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**SOCIO-DEMOGRAPHIC CHARACTERISTICS AND MAJOR PROBLEMS  
FACED BY THE FARMERS IN ADOPTING BRRI DHAN29 IN THE  
COASTAL AREAS OF BANGLADESH**

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**ABSTRACT:** *The main purpose of this study was to determine the socio-demographic characteristics and major problems faced by the farmers in adopting BRRI dhan29 in the coastal areas of Bangladesh. The study was conducted with 90 farmers in three villages of Batiaghata union. The majority (50.00%) of the respondents were middle aged, 80.00% had primary level of education. The highest 46.67% had small farm size, 60.00% of medium income and 71.11% had poor training experience. The highest (80.00%) proportion of the respondents had medium innovativeness, 74.44% medium extension contact and 83.33% medium adoption of BRRI dhan29. Higher yield, availability of quality seed, and short duration variety was the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> statement for the respondent's perceived benefits of adopting BRRI dhan29 cultivation. Unable to tolerate salinity at matured time was the main important problem for the respondents and its Problem Confrontation Index (PCI) found 311.*

**KEYWORDS:** socio-demographic, farmers, problems, adoption, BRRI dhan29, coastal area

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## **INTRODUCTION**

Bangladesh has a total area of 84 million ha, 62% of which are arable. Agriculture is the backbone of the economy accounting for 19.29% of GDP and 44% of employment. Rice alone contributes 18% of GDP and 55% of labor employment in its production, processing and marketing sectors (BBS, 2009). Coastal saline soils are irregularly dispersed across 64 upazillas in 14 districts, spanning eight agro-ecological zones (AEZ) across the country. The coastal zone encompasses over 20% of the country and over 70% of the net cultivable area. It stretches up to 150 kilometers from the coast on the inside. However, such a large expanse of land could not have contributed to agricultural development or productivity. The main reason for this is the rising salinity in this area. (Habibullah *et al.*, 1999).

The larger portions of saline land fall in the districts of Shatkhira, Khulna, Bagerhat, Barguna, Patuakhali, Pirojpur and Bhola in the west. A part of the coastal area, the Sundarbans, is a reserve natural mangrove forest covering about 4,500 kilometer per

square. The remaining part of the coastal area is used in agriculture. The cultivable parts in coastal districts are affected with varying degrees of soil salinity. The coastal and offshore area of Bangladesh includes tidal, estuaries and river floodplains within the south along the Bay of Bengal. In these locations, agricultural land utilization is around half of what it is in the rest of the country. (Petersen and Shireen, 2001). Salinity may be a year-round problem within the coastal Bangladesh but its intensity reaches peak during the season (January- May) and intrinsically Boro rice crop suffers the foremost. Reclamation of saline soil within the coastal area isn't a viable option due to frequent inundation by tidal saline water. Therefore, the remaining options for continuing crop productivity under salinity stressed condition are: I) selecting existing salinity tolerant crop species/varieties, ii) improving salinity tolerance in crop species/variety by incorporating the tolerant genes and ii) enhancing stress effects through crop managing practices. (Karim, *et al.*, 1990).

Bangladesh has made notable technological progress in rice cultivation over the last two decades, which has contributed in achieving food security despite doubling of population and a reduction in arable land since its independences in 1971. Adoption of salinity tolerant BRRI dhan29 seems to offer an opportunity to increase output and income substantially and to create employment opportunities. In Bangladesh, many people depend upon rice for his or her survival. As rice production increases, the prices of food will significantly go down, which will benefit the landless laborers and the urban poor. The introduction of HYV of rice specifically for saline-prone environments has the potential to maintain the future demand-supply balance for rice in the country. Adoption of modern agricultural technology undoubtedly will increase agricultural production and thereby will improve the living standard of the farmers. In addition, the saline resistant paddy will enable poor farmers to secure their landholdings that are leased at cheap prices to large shrimp farmers. Modern agricultural technology is that the product of recent science and technology. In case of technology, the economically profitable aspects of agricultural research are recommended to the farmers in the form of package of practices, the adoption of which shall bring them higher yield and income from their agricultural enterprises. Adoption of modern agricultural technology undoubtedly will increase agricultural production and thereby will improve the living standard of the farmers. Farmers receptivity to different agricultural innovation vary depending on their characteristics, attributes of innovations and social system variables (Ramegowda and Siddramaiah 1987).

Hossain (1991) stated that actual adoption depends on the behavior of the farmers. The behavior of a farmer is influenced by his/her personal, economic, social and physiological characteristics. Adoption is a decision to make use of innovation as the best course of action available (Ray, 1999). Rogers (1995) stated the five stages of adoption process. The stages are consciousness stage, attention stage, assessment stage trial stage and acceptance stage. In this study adoption behavior of farmers were measured based on some given criteria like farm size, use of improved varieties of seed etc. Farmers are not so skilled about new innovation although they are being influenced

by a number of GOs and NGOs to improve their knowledge. Use of agricultural practices is being increased in Bangladesh day by day. Although many researches were undertaken on adoption behavior of farmers still then this effort would have no end.

The coastal area is mainly used for agriculture. Water and soil salinity are the major problem restricting crop cultivation in the coastal zone. Potential survives for cultivating salt-tolerant new varieties, expanded coconut cultivation, floating or soil-less agriculture and bio-saline agriculture. 'Coastal agriculture' needs a distinctive recognition to facilitate its development. Salt tolerance is the ability of a plant to grow and complete its life cycle in saline substrates that contain high concentration of salts. The mechanisms of salt tolerance are complex and mostly depend on anatomical, biochemical and physiological changes occur due to the stress at the whole plant level rather than in a single cell. (Karim *et al.*, 1990). A considerable research progress has been made in developing salinity tolerant crop species/variety through gene transfer approach within the laboratory. Another time, a significant number of effective crop managing methods has been reported in country and abroad in ameliorating salinity stress in crop plants viz., seed priming, mulching, liming, application of silicon and gypsum, planting crops in raised bed etc.

Selection of saline safe paddy will create business openings as compared to shrimp cultivating and subsequently restrain the relocation of destitute and landless agriculturists to urban middle (Suryanarayanan, 2010). Rice is considered sensitive to salinity, particularly during early vegetative and later at reproductive stages. Nonetheless, it is one of the few crops that can thrive on salt-affected soils because of its ability to grow well in standing water that can help leach salts from topsoil and is, then, suggested as an entry crop for desalinization of salt affected lands. Salt stress is a major constraint across many rice production areas because of the high sensitivity of modern rice varieties. Salinity is particularly a major problem in coastal regions in the tropics where rice-based farming systems predominate. This is because of the intrusion of brackish water during the dry season and at the start of the wet season. Salt stress is also a worsening problem in inland areas because of the buildup of salinity as a consequence of excessive use of irrigation water with improper drainage coupled with the use of poor quality irrigation water (Rahman and Ahsan, 2001). So it is necessary to gain understanding the attributes of an innovation as well as the demographic characteristics responsible for its adoption.

Tremendous price hike of food staff makes the common people unable to have available food for their regular consumption. This situation is more acute in the south western region of Bangladesh where the productions of all agricultural commodities are decreasing because of increasing salinity. The success of any technology depends on its dissemination among the potential users which ultimately is measured by the level of adoption of that technology. Findings of this study, therefore, are helpful to the planners and extension workers in planning and execution of programmers' for enhancing the yield of crops. The forecasted rice deficit is troublesome from a food security standpoint, primarily in Asia, where rice remains the primary caloric source,

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and where undernourishment is prevalent (FAO, 2010). To ensure adequate food supply, it is necessary to give thrust to increase food production using modern agricultural technologies. Agricultural intensification, to minimize food storage 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. It is obviously true that growers are the key elements of adoption of selected HYV rice varieties. In order to accomplish the purpose of present study, the following specific objectives were formulated.

- To find out the socio-demographic characteristics of the respondents.
- To determine the extent of adoption of BRR1 dhan29 in the selected study area.
- To identify the major problems faced by the farmers in adopting of BRR1 dhan29.

## **METHODOLOGY**

Research methodology is the description, explanation and justification of various methods of conducting a research. It may be agreed as a science of studying how research is done scientifically. In methodology, the researcher describes the various steps that are generally adopted by herself in studying the research problem along with the logic behind them (Ray and Mondal, 1999). According to Chava and David (1996), a scientific methodology is a method of clear rules and procedures upon which research is based and against which claims for knowledge are evaluated. They described three roles of methodology viz. methodology provides rules for communication, reasoning and inter-subjectivity. Thus, methodology guides the researcher how s/he collects, analyzes, and interprets observations and findings. The method and procedures followed in conducting this research are described here in the following sections.

The study was conducted in Batiaghata Upazila of Khulna district. However, the study was conducted in Batiaghata, Purbatiaghata and Bagaladanga village of Batiaghata union under Batiaghata Upazila. Batiaghata Upazila of Khulna district was selected as because BRR1 dhan29 is widely cultivated in this area. The unit of analysis is the most fundamental part of the phenomenon to be studied. It influences the research design, data collection and decisions on data analysis. In this study, all the BRR1 dhan29 cultivators of the selected three villages of Batiaghata union under Batiaghata Upazila of Khulna district were treated as the unit of analysis. All the BRR1 dhan29 cultivators of the selected three villages of Batiaghata union under Batiaghata Upazila of Khulna district were the population of the study. Total numbers of the BRR1 dhan29 cultivators in the three villages were 620 that constituted the population of the study. In this study, 90 farmers were selected as sample following simple random sampling technique.

A variable is any representative, which can take varying or dissimilar values in successive individual cases (Ezekiel and Fox, 1959). In a scientific research, the selection and measurement of variables constitute the significant task. In the present

research, the researcher has gathered and reviewed related literature to widen his understanding about the nature and scope of the variables relevant to this piece of research. The variables of this study included: (i) Age, (ii) Gender, (iii) Education, (iv) Marital status, (v) Family size, (vi) Earning members, (vii) Farm Size, (viii) Annual Income, (ix) Training Experience, (x) Innovativeness, (xi) Extension Media Contact, (xii) Farming Experience, (xiii) Knowledge, (xiv) Adoption, (xv) Comparative Adoption, (xvi) profitability, (xvii) Perceived Benefit and (xviii) Problem faced by the farmers

## RESULTS AND DISCUSSION

### Socio Economic Characteristics of the Respondents

Age of a respondent referred to the period from his/her birth to the time of data collection. However, the analysis purposes, age of the respondents were broken into three categories as done by Rahman, 2008. The respondents' age ranged from 24 to 85 years. Based on their age, they were classified into three categories as shown in Table 1. Data presented in Table 1 indicated that the majority 50.00% of the respondents were middle aged, compared to 28.89% were old aged and remaining 21.11% were young age category. The average was 45.73 years. Data indicated that 78% of the respondents belonged to middle and old aged. On the other hand the young are generally dependent upon aged family member in decision making.

**Table 1. Distribution of the respondents according to their age**

Categories	Number	Percent	Mean	SD
Young ( 16 to 35years)	19	21.11		
Middle (36 to 50 years)	45	50.00	45.73	12.27
Old (above 50 years)	26	28.89		
Total	90	100.00		
Range (24-85 years)				

Maximum (95.56%) number of the respondents were male. And the rest 4.44% belongs to female (Table 2).

**Table 2. Distribution of the respondents according to their gender**

Categories	Number	Percent	Mean	SD
Male	86	95.56		
Female	4	4.44	1.0444	0.2072
Total	90	100.00		

The education is defined in terms of years of schooling that a respondent completed in educational institution. One score was assigned for passing each year in educational institution. For example, a score of 1 was assigned for passing one year in educational institution, 2 was assigned for passing two years and so on. A Zero (0) score was

assigned to a farmer who could not read or write or signs his name at all. The respondents had an average of 2.51 years of schooling. There was low degree of variability in the educational level of the respondents as indicate by low standard deviation 3.12. Computed education scores of the rice respondents ranged from 0 to 15. Data contained in Table 3 indicated that 80.00% respondents had primary level education and 10.00% respondents had secondary level education, although 5 respondents were illiterate of the study area. Educated person are more cosmopolite in nature. They like to visit outside their territory. They are interested to gain knowledge about different things. Their education helps them to be conscious about environment. Thus, farming community in the study area may be well considered as suitable for the adoption of BRR1 dhan29.

**Table 3. Distribution of the respondents according to their level of education**

Category	Number	Percent	Mean	SD
Illiterate (0)	5	5.56		
Primary education (1-5)	72	80.00		
Secondary education (6-10)	9	10.00	2.51	3.12
Higher Secondary (11-12)	2	2.22		
BS degree (13-16)	2	2.22		
Total	90	100.00		
Range (0-15)				

The respondents were mostly married (92.22%) persons. In addition, single respondents were 7.78% (Table 4).

**Table 4. Distribution of the respondents according to their marital status**

Categories	Number	Percent	Mean	SD
Single	7	7.78		
Married	83	92.22	1.92	0.26
Total	90	100.00		

The family size of a respondent was measured in terms of the number of family member who used to eat and live together permanently. Respondents were classified into three categories on the basis of their family size according to Islam (2008). Family size of the respondents was referred to the total members of the family including the respondents himself, spouse, children and other dependents those use to live, eat and act together in a family unit. The number of family member of the respondents ranged from 2 to 11 with an average of 5.04. The family size of the respondents was classified into the following three categories as presented in Table 5. Data contained in Table 5 revealed that the highest proportion 46.67 % of the respondents had medium family size compared to 42.22% had small family size and 11.11% had large family size. Data indicated that average family size 5.04 of the respondents in the study was higher than the national average of 4.9 of Bangladesh (BBS, 2008). Finding of this table also

indicates that about 88% of the respondents had somewhat smaller and medium family. As the education rate of the respondents is increased for this respondent's decision about medium and small family may also be increased.

**Table 5. Distribution of the respondents according to their family size**

Categories	Number	Percent	Mean	SD
Small (up to 4 members)	38	42.22		
Medium (5 to 7 members)	42	46.67		
Large (above 7 members)	10	11.11	5.04	1.85
Total	90	100.00		
Range (2-11 members)				

Small earning members (55.56%) were found highest of the respondents compared to medium (36.67%) and large (7.78%) earning members. Range were 1 to 5 members (Table 6).

**Table 6. Distribution of the respondents according to their earning members**

Categories	Number	Percent	Mean	SD
Small (1 member)	50	55.56		
Medium (2 to 3 members)	33	36.67	1.76	1.03
Large (above 3 members)	7	7.78		
Total	90	100.00		
Range= (1-5) members				

Land is the most important capital to a farm family and the farm size has influence on many personal characteristics of a farmer. It may be an important factor that may influence the realization of impact of any program since differences in farm size may necessitate different types and amounts of information. The farm size of the respondent includes the total cultivated area either owned by a respondent or his/her family or obtained from others on share cropping system or taken from others as lease where she/he used to do his/her farming operations during the period of this study.

The farm size of respondents in the study area varied from 0.061 to 6.09 hectares with an average of 1.47ha. Based on their farm size the respondents were classified into five categories as done by (BBS, 2009) is presented in Table 7. Data contained in Table 7 revealed that the highest proportion 46.67% of the respondents possessed small farm size, 32.22% possessed to medium farm size, 17.78% possessed to large farm size and 2.22% possessed to marginal farm size. On the other hand, 1.11% possessed to landless farm size. The average farm size of the respondents' farmers was 1.47 hectare, which is higher than the national average (0.81 hectare). Finding of this table also indicates that about 78% of the respondents had small to medium farm size. Khulna is popular for shrimp cultivating. This uncommon cultivating requires greater arrive zone. In spite of the fact that rice isn't their fundamental cultivating practices. But they have greater land.

**Table 7. Distribution of the respondents according to their farm size**

Categories	Number	Percent	Mean	SD
Landless (<0.02 ha)	1	1.11		
Marginal (0.02 - 0.19 ha)	2	2.22		
Small (0.20 - 0.99 ha)	42	46.67	1.47	1.31
Medium (1.00 - 3.00 ha)	29	32.22		
Large (>3.00 ha)	16	17.78		
Total	90	100.00		
Range= (0.061 - 6.09) ha				

Annual income of a respondent was measured in terms of taka in thousand per year as earned by the respondent. The possible sources of income considered were: BRRI dhan29 cultivation, cultivation of crops other than BRRI dhan29, farming, business, services and foreign remittance. The gaining from these sources were included together to get add up to yearly salary of a respondent. The yearly pay of a respondent was changed over into his yearly salary score by doling out a score of 1 for each thousand taka earned from diverse pay sources. Annual income of the respondents was determined based on their total earnings from agriculture, service, business and other sources. Annual income of the respondents ranged from 18000.00 to 360000.00 taka with an average being TK 87400. Based on annual income, respondents were classified into three categories as presented in Table 8. Data contained in Table 8 indicated that the highest proportion 60.00% of the respondents had medium income while 32.22% had low and only 7.78 % had high income. The overwhelming majority of the respondents 92% had low to medium annual income. Majority of the respondents of the study area were heterogeneous in nature based on their annual income. They also participated in diversified income sources like shrimp culture, job/service, small business, and some other self-employed works. Moreover, adoption of BRRI dhan29 also may increase the respondents' annual income.

**Table 8. Distribution of the respondents according to their Annual family income (in thousand)**

Categories	Number	Percent	Mean	SD	Sum
Low (up to50)	29	32.22			
Medium (51-150)	54	60.00	87400	69810	7866000
High (above 150)	7	7.78			
Total	90	100.00			
Range= (18000.00-360000.00) (in thousand)					

Training is the process of improving knowledge and skill of an incumbent for doing a specific job better. It was measured by the total number of days that a respondent had encountered training experience in his/her entire life from different agricultural related organizations and from other organizations under various training programs. On the



basis of training score, respondents were classified in to four categories as done by Wadud (2010). Training plays vital role for the development of knowledge, skill and attitude of a person, which makes him more capable and competent. Training support also lets a person participate more in the development processes more cheerfully with confidence. The training experience has been classified into four groups according to the classification of Wadud, 2010. Data in Table 9 showed that most of the respondents 71.11% had poor training experience whereas about 13.33% did not receive any training at all in compare with about 15% had medium to high training experience. Majority 84% of respondents in the study area had almost no training or poor training experience on rice cultivation. Hence, Department of Agricultural Extension (DAE) and other extension service provider may give more emphasis to train farmers to improve their skills on the rice cultivation.

**Table 9. Distribution of the respondents according to their training experience**

Categories	Number	Percent	Mean	SD
No training (0)	12	13.33		
Poor training (1-3)	64	71.11		
Medium training (4-5)	10	11.11	1.67	1.66
High training (above 5)	4	4.44		
Total	90	100.00		
Range= (0-7)				

Innovativeness refers to the degree to which an individual relatively earlier in adopting new ideas than other members of a social system (Rogers, 1995). BRR1 dhan29 was first introduced in 2007 by DAE in the study area. Hence, the relative earliness of the adoption of BRR1 dhan29 by a respondent was considered as how much innovative he is. The earlier the first adoption of BRR1 dhan29, the earlier he was in adopting the technology than other members of that social system. Innovativeness of the respondent was measured through assigning scores on the basis of year of first adoption of BRR1 dhan29 after demonstration in 2007 in the study area. A score 4 was assigned for adoption of BRR1 dhan29 at first year after demonstration whereas score 3, 2 and 1 was assigned for second, third and fourth year after demonstration. Based on innovativeness scores, the respondents were classified into three categories. Data presented in the Table 10 shows that the highest proportion 80.00% of the respondents had medium innovativeness and 11.11% had low innovativeness and 8.89% had high innovativeness. The innovativeness of farmers of the study area was satisfactory because of their communication with the technical person, input dealer, demonstration, print and electronic media.

**Table 10. Distribution of the respondents according to their innovativeness**

Categories	Number	Percent	Mean	SD
Low (less than 2)	10	11.11		
Medium (2-3)	72	80.00	2.24	0.77
High (above 3)	8	8.89		
Total	90	100.00		
Range= (1-4)				

Respondents' contact with different information sources and media channel to a different extent in order to receive information and their exposures to variety of information sources usually guide them to adopt an innovation. Extension media contact of the respondents was measured by employing a 4-point rating scale as such not at all =0, rarely =1 occasionally =2, and regularly =3, according to frequency of their visit with the some selected communication media. The extension media contact score of the respondents ranged from 1-9. Based on the mean and SD, the respondents were classified into three categories as shown in Table 11. Data contained in Table 11 indicates that the majority 74.44% of the respondents had medium extension contact, compared to 17.78% had low extension contact and 7.78% high extension contact. Extension contact pertains to one's contact with multifarious sources of knowledge and information. The findings clearly indicate that major portion of the respondents had low to medium extension media contact, which is not fully encouraging for extension service providers for transferring any technology.

**Table 11. Distribution of the respondents according to their contact with extension media**

Categories	Number	Percent	Mean	SD
Low (1 to 3)	16	17.78		
Medium (4 to 7)	67	74.44	4.79	1.71
High (above 7)	7	7.78		
Total	90	100.00		
Range= (1-9)				

Farming experience was measured by the total number of days that a respondent had encountered farming experience in his/her entire life from different agricultural related works. The respondents were given a score of 1 for each year farming experience. The farming experience score of the farmers ranged from 2-55 years. Based on the score the respondents were classified into three categories as shown in Table 12. Data presented in Table 12 indicates that the majority 37.78% of the respondents had long farming experience which is above 25 years, compared to 34.44% had medium farming experience and 27.78% had low farming experience. Farming experience helps to improve the knowledge and skill of the respondents. The findings clearly indicate that the respondents had an average of about 24.50 years farming experience, which is encouraging for extension service providers for transferring any technology.

**Table 12. Distribution of the respondents according to their farming experience**

Categories	Number	Percent	Mean	SD
Low (up to 15 years)	25	27.78		
Medium (16 to 25years)	31	34.44	24.50	12.99
Long (above 25 years)	34	37.78		
Total	90	100.00		
Range= (2-55)				

Knowledge of the respondents on rice farming technologies and associated issues was measured by managing a knowledge test containing 20 test items on different areas of knowledge viz. awareness knowledge, how to knowledge, and principle knowledge following Rogers (1995). All the questions included in the scale for measurement of knowledge level were relevant to improved BRR1 dhan29 cultivation technologies. Each question was assigned '2' marks. For a correct answer, a respondent was given full marks and for partial answer half mark (i.e. 1). In case of incorrect answer, a score of '0' (zero) was assigned. Knowledge on modern rice cultivation technologies of the respondents ranged from 19 to 35 and standard deviation 2.50 with an average of 25.88. Based on Knowledge on modern rice cultivation technologies scores, the respondents were classified into three categories as shown in Table 13. Data contained in the Table 13 shows that the highest proportion 91.11% of the respondents had medium level knowledge, compared to 5.56% had high level knowledge and 3.33% had low level knowledge. About 96% respondents had medium to high Knowledge on rice cultivation technologies. This knowledge helped the respondents to adopt and carry on the BRR1 dhan29 technologies.

**Table 13. Distribution of the respondents according to their knowledge**

Categories	Number	Percent	Mean	SD
Low (up to 20)	3	3.33		
Medium (21 to 30)	82	91.11	25.88	2.50
High (above 30)	5	5.56		
Total	90	100.00		
Range= (19-35)				

Extent of Adoption was estimated by using a formula (Hedayet, 2011). Respondents' adoption of BRR1 dhan29 cultivation was the major focus of this study. Different aspects of this issue have been described in the subsequent sub-sector. The possible range of extent of adoption of BRR1 dhan29 by the respondents ranged from 27 to 70%. The mean adoption score was 55.07 and the standard deviation was 7.72. Based on observed range of extent of adoption, the respondents were classified into three categories as presented in Table 14. Information contained in Table 14 revealed that majority 83.33% of the respondents had medium adoption of BRR1 dhan29 compared to 10.00% high adoption of BRR1 dhan29. Findings clearly indicated that majority of the respondents had medium to high adoption of BRR1 dhan29 cultivation.

**Table 14. Distribution of the respondents according to their extent adoption of BRRI dhan29**

Categories	Number	Percent	Mean	SD
Low (up to 33 %)	6	6.67		
Medium (33 to 66 %)	75	83.33	55.07	7.72
High (above 66 %)	9	10.00		
Total	90	100.00		
Range= (27-70%)				

### Comparative Adoption of Different Rice Variety

Respondents in the study area are cultivating different rice varieties such as BRRI dhan29, BRRI dhan45, Super minicat dhan and BRRI dhan36. Comparative adoption was computed based on total average area covered as presented in Table 15. Findings in Table 15 shows that among the total rice cultivated area, BRRI dhan29 was covered 58.17% of extent of adoption and ranked first position whereas 23.40% was covered by BRRI dhan45 as compared to 17.01% and 9.16% area were covered with Super minicat dhan and BRRI dhan36 varieties respectively. As BRRI dhan29 could not tolerate high salinity and respondents have no access to measure salinity level at all, many respondents hesitated to adopt it although they agreed on its higher yield. Due to unavailability of salinity testing equipments respondents could not cultivate at tolerable salinity level; hence never achieved full potentiality of the yield of BRRI dhan29.

**Table 15. Comparative adoption of different rice varieties**

Name of rice variety	Cultivated area (ha) under each variety (a)	Potential area under cultivation (ha) each variety (b)	Extent of adoption (b/a X 100)(%)	Rank
BRRI dhan29	79.56	46.28	58.17	1st
BRRI dhan45	79.56	18.62	23.40	2nd
Super minicat dhan	79.56	13.53	17.01	3rd
BRRI dhan36	79.56	7.29	9.16	4th

### Comparative profitability of Different Rice Variety

Enterprise costing was followed in calculating cost and return. Economic performances as well as comparative profitability of BRRI dhan29 with other rice varieties of the study area was computed by calculating BCR (Benefit Cost Ratio). Comparative profitability was computed based on total average area covered as presented in Table 16. Information contained in Table 16 revealed that total area of BRRI dhan29 was 46.28 ha, compared to total area of BRRI dhan45, Super minicat dhan and BRRI dhan36 was 18.62, 13.53 and 7.29 ha respectively. Besides, average yield of BRRI dhan29 was 5.56(t/ha), compared to average yield of BRRI dhan45, BRRI dhan36 and Super minicat dhan were 3.64, 3.34 and 3.19(t/ha). Average selling price of BRRI dhan29 was 72687.53tk, compared to average selling price of BRRI dhan45, Super minicat dhan

and BRRi dhan36 were 30257.45, 28647.47 and 24584.58tk. Average production cost of BRRi dhan29 was 25635.85tk, compared to average production cost of BRRi dhan45, Super minicat dhan and BRRi dhan36 were 12587.59, 9685.62 and 9085.64tk. Average Net Income of BRRi dhan29 was 55967.56tk, compared to average Net Income of BRRi dhan45, Super minicat dhan and BRRi dhan36 were 16387.34, 15453.95 and 8364.86tk respectively. Therefore, it was found from this table that performance of BRRi dhan29 was more satisfactory as compared to BRRi dhan45, Super minicat dhan and BRRi dhan36 variety in respect of yield, average saling price and net income. Thus, the respondents earned more profit by cultivating BRRi dhan29 variety.

**Table 16. Comparative profitability of different rice varieties**

Name of rice variety	Total area (ha)	Average yield (t/ha)	Average sales (Tk)	Average production cost (Tk)	Average Net Income (Tk)
BRRi dhan36	7.29	3.34	24584.58	9085.64	8364.86
BRRi dhan29	46.28	5.56	72687.53	25635.85	55967.56
BRRi dhan45	18.62	3.64	30257.45	12587.59	16387.34
Super minicat dhan	13.53	3.19	28647.47	9685.62	15453.95

### Respondents' Perceived Benefit of adopting BRRi dhan29

Benefit of BRRi dhan29 cultivation by the respondents was measured by asking on ten selected benefit mentioning in the interview schedule. A five-point Likert scale was used for taking the agreement of the respondents. These statements were compiled, Perceived Benefit Index (PBI) count and percentage was measured and finally rank wise arranged. Data contained in Table 17 indicated that different statements were not equally important that the respondent's perceived benefit of adopting BRRi dhan29 cultivate. However, the important statements are high market price, non-complexity of cultivation procedure, enhanced social status, higher yield, availability of quality seed, and short duration variety. Higher yield, availability of quality seed, and short duration variety was the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> statement for the respondent's perceived benefits of adopting BRRi dhan29 cultivation.

**Table 17. Respondent's perceived benefit of adopting BRR1 dhan29 cultivate**

Statements of benefit for adopting BRR1 dhan28	Extent of benefit (N=90)										P B I	Ra nk
	SA (5)		A (4)		NO (3)		D (2)		SD (1)			
	N	%	N	%	N	%	N	%	N	%		
High market price	5	58.	3	38.	0	0.0	2	2.2	0	0.0	40	1st
	3	89	5	89	0	0	2	2	0	0	9	
Non- complexity of cultivation procedure	4	54.	4	45.	0	0.0	0	0.0	0	0.0	40	1st
	9	44	1	56	0	0	0	0	0	0	9	
Enhanced social status	4	46.	4	53.	0	0.0	0	0.0	0	0.0	40	2nd
	2	67	8	33	0	0	0	0	0	0	2	
Higher yield	4	48.	4	48.	0	0.0	2	2.2	0	0.0	40	3rd
	4	89	4	89	0	0	2	2	0	0	0	
Availability of quality seed	4	52.	3	42.	1	1.1	4	4.4	0	0.0	39	4th
	7	22	8	22	1	1	4	4	0	0	8	
Short duration variety	3	41.	5	56.	0	0.0	2	2.2	0	0.0	39	5th
	7	11	1	67	0	0	2	2	0	0	3	
Improved livelihood status through high income	3	35.	5	64.	0	0.0	0	0.0	0	0.0	39	6th
	2	56	8	44	0	0	0	0	0	0	2	
Better grain quality	2	27.	6	72.	0	0.0	0	0.0	0	0.0	38	7th
	5	78	5	22	0	0	0	0	0	0	5	
Tolerable to high level of salinity	1	11.	6	6.6	2	25.	3	37.	1	18.	22	8th
	0	11	6	7	3	56	4	78	7	89	8	

SA = Strongly Agree, A = Agree, NO = No Opinion, D = Disagree, SD = Strongly Disagree

### Problem faced in cultivation of BRR1 dhan29

For clear understanding of the fact, a Problem Confrontation Index (PCI) were used which is Shown in table 18. Unable to tolerate salinity at mature stage was the first important problem for the respondents and its PCI was 311 and unable to cope with higher level of salinity was the second problem for the respondents and its PCI was 310. Unavailability of salinity testing equipments was the third important problem for the respondents and its PCI was 304. Less yield than other popular varieties and less profitable in compare to shrimp cultivation was considered the nine number problem for the respondents and its PCI was 152.

**Table 18. Ranking of the problems faced by the BRRi dhan29 growers**

Nature of problem	Degree of problem (N= 90)					PCI	Rank
	Too much (4)	Much (3)	Medium (2)	Low (1)	Not at all (0)		
Unable to tolerate salinity at mature stage	46	39	5	0	0	311	1st
Unable to cope with higher level of salinity	46	40	2	2	0	310	2nd
Unavailability of salinity testing equipments	42	40	8	0	0	304	3rd
Higher price and inadequate supply of inputs	45	30	12	3	0	297	4th
Lack of proper land management technologies	18	6	32	26	8	180	5th
Losses due to natural calamities	14	8	33	30	5	176	6th
Lack of rain or proper irrigation at tillage stage	12	13	23	38	4	171	7th
Shattering problem	18	5	23	31	13	164	8th
Less profitable in compare to shrimp cultivation	14	4	23	38	11	152	9th
Less yield than other popular varieties	14	5	25	31	15	152	9th

## CONCLUSION

The majority (50.00%) of the respondents were middle aged, 95.56% male, 80.00% had primary level of education and 92.22% married. The highest (46.67%) proportion of the respondents had medium family size, (55.56%) small earning members, 46.67% small farm size, 60.00% of medium income and 71.11% had poor training experience. The highest (80.00%) proportion of the respondents had medium innovativeness, 74.44% of medium extension contact, 37.78% had long farming experience which is above 25 years but 91.11% had medium level knowledge. Majority 83.33% of the respondents had medium adoption of BRRi dhan29 with total rice cultivated area 58.17% of extent of adoption and ranked first position. Total area of BRRi dhan29 was 46.28ha. Besides, average yield of BRRi dhan29 was 5.56(t/ha), average selling price 72687.53tk, average production cost 25635.85tk and average Net Income was 55967.56tk. Higher yield, availability of quality seed, and short duration variety was the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> statement for the respondent's perceived benefits of adopting BRRi dhan29 cultivation. Unable to tolerate salinity at mature stage was the first important problem for the respondents and its Problem Confrontation Index (PCI) was 311. Majority of the respondents had medium adoption of BRRi dhan29 in coastal areas due to low farming experience and lack of proper extension media contact. So it may be recommended that steps are necessary to provide adoption behavior related training to the respondents and to effective extension services should be needed for the

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development and popularization of adopting BRR1 dhan29 in coastal saline areas of Bangladesh.

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