COMPARATIVE PROFITABILITY OF SALT TOLERANT RICE VARIETY ADOPTERS AND NON-ADOPTERS IN THE COASTAL AREAS OF BANGLADESH

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CERTIFICATE

This is to certify that thesis entitled, **"COMPARATIVE PROFITABILITY OF SALT TOLERANT RICE VARIETY ADOPTERS AND NON-ADOPTERS IN THE COASTAL AREAS OF BANGLADESH"** *submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* ***MASTER OF SCIENCE IN MANAGEMENT AND FINANCE,*** *embodies the result of a piece of bona fide research work carried out* ***SHIRMIN AKTER RIMA****, Registration No.* ***15-06496*** *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

Dated:

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Dedicated to

My PARENTS

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LIST OF ACCRONYMS AND ABBREVIATION

BRRI = Bangladesh Rice Research Institution
BINA = Bangladesh Atomic Agriculture Research Institute
BCR = Benefit-Cost Ratio
Ha = Hectare
% = Percentage
et al.= And others
etc.= Etcetera
No.= Number
MoP = Murate of Potash
Tk. = Taka
UNDP= United Nations Development Program
BBS= Bangladesh Bureau of Statistics
TSP= Triple Super Phosphate
SAU= Sher-e- Bangla Agricultural University
1 kani= 40 decimal
IOC= Interest on Operating Capital

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ABSTRACT

The objectives of this study were to determine the socio-economic characteristics of the respondents and to determine the comparative profitability between adopters and non-adopters. Data were collected from randomly selected 150 farmers who were adopted salt tolerant rice variety and those who did not adopt via pre-tested interview schedule during August 26 to September 20, 2021. In this study, profitability analysis was done to achieve the objectives of the study. From this study, it was estimated that the average per hectare cost for salt tolerant rice variety and other local rice variety production was Tk. 125368 and Tk. 104585 respectively. Per hectare gross return of adopter of salt tolerant rice varieties and non-adopter of other local varieties were Tk. 137380 and Tk. 121478, respectively. Therefore, per hectare average cost as well as gross return of adopter was higher than that of non-adopter. Average per hectare net return received by non-adopting farmers was Tk. 16893 and it was higher in case of adopter (Tk. 12012). In the study area, the average yield of local rice varieties (5.45 ton / hectare) was higher than salt tolerant rice varieties (4.92 ton / hectare). The undiscounted benefit cost ratio (BCR) was higher for local variety growers compare to salt tolerant variety growers. Results also revealed that most of the farmers are not using the recommended technologies regarding input usage and agronomic practices. Shattering problem, low rainfall, irrigation facility, cost on irrigation, natural calamities were the major problems faced by the farmers in cultivating salt tolerant rice variety. Proper extensions activities are needed to disseminate salt tolerant rice variety to bring the uncultivated areas under rigorous cultivation for ensure a better livelihood on the coastal farmers.

CHAPTER 1

INTRODUCTION

1.1 General Background of the Study

Rice is our main food crop. This crop is cultivated in more than 80 percent of the total cultivable land. Bangladesh is one of the major rice producing countries of the world (Salam et al., 2011). The coastal belt of Bangladesh consists of 19 districts, which cover 32% of the country and accommodate more than 35 million people (Alam et al., 2017). One fifth of the country's population lives in 19 coastal districts. The people of this region are somewhat disadvantaged in terms of poverty, food security, and natural disasters compared to other regions of the country. About 30 percent of Bangladesh's total cultivable land is in this region, which is about 1 million hectares.

Some of coastal area like, Shatkhira, Khulna, Bagerhat, Barguna, Patuakhali, Pirajpur, Bhola, Noakhali, Chittagong, Feni, in Bangladesh affected by varying degree of salinity. Salinity stress is one of the most serious environmental stresses limiting the productivity of agricultural crops (Khandker et al., 2014). Several unions in Chittagong's Banshkhali upazila are affected by salinity. The soil of 1,930 hectares of the coastal Panch Union of Banshkhali is saline. Nothing could be produced in the land of these areas. These lands were lying vacant for half of the year. Saly tolerant rice is being cultivated in 1,300 hectares of land in these saline areas for the last three years. Farmers are seeing additional profit as they can produce golden rice on fallow land. This time, 2 thousand 325 tons of salt tolerant rice has been produced in Banshkhali.

According to the Upazila Agricultural Department sources 1,930 hectares of land in the five unions of Chanua, Puichari, Gandamara, Saral and Shekherkhil of the Banshkhali coast are saline. Due to salt, it was not possible to produced common varieties of rice in these areas. In the last three years, salt tolerant paddy is being produced in several lands of these areas. Out of this, farmers are producing salt tolerant paddy in 350 hectares of Chanua, 320 hectares of Puichari, 50 hectares of Gandamara, 80 hectares of saral and 500 hectares of Shekerkhil. 2,325 tons of rice is produced in 1,300 hectares in these areas.

Zakir Ahmed, a farmer of Chanua Union, said that he has cultivated salt tolerant BRRI- 47 variety of rice in 1 Kani (40 Shotangsho) area. This year he has harvested 100 areas (10 kg in 1 areas) of rice. Earlier, this land was left vacant from the onset of winter. Now the fallow land is growing rice. At the end of winter salt is produced on the same land.

Abul Malek, a farmer of Gandamara union, said that he got 200 acres of rice by cultivating salt tolerant rice in 3 kani areas. Due to less rain this area, rice production is less. But it is also much better than the land lying fallow.

Among the produced salt tolerant varieties of rice are BRRI- 47, BRRI-55, BRRI-67, BINA-8, BINA-10. Bangladesh Atomic Agriculture Research Institute (BINA) has developed Bina-8 and Bina-10 varieties of salt tolerant rice. On the other hand, Bangladesh Rice Research Institute (BRRI) has developed salt tolerant rice varieties BRRI-47, BRRI-55, BRRI-67. The nutritional value of these varieties of rice is high.

Total of 2,325 tons of salt tolerant rice has been produced in Banshkhali. BRRI-47 variety of rice is generally produced more in Banshkhali. Bina-8 variety of rice is highly salt tolerant. Farmers will be encouraged to produce this type of rice in future.

Farmers are generally afraid to adopt any new technology, because if they face losses. Moreover, while adopting any new technology, farmers have to keep in mind some factors such as socio-economy, cultural, physiological condition, climatic condition etc. Studies on individual, group and society revealed that acceptance of modern technologies is conditional upon many factors, while conducting research, the entire actor like social, economic and situational factors takes into account

1.2 Specific Objectives of the Study

- **i.** To determine the socio-economic characteristics of the respondents.
- **ii.** To determine the comparative profitability between adopter and non-adopter.

1.3 Justification of the Study

The main focus of the study was to assess coastal farmers' adoption of Salt tolerant rice variety. The concluded result of the study especially valid to Chittagong district (the locale of

the study). However, this measurement will also have implications for other coastal area of the country. It is true that different types of salt tolerant rice varieties released by BRRI mainly for coastal areas cultivation where soil are affected by the salinity.

Population boom in Bangladesh needs maximum use every cultivation land. It is necessary to give attention on coastal areas while rice production low due to climatic factors for adequate food production. This idea indicates the need for an investigation to ascertain the relationship of the characteristics of farmers with their adoption of salt tolerant variety. The present study will be helpful to the researchers for further studies of similar nature and the extension personnel who are directly involved in different agricultural program and to planners to making effective plans.

1.4 Assumption of the Study

In this study, the researcher had the following assumptions in mind while carrying out the study:

1. The farmers included in the sample were competent to furnish proper responses to the items included in the interview schedule.
2. The researcher who also acted as the interviewer was well adjusted to the socio-cultural environment of the study area. The researcher collected data with utmost care and can be treated as reliable.
3. The responses furnished by the respondents were reliable and they truly expressed their opinion on adoption of salt tolerant rice variety and their selected characteristics.
4. The sample size was representative of the whole families of the study area.
5. The findings of the study would be useful for planning and execution of the programmers in connection with adoption of salt tolerant rice variety.
6. The measures of the adoption of salt tolerant rice variety by the farmers are normally and independently distributed with their respective means and standard deviation.

1.5 Limitations of the study

The present study was undertaken with a view to have an understanding on the level of adoption of salt tolerant rice variety by the farmers of Banshkhali upazila under Chittagong district. In order to manage the handle, the research, it became necessary to impose some limitations on certain aspects of the study. Considering time, money and other necessary resources available to the researcher, the following limitations had been observed throughout the study:

1. Data was not collected from all the coastal areas of Chittagong. Only some selected areas data were collected.
2. The researcher relied on the data furnished by the farmers from their memory during interview.
3. Researcher had to conduct this study in a limited time period which was not enough to conduct an in-depth study.

CHAPTER 2

REVIEW OF LITERATURE

Review of literature gives the clear and concise direction to the researcher for conducting the experiment. In this Chapter, review of literatures relevant to the objectives of this study was presented. This was mainly concerned with "adoption of salt tolerant rice variety". There was dearth of literature with respect to research studies on this aspect. So, the directly related literatures ere not readily available for this study. Some researchers addressed various aspects of the adoption of technology and its effect on client group and suggesting strategies for their emancipation from socio-economic deprivations. A few of these studies relevant to this research are briefly discussed in this chapter under the following sections:

Khandker et al., (2014) conducted research on adoption of BRRI 47 by the coastal farmers of Noakhali district. The main objectives of this study were to determine the extent of adoption of BRRI dhan 47 in Noakhali district. Data were collected from randomly selected 100 farmers. The sample were selected using the simple random sampling technique and the SPSS was used to perform the data analysis. Percentage, mean and standard deviation were calculated. Coefficients of correlation (r) were computed to find out the relationship between adoption of BRRI dhan 47 and the selected socio-economic characteristics. The study's findings indicated that farmers' education, farm size, annual income, innovativeness, extension contact and knowledge on rice cultivation showed significant and positive relationship with adoption of BRRI dhan 47.

Haider et al., (2001) studied the adoption level of improved package for T. Aman rice cultivation in Gouripur upazila of Mymensingh district. He categorized the farmers into non-adopters, low adopters, medium adopters, high adopters which was 5%, 62%, 24.5% and 8.5% respectively. Majority percent adopted MV program of T. Aman rice. In his research he applied linear regression method. The study's findings indicated that farmers adoption level had a positive significant influence on the widespread adoption of T. Aman rice cultivars in Mymensingh district. The authors did not mention in his research the factors that affect the acceptance of salt tolerant rice variety in the coastal region.

Islam et al., (2013) explored the progress of salinity tolerance rice variety development in Bangladesh. The principal focus was to pyramid multiple stress tolerant genes into mega-varieties of rice to ensure better adaptability in coastal salt affected areas. The study applied advanced tools such as marker assisted selection (MAS) and marker assisted backcrossing (MABC) to introgress SalTol QTL int BR11. All of these introgressed line were tested in the farmers' field in coastal region. The results of the study demonstrated that the modern salt tolerant rice variety was able to perform as an irrigated high yielding variety without stress and also performed better than sensitive variety in stress conditions.

Haque et al., (2019) study was designed to assess the adoption and impact on income of salt tolerant rice varieties viz., Binadhan-8 and Binadhan-10 cultivation in coastal areas of Bangladesh. In total 300 farmers from six salt tolerant rice growing areas, namely Patuakhali, Cox's Bazar, Chittagong, Bagerhat, Khulna and Sathkhira districts were taken to conduct the study. According to the study, profitability analysis was done to achieve the objectives of the study. The findings of the study revealed that most of the farmers are not using the recommended technologies regarding input usage and agronomic practices.

Rahaman et al., (2020) examined the prospect and constraint of BRRI developed Aman rice varieties in Bangladesh. To address the objective 13 Upazila of Mymensingh district selected purposively. Farm level data was collected through farmer's group discussions (FGD) with the key informants and face to face interviews for household surveys. A multistage random sampling technique was adopted in selecting the 780 respondents. A censored Tobit model was used to measure the adoption intensity of BRRI released Aman varieties. The findings of the study show that farmers adopted about 68 percent of BRRI varieties followed by indigenous (15.6%), other MVs (10.2%), Indian (5.5%), and hybrid (1.3%).

Ramos et al., (2018) considered a study on developing of new stress-tolerant rice varieties for the Mediterranean region. The main objective of this study was to develop new stress-tolerant rice varieties for the Mediterranean region. A molecular marker assisted backcross scheme (using KASP technology) was followed to introgress the salt tolerant traits. The finding of the study was that the evaluation rice blast tolerance was really difficult and no outstanding line was selected to proceed.

Essink (2016) conducted research on the interrelationship of salinity and land use in the Khulna Division. The main objective of this research was to identify the relation between

land use, agriculture and rice in particular, and salinity. Remote sensing data was used to make a land use map. 72 soil samples, 73 water samples from boreholes and 115 water samples from the aquifers were taken. Data were analyzed using a set of T-tests. The study's finding was that soil salinity, groundwater salinity at the water table and surface water salinity is related to certain land use types.

Rashid et al., (2014) investigated the use of marginal coastal saline lands for rice cultivation is one of the options to sustain the net rice cropped area and rice production. Data were randomly collected from Khulna district. Data were analyzed using a set of T-tests. The objective of the study was to identify suitable Boro variety for medium saline soils. The findings of the study shown that varieties faced similar salinity at different growth stages both in non-gher and gher.

Swinkels et al., (2002) examined effect of climate change on agriculture in the saline prone areas. The methods of the study is an integration of quantitative and qualitative methods based on data collection. Data were collected from 88 farmers under study group and 30 farmers under control group. Descriptive statistics, multiple regression, t-tests were used for data analysis. The finding of the study was 61.4 percent of the farmers had medium effect, 17.0 percent had lo effect and 21.6 percent of the farmers had high effect of climate change on agriculture.

Kai et al., (2018) conducted a study resilience of agricultural systems facing increased salinity intrusion in deltaic coastal areas of Vietnam. Research conducted 27 in depth interviews with local and national authorities, 11 focus group discussions, and 118 semi-structured and 219 structured interviews with farmers in case study villages located along salinity transects in the Mekong Delta and at different distances to sea dikes in the Red River Delta in Vietnam in 2015-2016. Results from the subjective resilience assessment reveal that none of the agricultural systems studied systematically scored higher than the other systems studied systematically scored higher than the other systems on all three resilience components, implying that an increase in one resilience component by switching agricultural systems would negatively affect others.

Siddaramaiha et al., (1995) carried out the result, almost cent percent adoption about the study of improved Seri-cultural practices along with big and small farmers. Their recommendation improved practices were optimum time of planting (95%), adoption of

recommendation spacing (91.25%), recommended irrigation schedule (93.75%), and used improved variety of mulberry crop (87.50%). Approximately half of the respondents used quantity of farmyard manure and plant protection measure in mulberry cultivation.

Ahmed et al., (2016) investigated the rate of adoption of modern stress-tolerant rice varieties by the beneficiary farmers of the Cereal Systems Initiative for South Asia (CSISA) and compares that with non-CSISA-promoted rice varieties. The study reveals that the adoption of such varieties has been very low. The study's findings that 27% of the farmers in the CSISA beneficiary survey and 9% of non-CSISA rice farmers grew at least one of the CSISA-promoted rice varieties. The survey did not specifically ask the farmers for reasons for non-adoption.

Sheheli and Roy (2014) studied on profitability, constraints and opportunities of raw jute production in Kishoregonj district with a sample of 100 farmers using Cobb-Douglas production function and found that jute cultivation was profitable and medium farmers had the highest profit than small and large farmers.

Kumar et al., (2014) studied on system productivity, profitability and resources use efficiency of white and tossa jute production in the eastern Indo-gangetic plain in India with a sample of 120 farmers using Cobb-Douglas production function and found that tossa jute had the highest profitability, system productivity and energy productivity than white jute.

Hoque and Haque (2014) studied on the economic profitability of boro rice production in Jamalppur, Gazipur and Manikgonj district with a sample of 211 respondents by using Cobb-Douglas production function and found that factors like cost of irrigation, insecticide, seed and human labour showed significant effect on profitability.

Forman (2011) studied on comparative economic analysis of Aus rice and jute production in Mymensingh district with a sample of 80 farmers by using Cobb-Douglas production function and found that jute was more profitable than aus rice as jute had higher net return than Aus rice.

Ghosh (2016) studied on adoption of BRRI Dhan28 in the coastal areas of Bangladesh. The main purpose of this study was to determine the adoption of BRRI dhan28 in coastal areas of Bangladesh. The study was conducted in three villages (Shimulbaria, Balitha and Fingri) of

Fingri union under Satkhira Sadar Upazila of Satkhira district. In this study, 75 farmers were selected as sample following simple random sampling technique, complied, coded, analyzed and interpreted as per objectives. Majority of the respondents had medium adoption of BRRI dhan28 in coastal areas. Comparative profitability of BRRI dhan28 was more than other varieties on the basis of area under cultivation, average yield, average selling price and average net income.

Rahman et al., (2007) conducted a study on measuring the costs of production, based on sizes of farm operation on rice farmers in Jessore district of Bangladesh study. The objectives of the study were to measure the differences in the cost of production of Boro rice farmers on the basis of land. They included three types of rice farmers such as small, medium and large. They found that although there were no significant differences in the quantity of inputs used for all categories of farmers, the unit cost of some inputs significantly varied between small-large medium-large, thus affecting the cost of production. The reason is that most of the small medium farmers purchased inputs on credit, spending comparatively more than cash and they paid higher interest on borrowed money. They showed that for that reason rice production increased regardless of the land operation size but small and medium farmers still have a serious problem especially the increasing cost involved in the production.

Review of the past studies and literature indicated various factors influenced the adoption of salt tolerant variety by the farmers. The literature review revealed that there has been little research on salt tolerant rice varieties cultivation in the study region. It is sometimes difficult to deal with all the factors in a single study. Related literature, resources at hand helped the researcher in selecting some variables to assess the adoption of salt tolerant rice variety by the farmers.

CHAPTER 3

MATERIALS AND METHODOLOGY

Methods and procedures used in conducting research need very careful consideration. Methodology enables the researcher to collect valid information and to analyze the same properly to arrive at correct decisions. The methods and procedures followed in conducting this research are being described below:

3.1 Locale of the study

Chittagong is one of the coastal districts in Bangladesh having salinity problem on cultivable land and due to sea level increasing now a days it' a major problem on rice cultivation. Some common salt tolerant rice varieties are cultivated in some upazila's of Chittagong. They are BRRI 47, Bina 10, Bina 8 and BRRI 67. Banshkhali, Anowara and Sitakunda upazila's of Chittagong district considered as most suitable location to conducting research on adoption of salt tolerant varieties BRRI 47, Bina 10, Bina 8 and BRRI 67 by the rice growing farmers. Banshkhali, Anowara and Sitakunda upazila's under Chittagong district was purposively selected as a locale of the study. These areas situated near the Bay of Bengal which are demarked as a coastal area. There are six unions in Banshkhali upazila. Among the six unions, data was randomly collected from the population of only Chanua, Shekherkhil, Gandamara and Haliapara unions. On the other hand, data was randomly collected from the population of Gahira union and Uttar Paruapara union of Chittagong's Anowara upazila. And some data was randomly collected from Muradpur union of Sitakunda.

Table 3.1: Distribution of population and sample of respondents in seven selected unions under Banshkhali, Anowara and Sitakundo upazila's of Chittagong district.

SL. NO	Name of the upazila	Name of the union	No of adopter	No of non-adopter	Adoption Rate (in %)	Total sample size
1	Banshkhali	Shekherkhil	23	7	76.67%	30
2	Banshkhali	Gandamara	19	11	63.33%	30
3	Banshkhali	Chanua	27	3	90%	30
4	Banshkhali	Haliapara	20	10	66.67%	30
5	Anowara	Uttar Paruapara	2	8	20%	10
6	Anowara	Gahira	2	8	20%	10
7	Sitakundo	Muradpur	3	7	30%	10
Total			96	54	64%	150

Fig 1 A Map of Sitakunda Upazila showing study

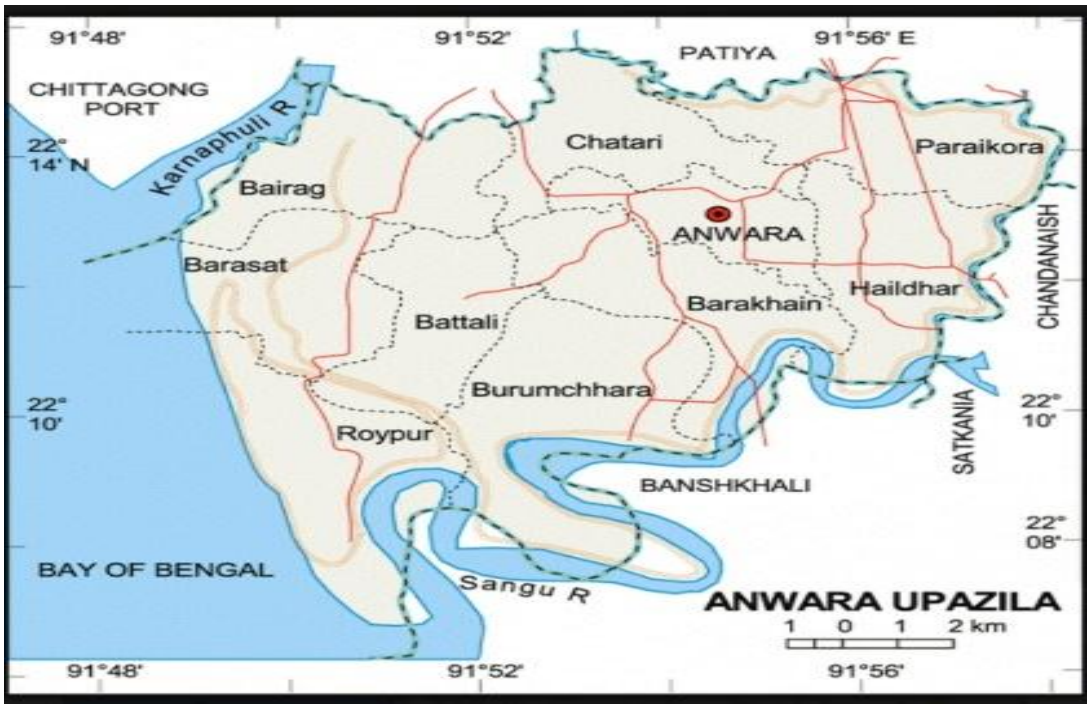

Fig 2. A Map of ANWARA Upazila showing study area

3.2 Population and Sampling Design

An up-to-date list of all farm family heads of selected union were made with the help of pilot survey and Sub-Assistant Agriculture Officer. Data of only 150 farmers were randomly collected from the total cultivated farmers of all the selected upazila's of Chittagong. Among them, the farmers were divided into two groups. One group who adopted salt tolerant rice variety and another group who did not adopted salt tolerant rice variety. Sample size for Sherkherkhil was 30, Chanua was 30, Gandamara was 30, Haliapara was 30, Uttar Paruapara was 10, Gahira was 10 and Muradpur was 10 making the total sample size of 150 farmers. The distribution of population sample shown in Table 1.

3.3 Data collection Instrument

To collect relevant information from the selected respondents, an interview schedule was carefully designed to fix spotlight on the objectives of the study. The questions and statements contained in the schedule were simple, direct and easily understandable by the farmers in one hand and different scales, closed and open form questions were exerted in the interview schedule to obtain necessary information on the other. Appropriate scales were also developed to measure the characteristics of farmers.

3.4 Data collection

In this study, primary data was collected through interviews using a structured interview schedule. During interview, the researcher systematically asked questions and explained the purpose of the study for better understanding. Secondary data was gathered from research related statistical papers and other related publication.

3.5 Processing, tabulation and analysis of data

The collected data were coded and edited manually. After that all the collected data were scrutinized and summarized very carefully. Data entry was done in computer and analysis was done accordingly in computer. The information was first collected in local units and then it was converted into international standard units.

3.6 Analytical technique

Several analytical techniques were used to meet particular research objectives. The collected data was analyzed using Microsoft Excel and SPSS because they are very popular and widely used.

3.6.1 Descriptive statistics

The descriptive statistics is a tool that was used through SPSS software for sum, average and percentage of total costs, gross returns, net returns and profitability of adopter and non-adopter rice growing farmers. It was also used for analyzing the socio-economic conditions and problems faced by the salt tolerant rice varieties adopter and non-adopter growers.

3.7 Ethical issues

Researcher tried to follow all the ethical issues related to the study. Researcher booked an appointment before interviews of the farmers and farmers were well informed about the purpose of the study. Additionally, farmers were ensured that their information would be used only for the completion of thesis paper and would not be used for other purposes. The collected data were preserved in a password protected device.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Socio-economic characteristics of adopter of salt tolerant rice varieties and non-adopter farmers

The socio-economic characteristics of the sample farmer are an essential part of research because these characteristics can affect their production decision and production pattern. There was a lot of difference in the socio-economic characteristics of adopter and non-adopter salt tolerant rice varieties farmers in the selected areas. The socio-economic characteristics of the sample farmers that was considered in the study area involved age, farm size, years of schooling, farming experience, extension contact, membership in societal organization, credit access and off-farm income of the farmer.

4.1.1 Age structure of the sample farmers

The respondents of adopter and non-adopter were classified into five categories such as 21-30 years, 31-40 years, 41-50 years, 51-60 years, 61 years and above. Table 4.1 shows that out of total adopters 23.96% fall into 21-30 years and 28.13% are between 31-40 years, 32.29% fall into 41-50 years, 10.42% fall into 51-60 years and 5.21% farmers belong to between 61 years and above age group. Table 4.1 also shows that out of total non-adopter group 16.67% fall into 21-30years, 31.48% are between 31-40 years, 38.89% fall into 41-50 years, 9.26% fall into 51-60 years and 3.70% farmers belong to between 61 years and above age group. It was obvious from Table 4.1 that majority of adopter group fell into 41-50 years age group which was 32.29% whereas also majority of the non-adopter rice cultivator group were between 41-50 years age group which was 38.89%.

Table 4.1: Distribution of sample farmers according to age group

Farmers age (Years)	Salt tolerant rice adopter		Salt tolerant rice non-adopter		All farmers	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
21-30	23	23.96	9	16.67	32	21.33
31-40	27	28.13	17	31.48	44	29.33
41-50	31	32.29	21	38.89	52	34.67
51-60	10	10.42	5	9.26	15	10
61 and above	5	5.21	2	3.70	7	4.67
All groups	96	100	54	100	150	100

(Source: Field Survey, 2022)

4.1.2 Educational status of the respondents

Education helps individuals to develop the capacity of understanding their environment and improve rational insight of life. Education influences farmers to adopt the modern technology and use scarce resources efficiently which contribute in earning higher profit. The farmers were classified into four categories such as illiterate, primary, secondary, higher secondary and graduate/post graduate for research purpose. Table 4.2 shows that among adopter of salt tolerant rice varieties 27.08% are illiterate, 45.83% have primary education, 19.79% have secondary education and, 6.25% have higher secondary education but no farmers have graduate or post graduate degree. Table 4.2 also shows that among non-adopter of salt tolerant rice varieties 20.37% are illiterate, 50% have primary education, 22.22% have secondary education, 7.41% have higher secondary education and only 1% have graduate/post graduate degree. It was obvious from Table 4.2 that majority of farmers of both adopter and non-adopter had primary level education which was 47.33%. This table revealed that salt tolerant rice variety adopters were more illiterate in number than non-adopters.

Table 4.2: Educational status of the respondents

Educational Status	Salt tolerant rice adopter		Salt tolerant rice non-adopter		All farmers	
	Frequency	Percent	Frequency	Percent	Frequency	PERC ENT
Illiterate	26	27.08	11	20.37	37	24.67
Primary	44	45.83	27	50	71	47.33
Secondary	19	19.79	12	22.22	31	20.67
Higher Secondary	6	6.25	4	7.41	10	6.67
Graduate / post graduate	1	1.04			1	0.67
Total	96	100	54	100	150	100

(Source: Field Survey, 2022)

4.1.3 Farm holdings of the respondents

Farm holding is the entire land owned by the farmers and is used by the farmers for any agricultural purposes. Farmers were classified into three categories- small (0.02-2.49 acre), medium (2.50-7.49 acre) and large farmers (>7.50 acre) based on the farm holding size. It was found from Table 4.3 that out of total adopters, 30.21% were small farmers, 40.63% were medium and 29.17% are large farmers. Table 4.3 also shows that out of total non-adopters, 33.33% are small, 44.44% are medium and 22.22% are large farmers in the study area. Based on Table 4.3, it was obvious that adopter of salt tolerant rice variety with medium farm size was higher in non-adopters.

Table 4.3: Classification of the respondents according to farm holding size

Land holdings	Farm size (acre)	Salt tolerant rice variety adopter		Salt tolerant rice variety non-adopter		All farmers	
		Frequency	PERCENT	Frequency	PERCENT	Frequency	PERCENT
Small farmers	0.02-2.49	29	30.21	18	33.33	47	31.33
Medium farmers	2.50-7.49	39	40.63	24	44.44	63	42
Large farmers	7.50-above	28	29.17	12	22.22	40	26.67
Total		96	100	54	100	150	100

(Source: Field Survey, 2022)

4.1.4 Farming Experience

The farmers in the study area were divided into five groups based on their year of farming experience. Table 4.4 shows that out of total adopters 13.54% farmers have 1-10 years, 19.79% have 11-20 years, 28.13% have 21-30 years, 21.88% have 31-40 years and 16.67% have 41-60 years of experience. Table 4.4 also reveals that out of total non-adopters 12.96% farmers have 1-10 years, 20.37% have 11-20 years, 27.78% have 21-30 years, 31.48% have 31-40% and 7.41% have 41-60 years of experience. From Table 4.4, it was obvious that most of the respondents of both adopter and non-adopter had 21-30 and 31-40 years of experience who were related with agricultural activities.

Table 4.4: Distribution of sample farmers according to farming experience

Years of experience	Salt tolerant rice adopter		Salt tolerant rice non-adopter	
	Frequency	Percent	Frequency	Percent
1_10	13	13.54	7	12.96
11_20	19	19.79	11	20.37
21_30	27	28.13	15	27.78
31_40	21	21.88	17	31.48
41_60	16	16.67	4	7.41
Total	96	100	54	100

(Source: Field Survey, 2022)

4.2 Profitability analysis of adopter and non-adopter rice cultivation

The cost, returns and profitability of cultivating salt tolerant rice varieties and other locale varieties in the coastal regions are briefly described in this chapter. The variable and fixed costs were considered to estimate the total cost of production salt tolerant rice varieties and other locale varieties. Variable costs include cost of human labor, power tiller, animal labor, mechanical labor, seed, fertilizer, manure, pesticides and irrigation. Fixed costs include land use cost and interest on operating capital. The total return includes return from main product and by product.

4.2.1 Estimation of variable costs

Variable costs include the costs of using all variable inputs. There are some costs that vary with the level of production such as cost of seed, fertilizer, human labor, manure, irrigation, power tiller and insecticides. These inputs are essential in production. Thus, the costs have to

be estimated for calculating the total production costs. Variable costs for salt tolerant rice varieties and other locale rice varieties are discussed below:

4.2.2 Cost of human labor

Human labor is the most vital input for producing rice. Human labor includes both family labor and hired labor. Table 4.5 shows that total labor requirements per hectare for salt tolerant rice varieties is 145.74 man-days of which 36.61 man-days are family labor and 109.13 man-days are hired labor. Average wage rate was estimated as Tk. 491.67 in the study area during data collection. It was estimated that the total cost of human labor for salt tolerant rice was Tk. 72110.5 per hectare (Table 4.5). Human labor cost for land preparation, transplanting, weeding, fertilizer and insecticides, harvesting and threshing was estimated as 12.34%, 17.97%, 18.36%, 5.94%, 24.20% and 21.18% of total labor cost respectively.

Table 4.5: Per hectare operation wise average human labor cost for salt tolerant rice varieties

Operation	Labor (man-days)		Total labor (man-days)	Unit cost (Tk.)	Total cost (Tk.)	% of total labor cost
	Family labor	Hired labor				
Land preparation	4.6	15.18	19.78	450	8901	12.34
Transplanting	6.8	21.99	28.79	450	12955	17.97
Weeding	5.7	27.4	33.1	400	13240	18.36
Fertilizer and Insecticides	6.12	3.4	9.52	450	4284	5.94
Harvesting	6.19	22.9	29.09	600	17454	24.2
Threshing	7.2	18.26	25.46	600	15276	21.18
Total	36.61	109.13	145.74		72110	100

(Source: Field Survey, 2022)

In case of local rice varieties production in the coastal regions, Table 4.6 shows that total labor requirement per hectare is 112.06 man-days in which 28.4 man-days are family labor and 83.66 man-days are hired labor. Average wage rate estimated as Tk. 458.33 at the time of data collection in the study area. Table 4.6 shows that per hectare total labor cost is estimated as Tk. 52022 per hectare for local rice varieties production. This table also showed that labor cost for land preparation, transplanting, weeding, fertilizer and insecticides, harvesting and threshing was estimated as 12.63%, 16.43%, 17.55%, 4.50%, 26.19% and 22.70% of total labor cost respectively.

Table 4.6: Per hectare operation wise average human labor cost for non-adopters in the coastal areas

Operation	Labor (man-days)		Total labor (man-days)	Unit cost (Tk.)	Total cost (Tk.)	% of total labor cost
	Family labor	Hired labor				
Land preparation	3.3	13.12	16.42	400	6568	12.63
Transplanting	4.5	16.87	21.37	400	8548	16.43
Weeding	3.5	19.33	22.83	400	9132	17.55
Fertilizer and insecticides	3.9	1.3	5.2	450	2340	4.5
Harvesting	5.9	18.87	24.77	550	13623.5	26.19
Threshing	7.3	14.17	21.47	550	11808.5	22.7
Total	28.4	83.66	112.06		52022	100

(Source: Field Survey, 2022)

4.2.3 Cost of seed/seedlings

For any agricultural crop production seed is the basic input. Yield of any agricultural production is highly dependent on the quality of seed. High quality of seed can yield high production and bad quality can produce low rate of production. Table 4.7 and Table 4.8 shows that adopter of salt tolerant rice and non-adopter of salt tolerant rice use 40 kg and 38.02 kg seed per hectare. Per unit cost of seed for salt tolerant rice variety was Tk. 65 and Tk. 60 respectively during data collection. Total cost of seed for salt tolerant rice and local variety rice was estimated as Tk. 2600 and Tk. 2281.2 per hectare in which seed cost of salt tolerant rice was 4.70% and seed cost of other local rice variety was 4.35% of total material input costs.

Table 4.7: Per hectare cost of material inputs for salt tolerant rice variety production

Various Inputs	Units	Quantity	Unit price (Tk.)	Total Cost (Tk.)	Total Cost (Tk.)
Seed	Kg	40	65	2600	2600
Fertilizer	Kg				
Urea	Kg	260	20	5200	5200
TSP	Kg	180	35	6300	6300
MOP	Kg	130	18	2340	2340
Total fertilizer cost	Tk.			13840	13840
Manure	Kg	300	3	600	600
Pesticide	Tk.			2200	2200
Power tiller	Tk.			6122	6122
Thresher	Tk.			4731.25	4731.25
Irrigation	Tk.			11355	11355
Total				55288.25	55288.25

(Source: Field Survey, 2022)

4.2.4 Cost of fertilizer

Adopter of salt tolerant rice and non-adopter used fertilizers such as Urea, TSP and MOP which were required for cultivation. Table 4.7 shows that per hectare total fertilizer cost of salt tolerant rice is estimated as Tk. 13840 and it is 25.03% of the total material input cost. Table 4.8 shows that per hectare cost of fertilizers required for locale rice variety production is estimated as Tk. 13667.2 and it is 26.04% of the total material input cost.

Table 4.8: Per hectare cost of material inputs for local rice variety production

Various Inputs	Units	Quantity	Unit price (Tk.)	Total Cost (Tk.)	% of total cost
Seed	Kg	38.02	60	2281.2	4.35
Fertilizer	Kg				
Urea	Kg	223	18	4041	7.7
TSP	Kg	174	30	5220	9.95
MOP	Kg	125	17	2125	4.05
Total fertilizer cost	Tk.			13667.2	26.04
Manure	Kg	425	2	850	1.62
Power tiller	Tk.			5175	9.86
Pesticide	Tk.			1700	3.24
Thresher				4100	7.81
Irrigation				13321	25.38
Total				52480.4	100

(Source: Field Survey, 2022)

4.2.5 Cost of manure

Most farmers in the study area had their own cow and for this reason they did not have to buy manures for using in the field. The farmers were able to use manures from their own supply. Table 4.7 shows that per hectare cost of manure for salt tolerant rice production is Tk. 600 which is 1.09% of total material input cost. Table 4.8 shows that per hectare manure cost for other local rice variety production is Tk. 850 which is 1.62% of total material input cost.

4.2.6 Cost of Thresher

Thresher was needed for threshing salt tolerant paddy after harvesting. Table 4.7 shows that total cost of thresher is Tk. 4731.25 per hectare which is 8.56% of total material input cost.

4.2.7 Cost of Irrigation

Irrigation is very important for any agricultural production. Both salt tolerant rice and local variety of rice field needed a huge amount of water from land preparation to harvest. Adopters of salt tolerant rice had to depend on machine supplied water as there was a lack of water at the time. Table 4.7 shows that the charge of irrigation water for producing salt tolerant rice is Tk. 11355 per hectare which is 20.54% of total material input cost.

4.2.8 Cost of pesticide

There are several types of insects that can cause damage in the yield of salt tolerant rice and other locale variety rice production. Termites, caterpillars, beetles, horned grasshoppers, rats, brown plant hopper, yellow stem borer, gal midge, leaf folder and rice bug cause serious damage in salt tolerant rice and local variety rice production. Farmers had to use insecticides to control pests in the study area. Table 4.7 shows that the estimated cost per hectare for salt tolerant rice is Tk. 2200 which is 3.98% of total material input cost. Table 4.8 shows that the estimated cost per hectare for local rice variety production is Tk. 1700 which is 3.24% of total material input cost.

4.2.9 Estimation of fixed costs

Fixed costs are those expenses that are not dependent on the level of output and does not change with an increase or decrease with the level of output change. The producers have to bear the expense even if the production is not undertaken. Fixed costs include land use cost and interest on operating capital which is described below.

4.2.10 Land use cost

Most of the farmers in the study area had own land for producing salt tolerant rice and local variety rice. Land use cost was a fixed cost for the producers. Table 4.9 shows that the land use cost per hectare is estimated at Tk. 9916.66 which is similar for salt tolerant rice and local variety rice production. The land use cost for salt tolerant rice and local variety rice was 7.91% and 9.48% of total production cost respectively.

4.2.11 Interest on operating capital (IOC)

Interest on operating capital was calculated for 4 months for both salt tolerant rice variety and local rice variety. Interest rate of 9% per annum for both crops were considered for calculation. Interest on operating capital was calculated based on this formula:

Interest on Operating Capital (IOC) = AI*i*t

Where, AI = (Total investment)/2

i = Rate of interest

t = Length of crop period in months

Table 4.9 shows that interest on operating capital calculated for salt tolerant rice is Tk. 1892.65 and for local variety is Tk. 1551.94 per hectare. IOC of salt tolerant rice was 1.51% and 1.48% of total production cost respectively.

4.2.12 Total cost

The total cost was estimated by summing up the variable and fixed cost for both salt tolerant rice and local rice production. Table 4.9 shows that total variable cost for salt tolerant rice and local rice variety is Tk. 113558.75 (90.58% of total cost) and Tk. 93116.4 (89.03% of total cost) respectively. Table 4.9 also shows that total fixed cost for salt tolerant rice and other local rice variety was Tk. 11809.31 (9.42%) and Tk. 11468.6 (10.97%) respectively. The total cost per hectare estimated for salt tolerant rice variety and other local rice variety production was Tk. 125368.06 and Tk. 104585 (Table 4.9).

Table 4.9: Per hectare total cost of salt tolerant rice variety and local rice variety production

Items	Salt tolerant rice (Tk.)	% of total cost	Local variety rice (Tk.)	% of total cost
A. Variable cost				
Human labor cost	72110	63.5	52022	55.87
Seed cost	2600	2.29	2281	2.45
Fertilizer cost	13840	12.19	13667	14.68
Power tiller	6122	5.39	5175	5.56
Pesticide	2200	1.94	1700	1.83
Thresher	4731	4.17	4100	4.4
Manure	600	0.53	850	0.91
Irrigation	11355	10	13321	14.31
Total variable cost	113558	90.58	93116	89.03
B. Fixed cost				
Land use cost	9916.66	7.91	9916	9.48
Interest on operating capital	1892	1.51	1551	1.48
Total Fixed Cost	11809	9.42	11468	10.97
Total Cost (A+B)	125368	100	104585	100

(Source: Field Survey, 2022)

4.2.13 Gross return

Gross return is the total revenue earned from the production which includes return from the main product and by-product. Table 4.10 shows that per hectare return from main and by-product of salt tolerant rice is Tk. 98449.40 and Tk. 15800 respectively. Table 4.10 also shows that the return from main and by-product of local rice variety is Tk. 90802.02 and Tk. 14820 respectively. The total gross return per hectare was estimated as Tk. 114249.4 for salt tolerant rice and Tk. 105621.02 for local rice variety (Table 4.10).

Table 4.10: Per hectare gross returns from salt tolerant rice variety and other rice variety

Name of the crops	Value of the main product			Value of the by-product (Tk.)	Gross Return (Tk./ha)
	Quantity (kg/ha)	Price (Tk./ha)	Value (Tk.)		
Salt tolerant rice	5845	20	116900	15800	132700
Local variety rice	5643	18	101574	14820	121478

(Source: Field Survey, 2022)

4.2.14 Profitability of salt tolerant rice and local rice variety production

The profitability of salt tolerant rice and local rice cultivation is presented in the Table 4.11 The gross return per hectare from salt tolerant rice was estimated as Tk. 137380, total variable cost per hectare was Tk. 115358 (90.58%) and total fixed cost per hectare was Tk. 11809 (89.03%). The total cost of salt tolerant rice per hectare was Tk. 125368.06. Local rice

gross return percentage 116.15% was high than salt tolerant rice variety (109.58%). The gross margin of salt tolerant rice per hectare was estimated as Tk. 23821.62 and net return per hectare was Tk. 12012. The benefit cost ratio of salt tolerant rice was 1.10 which means that by investing Tk. 1.00, farmers would earn Tk. 1.10 in return. Table 4.11 also shows that the total gross return per hectare of local variety is Tk. 121478, total variable cost per hectare is Tk. 93116, fixed costs per hectare is Tk. 11468. The total cost per hectare of local rice variety was estimated at Tk. 104585. Gross margin per hectare of local rice variety was estimated at Tk. 28362 and net return per hectare was Tk. 16893. The benefit cost ratio of jute was 1.16 which means that by investing Tk. 1.00, farmers would earn Tk. 1.16 in return. Total variable cost percentage of salt tolerant rice adopters were higher local rice adopters. On the other hand, total fixed cost was lower for salt tolerant adopter than non-adopter. Net return percentage for adopters were very low 9.58% than non-adopters 16.15%. It was clear from table 4.11 shows that adopters of salt tolerant rice variety earned higher gross return and lower net return than non-adopters.

Table 4.11: Profitability of per hectare salt tolerant rice and local rice variety production

Item	Salt tolerant rice variety	% of total cost Salt Tolerant Rice Variety	Local rice variety	% of total cost Local Rice Variety
A. Gross Return	137380	109.58	121478	116.15
B. Total Variable Cost	113558	90.58	93116	89.03
C. Total Fixed Cost	11809	9.42	11468	10.97
D. Total Cost	125368		104585	
E. Gross Margin (A-B)	23821	19	28362	27
F. Net Return (A-D)	12012	9.58	16893	16.15
G. BCR (A/D)	1.1		1.16	

(Source: Field Survey, 2022)

4.2.15 Concluding Remarks

On the basis of above discussions, it could be thoughtfully be concluded here that cultivation of salt tolerant rice and local rice were found profitable. However, cultivation of salt tolerant rice was less profitable than that of local rice in the coastal regions. The reason behind low profitability of salt tolerant rice was that the overall cost of cultivating those rice was higher than local variety. So, the net return was less compared to local rice.

4.3 Problems faced by the farmers in cultivation of salt tolerant rice varieties

The Problem Faced Index (PH) was calculated to find out major problems faced by the farmers in adopting salt tolerant rice variety of cultivation.

Here,

PH = (3xHigh Problem) + (2xMedium Problem) + (1 x Low Problem) + (0 x No Problem)

The severity of problem faced of the farmers is shown in Table 4.12

Table 4.12: Problem Faced Index for selected 10 problems with rank order

SI.NO	Nature of problem	Opinion at extent of problem				PFI	Rank order
		High	Medium	Low	Not at all		
1	Shattering problem on seedling stage	75	35	40	0	335	1st
2	increasing cost on irrigation facilities	65	43	42	0	323	2nd
3	Unable to tolerate salinity at mature stage	83	37	30	0	353	8th
4	Lack rain or proper irrigation at tillering stage	67	46	37	0	330	4th
5	Losses due to natural calamities	55	51	44	0	311	3rd
6	Inadequate supply of inputs	41	49	60	0	281	9th
7	Lower yield than other popular varieties	29	33	88	0	241	10th
8	Less profitable than other crop cultivation	39	44	67	0	272	5th
9	Lack of proper land management techniques	27	36	87	0	240	7th
10	Unable to cope with higher level of salinity	61	55	34	0	327	6th

(Source: Field Survey, 2022)

> "Shattering problem on seedling stage" was ranked first in Table 7 among the problem faced in cultivating salt tolerant rice variety. Shattering seedlings of salt tolerant rice variety might be major hindrance in harvesting crop during boro season.

> "Increasing cost on irrigation facilities" during cultivation of crop is another major problem and it ranked 2" in Problem Faced Index. Price of fuel increase day by day. That's why increase cost on irrigation supply on the field as well as cost of production.

> "Losses due to natural calamities" is most important problem and it ranked 3rd in ranking order on the basis Problem Faced Index (PH). Due to cold injury damage a lot on the field.

> "Lack of rain or proper irrigation at tillering stage" was ranked in 4th in Problem faced ranking order. At tillering stage salt tolerant rice varieties are more sensitive to availability of water.

> "Less profitable than other crop cultivation" was ranked 5th in Problem Faced Index. Now a day farmer showed more interest on water melon cultivation because of its more profitable than rice cultivation.

> "Unable to cope with higher salinity" is also hindrance to adopt salt tolerant rice varieties cultivation. This problem placed 6th in ranking order. Coastal areas are varying with rate of salinity.

> "Lack of proper land management techniques" is needed to escape salinity and it ranked 7th in Problem Faced Index. Farmers are not aware about modem land management techniques which yield has been lower than general level.

> “Unable to tolerate salinity at mature stage" was ranked 8^{th} in Problem Faced Index. Salt tolerant rice varieties only able to tolerate salinity at seedling stage but at mature stage farmer faced problem during cultivation.

> "Inadequate supply of inputs" is the problem in rice cultivation which ranked 9^{th} in Problem Faced Index. Lack of proper supply of seed fertilizer etc. as a result cannot fulfill demand of farmers.

> "Lower yield than other popular varieties" was ranked 10th in ranking order of Problem faced. BRRI released many of salt tolerant rice varieties such as BRRI dhan 47, BINA 10 and BINA 8 etc. gives more yield than other local varieties.

CHAPTER 5

SUMMARY

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The adoption of salt tolerant varieties among the coastal farmers depends upon on various facts including farmer's characteristics. A thoughtful understanding of the factors manipulating this adoption manner of the farmers is compulsory to study the adoption and diffusion process in the country. Therefore, the current study was carrying out in Banskhali, Anowara, and Sitakundo upazila under Chittagong District. Seven unions named Shekherkhil, Gandamara, Chanua, Haliapara, Uttar Paruapara, Gahira and Muradpur were selected to conduct study and the sample was 150 rice farmers adopter and non-adopter were drawn from the population of those unions. Data were gathered via a pretested interview schedule. Collected data decoded, analyzed by Excel. The study with the following specific objectives:

To determine the socio-economic characteristics of the respondents.

To determine the comparative profitability between adopter and non-adopter

5.1.1 The major findings of the study

Firstly, the socio-economic condition of farmer was analyzed. Different characteristics of farmer like- age, education, farm size, farming experience were taken under consideration during analyzing the socio-economic condition of farmers. It was seen that majority of salt tolerant rice adopters and local rice adopters fell into 41-50 years age group. The study revealed that majority of adopters of both salt tolerant rice (45.83%) and local rice (50%) had primary level education and salt tolerant rice adopters (27.08%) were more illiterate in number than local rice adopter (20.37%). The study revealed that majority of salt tolerant rice adopters (28.13%) had 21-30 years of farming experience and non-adopters (31.48%) had 31-40 years of farming experience.

Costs and return were estimated to find out the profitability of salt tolerant rice and other local rice variety production in the study area. Several variable inputs like- human labor, power tiller, seed, fertilizer, manure, pesticide and irrigation cost were computed for salt tolerant rice and other local rice variety production. The human labor cost was found as the most important factor because it had the highest percentage of total cost. Human labor cost per hectare for salt tolerant rice adopter and for non-adopters was Tk. 72110 (63.50%) and Tk. 52022 (55.87%). Per hectare seed cost for salt tolerant rice and local rice was Tk. 2600 (2.29) and Tk. 2281.2 (2.45%) respectively. Fertilizer cost per hectare for salt tolerant rice and local rice was Tk. 13840 and Tk. 13667 respectively. Power tiller cost per hectare was found to be TK. 6122 and Tk. 5175 respectively. Manure cost per hectare was Tk. 600 and Tk. 850 respectively. Pesticide cost per hectare was Tk. 2200 and Tk. 1700 respectively. Irrigation cost per hectare was found Tk. 11355 and Tk. 13321 respectively. Threshing cost per hectare was Tk. 4731 and Tk. 4100 respectively. Land use cost per hectare for both salt tolerant and local rice was fixed and it was Tk. 9916. Interest on operating capital for per hectare salt tolerant rice and local rice was Tk. 1892 and Tk. 1551 respectively. The total gross return of salt tolerant rice per hectare Tk. 137380 was higher than local rice Tk. 121478. Net return from local rice was Tk. 16893 which was higher than salt tolerant rice Tk. 12012. Net return of local rice was higher than salt tolerant rice because cost of cultivating salt tolerant rice varieties is high than other local rice varieties, so that's why adopters net return was low. The benefit cost ratio of local rice was 1.16 which was also higher than salt tolerant rice that was 1.10. From this above discussion, it was found that local rice was more profitable than salt tolerant rice in the study area.

5.3 Conclusion

The present study was conducted to compare the profitability of the salt tolerant rice adopters and non-adopters. The socio-economic characteristics of the farmer revealed that majority of the farmers of both salt tolerant rice adopters and non-adopters had primary level of education and salt tolerant rice adopters were more illiterate in number than local farmers. It was found that most the adopters of salt tolerant rice and non-adopters had 21-30 years of farming experience. Additionally, it was also found in the study that the percentage of adopters of salt tolerant rice and non-adopters having medium farm. The study revealed that the net return of local rice was higher than salt tolerant rice. Furthermore, the benefit cost

ration of local rice was found higher than salt tolerant rice. The result revealed that local rice was more profitable than salt tolerant rice in the study area.

5.4 Recommendation

Recommendations based on the findings and the conclusions of the study are presented below:

Firstly, Extension contact is key factor to adopt any innovation, so it is urged that extension worker should keep close link with the farmers.

Secondly, adopting salt tolerant rice varieties cultivation farmers faced various problems. Natural calamities are most important problem among the various problems. BRRI scientist and other concerned authorities should take necessary step to mitigate these problems.

Thirdly, Knowledge about salinity level had positive relation with farmers adoption of salt tolerant variety. Extension worker, NGOs and other agriculture related organization are ought to increase knowledge.

Fourthly, Shortage of human labor was a major problem for the salt tolerant rice adopter and non-adopters of the study areas. Government and other authorities should take initiative for lessen these problems.

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An Interview Schedule for the Study Entitled

ADOPTION OF SALT TOLERANT RICE VARIETY IN THE COASTAL AREAS OF BANGLADESH

Serial number: Date:

Dear Respondent,
All of your information will be kept confidential and will be used for research purpose only. Please provide the following information.

A. General information

Respondent's Name: ....…….....

Address: Village: ……..……..…… Upazila: ……..…….

District: ……..……. Mobile: ……..……

B. Socio-economic information

1. Household Information

Name of Respondent	Relation with Respondent	Age (Years)	Years of Schooling	Sources of income		Total annual Income (Tk)
				Main	Subsidiaries	
Respondent	Self					
Respondent	Spouse					

2. Farm Size

Types of Land	Area (decimal)
Homestead land	
Own cultivable land	
Mortgaged in land	
Mortgaged out land	
Rented in land	
Rented out land	
Leased in Land	
Leased out land	
Pond	
Fallow	

3. How much land do you use for “salt tolerant rice” cultivation last year: .....decimal

C. Profitability related information

4. Cost of production (on the basis of the land area given in question no. 3)

a) Human labor use

Activities	Types of labor	Man-days	Wage rate (Tk./day)
1. Land preparation and seed sowing	a. Family		
	b. Hired		
2. Transplanting	a. Family		
	b. Hired		
3. Weeding	a. Family		
	b. Hired		
4. Irrigation	a. Family		
	b. Hired		
5. Applying fertilizer	a. Family		
	b. Hired		
6. Applying insecticide or others	a. Family		
	b. Hired		
7. Harvesting	a. Family		
	b. Hired		
8. Threshing and winding	a. Family		
	b. Hired		
9. Drying and storing	a. Family		
	b. Hired		

b) Machinery Inputs

Purpose of use	Types of ownership	Unit	Cost/unit	Total Cost (Tk.)
1. Land preparation (Power tiller / Tractor)	a. Owned			
	b. Hired			
2. Harvesting (Harvester)	a. Owned			
	b. Hired			
3. Carrying (Tractor / Power tiller / Van)	a. Owned			
	b. Hired			
4. Threshing (Thresher)	a. Owned			
	b. Hired			
5. Others (specify)	a. Owned			
	b. Hired			

c) Materials Inputs

Inputs (unit)	Types	Quantity	Price / unit	Total Price (Tk.)
1. Seed (Kg)	a. Owned			
	b. Purchased			
2. Paddy seedling	a. Owned			
	b. Purchased			
3. Manure (Sack)	a. Owned			
	b. Purchased			
4. Fertilizer (Kg)	Urea			
	TSP			
	MoP			
5. Irrigation				
6. Insecticide (Liter)				
7. Others				
8. Rental value of land (yearly)				

5. Return from production

Output(s)	Quantity	Price / unit
Rice (Kg)		
By Product		

6. Please mention the problems in salt tolerant rice cultivation.

   i. ……..

   ii. …….

   iii. …….

7. Suggest some measures to overcome these problems.

   i. …….

   ii. ……..

   iii. ……..

8. Agricultural Farming Experience of the respondent: ……. Years

9. Do you receive credit for rice cultivation from formal sources? Yes/ No

   9.1 If yes, total amount of credit……Taka

10. Do you receive credit for rice cultivation from NGOs? Yes/ No

    10.1 If yes, total amount of credit……Taka

11. Membership in societal organization: Yes/ No

12. Do you receive rice cultivation related advice from extension officers? Yes/ No

13. Do you use mobile phone to get information about rice cultivation? Yes/ No

14. Do you watch agricultural related shows on TV? Yes/No

15. Do you have electricity facilities? Yes/ No

16. Do you think adoption of salt tolerant varieties increases yield? Yes/No
17. Do you think adoption of salt tolerant varieties can reduces negative effect of climate change? Yes/No
18. Do you think profitability of salt tolerant varieties is higher than normal varieties? Yes/No
19. Do you receive climate/weather related information in advance? Yes/No
20. Severity of salinity in your village: High/ Medium / Low/ No
21. Do you think salt tolerant varieties are available in your areas? Yes/No
22. Do you receive any training on agriculture? Yes / No

    20.1 If yes, for how many days…….
23. Do you receive any assistance/relief/SSNP from government? Yes / No
24. Do you have input subsidy card? Yes/ No
25. Do you receive any input subsidy for salt tolerant rice cultivation? Yes /No
26. Do you think your soil is fertile? Yes/No
27. Do you have off- farm income sources? Yes / No
28. Do you allow women in your family to work on your farm? Yes/ No

Thank you for your nice cooperation