education		-0.089NS	PPCC
Farm size		0.053NS	PPCC
Annual income		-0.011NS	PPCC
Innovativeness		0.047NS	PPCC
Exposure to communication media		0.877**	SRCC
Organizational participation		-0.068NS	SRCC
Cosmopoliteness		0.848**	SRCC
Attitude towards adoption		0.003NS	SRCC

Table 5: Computed coefficient of correlation (r) and spearman rank correlation between the selected characteristics of the respondents and their extent of adoption.

NS = Non-significant **. Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed). PPCC = Pearson's Product Moment co-efficient of correlation. SRCC = Spearman Rank Correlation Coefficient.

Findings indicate that among fifteen independent variables exposure to communication media and cosmopoliteness of the respondents showed a significant positive relationship with their extent of adoption while educational qualification, family size, farm size, innovativeness and attitude showed only positive relationship with their extent of adoption. It means that the more are the exposure to communication media and cosmopoliteness of the respondents the more are the farmers' extent of adoption of BRRI recommended boro rice varieties. Ahmed [8] also found that communication behavior and cosmopoliteness of the respondents had significant positive relationship with their adoption of selected wheat varieties. Aurangzeb [9] found there was positive relationship between education and adoption of integrated homestead farming technologies. Chowdhury [10] observed that family size of the farmers had positive and significant relationship with the adoption of selected BINA technologies. Hossen [11] found that farm size and innovativeness of the farmers had significant positive relationship with their adoption of intercropping with jackfruit by the farmers of Bhaluka upazila under Mymensingh district. Ahmed [8] found that the attitude towards wheat cultivation of the wheat growers had positive significant relationship with their adoption of selected wheat varieties.

Conclusions

Findings of the study and logical interpretation of their meaning in the light of other relevant facts it can be concluded that majority (77.5%) of the respondents had high adoption followed by medium (16.3%) and low (6.3%) adoption. So we found that most (93.8%) of the respondents of the study area had high to medium level of adoption. Among fifteen independent variables exposure to communication media and cosmopolitans of the respondents showed a significant positive relationship with their extent of adoption while educational qualification, family size, farm size, innovativeness and attitude showed only positive relationship with their extent of adoption. Respondents in the study area highly adopted only BRRI dhan28 mainly for two reasons such as early maturity and non-complexity of cultivation procedure.

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