

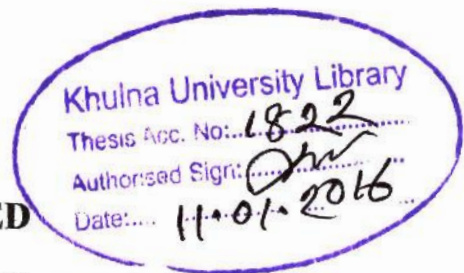
**ADOPTION OF SELECTED RECOMMENDED AGRONOMIC
PRACTICES BY THE BORO RICE GROWERS OF JALMA
UNION UNDER KHULNA DISTRICT**

A THESIS

BY

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EXAMINATION ROLL NO: MS-070804



A thesis (Course No. AT-6104)
Submitted to the Agrotechnology Discipline, Khulna University, Khulna
In partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

IN

AGRONOMY



**AGROTECHNOLOGY DISCIPLINE
KHULNA UNIVERSITY
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January, 2010

ACKNOWLEDGEMENT

The author expresses his best gratitude to Almighty Allah for His never-ending blessings for the successful completion of the research work.

The author received help and cooperation in various forms from many persons and institutions to complete the research work. Although it is not possible to mention everyone by name, he is immensely grateful to all of them.

The author expresses his deepest sense of gratitude and indebtedness to venerable Teacher and Supervisor Professor Dr. Mohammad Bashir Ahmed, Agrotechnology Discipline, Khulna University, Khulna for his keen interest, scholastic supervision, guidance, valuable suggestions, generous help, affectionate feelings, constant encouragement that have made it possible to complete this piece of research and reviewing the entire manuscript.

From the core of heart the author humbly desires to express his deepest and profound gratitude and immense indebtedness to his cosupervisor Professor Khan Golam Quddus, Agrotechnology Discipline, Khulna University, Khulna for his cordial inspiration, valuable guidance, advise and cooperation in all respects in preparation of the thesis.

A special appreciation is extended to all honorable teachers of the Agrotechnology Discipline, Khulna University, Khulna for their kind cooperation and help throughout the tenure of the study.

The author also expresses his immense gratitude to Mohammad Quamrul Islam Matin, Scientific Officer (SO), RARS, Jessore, and Sub Assistant Agricultural Officer (SAAO) Md. Mosir Ahmed of Jalma union for their valuable suggestions during the period of the preparation of interview schedule. The author expresses his indebtedness to Md. Ashraf Ali Sikder, Executive Committee Member of Community Policing Committee of Jalma Union and Motiar Rahman, Executive Committee Member of a Cultural Club of Krishnonagar village for their help and cooperation during data collection from the respondents.

Special thanks are due to the farmers of the study area who gave their valuable time for interview during the collection of data.

The author takes the opportunity to express his indebtedness, deepest sense of gratitude and profound respect to his beloved mother Monowara Khatun, sister Shahina Yasmin Munni and wife Syeda Fariha Sultana for their blessings, sacrifices and encouragement for higher study which can never be forgotten. Without their cordial inspiration, the finishing of this work might not be possible.

January, 2010

The Author

ADOPTION OF SELECTED RECOMMENDED AGRONOMIC PRACTICES BY THE BORO RICE GROWERS OF JALMA UNION UNDER KHULNA DISTRICT

ABSTRACT

A study was carried out with the aim to determine the extent of adoption of selected recommended agronomic practices by the boro rice growers and also to explore the relationship between selected characteristics of the farmers with their adoption of selected recommended agronomic practices of boro rice cultivation. Data for the study were collected by personal interview using an interview schedule from 85 randomly selected farmers of 4 villages of Jalma union under Khulna district, during May to June, 2009. Three-fifths (61%) of the respondents belonged to high adoption category while about two-fifths (39%) of the respondents were under medium adoption of selected recommended agronomic practices of boro rice cultivation. All of the respondents strictly adopted/followed the ladderling while none of them followed recommended time for 3rd installment of urea application. The other highly adopted / strictly followed agronomic practices were land preparation, number of seedling per hill, intercultural operation (weeding), fertilizer (urea) application 2nd time, harvesting time and threshing. On the other hand seed bed preparation, variety, seed rate, transplanting, spacing and sowing date were the moderately adopted practices. The partially adopted practices were seed bed size, fertilizer application, source of seed, irrigation, pest control and fertilizer (urea) application at 3rd times. Out of eleven selected characteristics of the boro rice grower's only age, farming experience and farm size showed a positive significant relationship with their adoption of selected recommended agronomic practices of boro rice cultivation.

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ABBREVIATIONS AND ACRONYMS

BARI	: Bangladesh Agricultural Research Institute
BBS	: Bangladesh Bureau of Statistics
BRAC	: Bangladesh Rural Advancement Committee
BRRI	: Bangladesh Rice Research Institute
DAE	: Department of Agricultural Extension
df	: Degrees of Freedom
<i>et al</i>	: Associates
FAO	: Food and Agriculture Organization
GO	: Government Organization
ha	: Hectare
HYV	: High Yielding Variety
i.e.	: That is
NAEP	: New Agriculture Extension Policy
NGO	: Non Government Organization
NS	: Not-significant
r	: Co-efficient of Correlation
RARS	: Regional Agricultural Research Station
RDRS	: Rangpur Dinajpur Rural Service
SO	: Scientific Officer
SAAO	: Sub Assistant Agricultural Officer
SAARC	: South Asian Association for Regional Cooperation
SPSS	: Statistical Package for Social Science
Tk.	: Taka
*	: Significant at 0.05 level of probability
**	: Significant at 0.01 level of probability

CHAPTER I INTRODUCTION

1.1 General background

Bangladesh is predominantly an agricultural country comprising 1,47,570 sq. km of area with an estimated population of more than 160 millions (BBS-2006). This country is regarded as one of the most densely populated area of the world. Its population density is 928 per sq. kilometer (BBS, 2005). It is Asia's 5th and world's 7th most populated country. The economy of the country is predominantly agrarian accounting for 21.91 percent of GDP (BBS, 2005). So agriculture plays a vital role in employment, poverty alleviation, food security, standard of living and increase of earnings. The per capita income is about \$ 470 and its people have a life expectancy of 64.9 years (BBS, 2005). The pressure of increasing population reduced the average size of the farm holding from 1.69 acres in 1996 to 1.48 acres in 2005 (BBS, 2005).

Rice (*Oryza sativa*) is the leading cereal crop in the world and it is the staple food crop in Bangladesh. It is the most important food grain in the diet of more than half of the world's population in tropical and subtropical Asia, Africa and Latin America (Yoshida, 1981). Rice covers 76% of total cropped area with an average yield of 2.39 t ha⁻¹ (BBS, 2004). Bangladesh ranks third position in rice area and fourth in production among the rice growing countries of the world (BRRI, 1991). But its average yield is quite low (2.39 t ha⁻¹) compared to those of other leading rice growing countries such as China, Korea, Japan, U.S.A. producing 6.23, 6.59, 6.70 and 7.04 t ha⁻¹, respectively (FAO, 2000).

Bangladesh is the fourth largest rice producing country in the world, following China, India and Indonesia (FAO, 1996). Per capita consumption of rice is also higher in Bangladesh. In Bangladesh a person on an average uptake 150 kg of milled rice annually. People obtain 75% calorie from rice alone. This ratio is the highest in the world. It is revealed from the data furnished in the Table 1.1 that per unit production of rice is the second lowest in Bangladesh among the rice producing countries.

Table 1.1 Top paddy producing countries in the world

Serial	Country	Area (000'ha)	Paddy yield (kg/ha)
1	China	31107	6022
2	India	42910	2784
3	Indonesia	11439	4349
4	Bangladesh	9952	2653
5	Vietnam	6766	3690
6	Thailand	9020	3243
7	Myanmar	6144	3185
8	Japan	2118	6343
9	Brazil	4374	2565
10	Philippines	3759	2804
11	United States of America	1252	6301
12	Republic of Korea	1056	6007

Source: FAO, 1996

Rice grows in three seasons namely; Aus, Aman and Boro. The country is approaching near to the self-sufficiency in rice production still there is some shortage of food. The country imports 0.88 million tons of food spending Tk 7192.8 million (\$ 1.24 million) almost every year (BBS, 2005).

Rice area and productivity differ widely from country to country. Although the climate of Bangladesh is the most suitable for rice cultivation but still the per hectare yield of rice is not satisfactory comparing with other rice growing countries of the world (Table 1.1).

The total production, however, is not sufficient to feed the vast and fast growing population of the country. A substantial quantity of food grains is therefore imported every year to meet domestic requirements. Recently production of cereals, particularly rice, has increased considerably.

Table 1.2 The acreage and production of local and HYV rice varieties in Bangladesh

Year	Area (000' acres)			Production (000' M. tons)		
	Local	HYV	Total	Local	HYV	Total
2000-2001	4821	16860	26681	5654	19427	25086
2001-2002	9394	17010	26337	5175	19125	24300
2002-2003	9140	17474	26614	5226	19162	25187

Source: BBS, 2004

A remarkable change in rice production has already been observed in Bangladesh after introduction of HYV rice (Table 1.2). Bangladesh Rice Research Institute (BRRI) has developed and released some modern varieties which are suitable for Boro season, such as BR 3, BR 12, BR 14, BR 15, BR 16, BR 17, BR 18, BR 19, BR 26, BRRI dhan28, BRRI dhan29, BRRI dhan35 and BRRI dhan36 having potential to produce 2.0 or more times yield than those of traditional varieties (BRRI, 2003).

In Bangladesh over 30% of the net cultivable area is in the coast. Salinity largely reduces productivity of the coastal areas of the country, mainly in Khulna, Patuakhali, Chittagong districts and in the island of Bay of Bengal like Bhola, Hatiya and Sandip (Brammer, 1971).

With the adoption of modern technologies in agriculture, the rice production of the country has considerably increased in the recent years. Most of the rice consumers of all over the world prefer a high yielding variety due to its high yield. In Bangladesh there are more than four thousand of local landraces of rice, adopted in different parts of the country some of which have very nice quality: fine, tasty, and high yielding. Rice is rich in carbohydrate. The protein content is about 8.5 percent. Rice does not have C and A vitamins. The thiamin and riboflavin contents are 0.27 and 0.12 micrograms respectively.

The success of rice production technologies depends on its dissemination among the potential users, which ultimately is measured by the level of its adoption. It is assumed that notable improvements can take place in rice production system among the farmers of Jalma union if farmers adopt the package of technologies properly. This is undoubtedly an educative process and concerned mainly in increasing agricultural production and improving living standard of farmers. An individual usually doesn't adopt a new technology unless he finds the benefit of it by himself. Even if he is convinced about its benefit still he may not use the same due to lack of financial capability. Sometimes he may have means to use the technology but his social norms and traditions do not encourage him to use the same for prestigious factors.

Generalization from studies conducted at home and abroad regarding the adoption of innovations may not be always applicable due to considerable variation in attributes of the innovations and for various other factors. It will be necessary to have a clear

understanding of the present status of adoption of selected recommended agronomic practices for boro rice production by the farmers. Since the country is densely populated there is a least scope to increase production by horizontal expansion. Consequently intensive or vertical expansion by using high cost agricultural practices and input are the only way to increase food production. These inputs considered are usually pure seeds, fertilizers, irrigation, pesticides etc. Accordingly efforts are being made to encourage farmers to accept and make use of the research findings. Nevertheless, the technologies are not being used by all the farmers at an equal rate. Some of them respond to an innovation quickly while others delay or sometimes don't adopt at all.

According to Rogers (1995), "Adoption is a decision to make full use of an innovation as the best course of action available". Ray (1995) also said that when an individual takes up a new idea as the best course of action and practices it, the phenomenon is known as adoption. It is, therefore, necessary that the concept and benefits of modern technologies should be disseminated to the farmers in a convincing and attractive manner, so that farmers respond quickly to adopt those technologies.

1.2 Statement of the Problem

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. It is assumed that notable improvements can take place in Bangladesh agriculture if the available practices are accepted and adopted by the farmer. For wider adoption of selected boro rice production practices, it is necessary to have a clear understanding of the present status of adoption of selected rice production practices by the farmers. It is also necessary to have an understanding of the factors, which contributed to adoption of selected production practices. Adoption of selected recommended practices of boro rice are influenced by the farmer's demographic and socio-economic position. An understanding of the relationship of farmer's adoption behavior with their selected characteristics as well as the problems faced by the respondents will be helpful to the planners and extension workers. The purpose of this study, therefore, was to explore the relationships between different characteristics of the farmers and their adoption of selected recommended practices of boro rice cultivation.

Considering the needs for understanding the farmers, the researcher undertook the present study entitled, Adoption of Selected Recommended Agronomic Practices by the Boro Rice Growers of Jalma Union Under Khulna District. The important purpose of the study was to have an understanding on the adoption of selected rice production practices by the farmers and about some selected factors contributing in the adoption of selected production practices. The following questions were answered by this piece of study.

- What were the selected characteristics of the farmers?
- What were the selected recommended practices for boro rice production that have been adopted by the farmers of the Jalma union in Khulna district?
- To what extent the farmers had adopted the selected rice production practices?
- What were the farmer's selected characteristics having relationships with the adoption of selected rice production practices by the farmers?

1.3 Objectives of the Study

The following objectives were formulated to give clear direction to the study:

- (1) To determine and describe the selected characteristics of the boro rice growers.
- (2) To identify the selected recommended agronomic practices that have been adopted by the farmers..
- (3) To determine the extent of adoption of the selected recommended agronomic practices by the boro rice growers.
- (4) To explore the relationships between the selected characteristics of the boro rice growers and their extent of adoption of selected recommended agronomic practices of boro rice.

1.4 Scope & Limitation of the Study:

Considering the time, money and other necessary resources available to make the study manageable and meaningful, it was necessary to consider the following limitations:

1. The study was confined in 4 villages of Jalma union under Botiaghata upazilla of Khulna district.
2. The study was confined mainly to adoption of selected recommended agronomic practices by the boro rice growers of Jalma union under Khulna district.
3. Population of the present study was kept confined within the heads of farm families in the study area, because they were the decision makers in their respective families in respect of adoption of selected recommended agronomic practices of Boro rice.
4. The study focused on the adoption of selected production technologies i.e. seed bed preparation, seed bed size, land preparation, laddering, fertilizer application, variety, seed rate, source of seed, transplanting, spacing, number of seedling per hill, sowing time, intercultural operation, irrigation, pest control, fertilizer (urea) 2nd time, fertilizer (urea) 3rd time, harvesting time and threshing.
5. There are many characteristics of the farmers of Jalma union of Khulna district but only eleven characteristics of the farmers were selected for investigation in the study.
6. The researcher relied on the data furnished by the farmers from their memory during interview.
7. There are many technologies associated with boro rice production. Here seed bed preparation, seed bed size, land preparation, laddering, fertilizer application, variety, seed rate, source of seed, transplanting, spacing, number of seedling per hill, sowing time, intercultural operation, irrigation, pest control, fertilizer (urea) 2nd time, fertilizer (urea) 3rd time, harvesting time and threshing were considered.
8. The study was confined with the selected recommended agronomic practices of boro rice growers during boro season of the year 2008-2009.

The findings of the study are considered to be useful for Jalma union of Khulna district. However, the findings are also generally applicable to other areas of Bangladesh where the social ecosystem does not differ much from those of the study area. Thus, the findings are expected to be useful to the planners for preparation of

programmes for rapid adoption of selected recommended agronomic practices by boro rice growers. The findings may also be helpful to the extension workers of different national departments/organizations to improve their technique and strategy of action for effective working method with the rural people to generate rural employment and to improve rural economy. Finally, there is a great scope for investigation on farmer's adoption of selected recommended agronomic practices, because no research work was conducted so far in Jalma union of Khulna district of Bangladesh.

1.5 Assumptions

"An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence" (Goode, 1945). An assumption is taken as a fact or belief to be true without proof. In this study, the researcher had the following assumptions in mind while undertaking this study.

1. The responses furnished by the respondents were reliable and the respondents truly and freely expressed all facts concerning the adoption of selected recommended agronomic practices of boro rice production and their selected characteristics.
2. The respondents included in the sample were competent to give proper responses to the queries included in the interview schedule.
3. The researcher who acted as interviewer was well adjusted to the social and cultural environment of the study area, hence, the data collected by him from the respondents were free from bias.
4. Views and opinions made by the respondents were representative of the whole population of the study area.

1.6 Statement of Hypothesis

In studying relationship between variables a hypothesis was formulated which stated the anticipated relationship between the variables. The null hypotheses were framed as "There is no relationship between the selected characteristics of the farmers and their adoption of selected recommended agronomic practices of boro rice". The selected characteristics of the farmers were:

- Age
- Education

- Farming experience
- Family size
- Family member involved in agriculture
- Farm size
- Organizational participation
- Family income
- Extension media contact
- Training experience
- Agricultural knowledge

1.7 Definition of Related Terms

The terms which used throughout the study were defined below for the clarity of understanding:

Adoption

Adoption is the implementation of a decision to continue the use of an innovation. According to Rogers (1995), adoption is a decision to make full use of an innovation as the best course of action available". When an individual takes up a new idea as the best course of action and practices it, the phenomenon is known as adoption (Ray, 1991).

Age

It refers to the period of time from his birth to the time of investigation. In this study the age of boro rice growers were considered only.

Education

Education refers to the desirable change of human behavior, i.e. change in knowledge, skill and attitude of an individual through reading, writing and other related activities. In this study education status of boro rice growers of Jalma union was taken into consideration.

Farming experience

It refers to the period of working with rice cultivation and was measured by year of rice cultivation.

Family size

Family size refers to the total number of individuals directly dependent upon the respondent farmers for fooding, clothing, education and for other socio-economic demands. They usually live in the same home and share same kitchen. Family members include respondent himself, his wife, children, brothers, sisters and parents.

Family member involved in agriculture

It refers the total number of individuals in a same family directly involved in agriculture. They usually live in the same home and share their income into the family.

Farm size

Farm size refers to the total area a boro rice grower on which family carry out farming operation. The area was estimated in terms of full benefit of the farmer's family.

Organizational participation

Organizational participation is referred to the degree to which a farmer takes part in different social organization either as an ordinary member, executive committee member or executive officer with in a specified period of time.

Family income

Annual income of a respondent refers to the total earnings receipt from business, land, works, job, and investment etc during the year of 2007-2008. It is expressed in Taka.

Extension media contact

It refers to the exposure of the respondents with extension personnel, mass media and group activities.

Training experience

An individual in a formal training course was measured in terms of days of training.

Agricultural knowledge

It is the extent of basic understanding of the farmers in different aspects of agricultural subject matters i.e. crops, livestock, fisheries, agro-forestry, soil, seed, fertilizer, insects and diseases of crops, high yielding variety etc. Agricultural knowledge of a respondent was measured by counting agricultural knowledge score.

Extent of adoption

Ray (1991) defined extent of adoption as “The degree to which the farmer has actually adopted a practice.”

Boro rice

It referred to the modern variety which is introduced by Bangladesh Rice Research Institute (BRRI) and possesses the quality for better performance in respect of yield, quality, insect and disease resistance and this boro rice grown during December to February where seedling are raised in a seedbed and transplanted in the main field. The varieties are BR 3, BR 12, BR 14, BR 19, BR 26, BRRI dhan28, BRRI dhan29, BRRI dhan35, BRRI dhan36 etc.

Seedling growing method

It refers to a standard method of raising seedling recommended by BRRI. Here it is also included the use of chemical fertilizer in the seedbed when necessary.

Seedling age

It refers to the optimum age of seedling for transplant that is recommended by BRRI. For BR 3, BR 14, BR 26, BRRI Dhan28, and BRRI Dhan29, BRRI suggested the time as 40-50 days.

Balanced fertilizer dose

The balanced fertilizer dose refers to the recommended doses of various chemical fertilizers for Jalma union, Khulna district. Those are mentioned below:

Cow dung-10-12 ton /ha

Urea-220 Kg/ha

TSP-120 Kg/ha

MoP-85Kg/ha

Gypsum-60 Kg/ha

Supplementary irrigation

Boro rice cultivation usually requires artificial application of water, i.e. irrigation water. Supplementary irrigation is referred to the use of irrigation water at the time of shortage of water or drought in cropping period.

Plant protection measures

It is referred to the insecticide and fungicides used in boro rice cultivation against insects and disease respectively.

Assumption

An assumption is “the supposition that an apparent fact of principle is true in the light of the available evidences” (Goode,1945).

Hypothesis

Defined by Goode and Hatt (1952), a proposition which can be put to “a test to determine its validity”. It may be true or false, it may seem contrary to or in accord with common sense. However, it leads to an empirical test.

Null hypothesis

The hypothesis which is picked for statistical test is null hypothesis (H_0). In this study the null hypothesis was stated that there was no relationship between the concerned variables and adoption of selected recommended boro rice technologies.

Statistical test

A body of rules which help to take decision regarding acceptance or rejection of the hypothesis is defined as test. In this study if a null hypothesis is rejected it is assumed that there is a relationship between the variables.

Rahman (1974) studied the adoption of IR-20 variety of paddy by the farmers in Bhabakhali union of Mymensingh district. He found that 29 percent of the growers had medium adoption of IR-20 while 31 percent of the growers did not adopt the innovation.

Mohammad (1974) studied the extent of adoption of insect control measures by the farmers in Khamar union of Rajshahi district. He found that among the respondent farmers, 25 percent did not adopt insect control measures, 28 percent had high level of adoption, 32 percent had medium level of adoption and 25 percent had low level of adoption.

Karim (1974) carried out a study on the adoption of fertilizers by transplanting aman growers in former Keyotkhali union of Mymensingh district. He investigated the adoption of three fertilizers urea, triple super phosphate (TSP) and muriate of potash (MP). He expressed that 4 percent of the respondent growers had high level of adoption of the fertilizers, 9 percent had medium adoption and 41 percent had low adoption. Forty six percent (46) of the remaining respondent growers were non adopters.

Sobhan (1975) studied the extent of adoption of ten winter vegetables namely, tomato, radish, lettuce, potato etc in Boilor union of Mymensingh district. Overall adoption scores indicated that 27 percent of the farmers did not adopt winter vegetables cultivation while 48 percent had low adoption and 25 percent high adoption.

Razzaque (1977) studied on the extent of adoption of HYV rice in the three villages of Agricultural University Extension Project area. He observed that among the respondent growers, 6.6 percent of the farmers had high adoption of HYV rice, 33.3 percent had medium adoption and 40 percent had low adoption.

Ahmed (1977) studied the extent of adoption of three specific practices of jute cultivation in Noapara union of Faridpur district. He observed that among the respondent farmers 98 percent adopted the recommended varieties of jute, 72 percent adopted plant protection measure and 49 percent adopted recommended dose of fertilizer.

Hossain (1981) studied on the relationships of the farmers (jute growers) with their adoption of improved practices of Jute cultivation. He found that more than half (54 percent) of the respondents had medium adoption of the improved practices compared to 31 percent having high adoption and 15 percent low adoption.

Hossain (1983) carried out the research study on the extent of adoption of HYV rice as transplanted Aman and other related aspects in Bhabakhali union of Mymensingh district. He observed that among the respondent farmers, 54 percent had high adoption of HYV rice and 46 percent had medium adoption of HYV rice as transplanted Aman.

Haque (1984) investigated the research problem on the extent of adoption of improved practices in sugarcane cultivation in selected areas of Jessore district. He observed that 62.75 percent respondent growers adopted early time of planting 60.75 percent of the respondent growers adopted recommended doses of fertilizers and 54.9 percent respondent growers adopted trench method.

Karim and Mahboob (1986) studied on the adoption of HYV wheat in Kushtia union of Mymensingh district. They found that among the respondent wheat farmers, 74 percent adopted HYV wheat cultivation and 26 percent farmers were non-adopters.

Karim and Mahbood (1986) studied the adoption of HYV wheat in Kushtia union of Mymensingh district. They found that among the respondent wheat farmers 74 percent adopted HYV cultivation and 26 percent farmers were non-adopters

Hossain (1987) stated, "If technology is to be made adaptable with the joint efforts of scientists, technologists, extension personnel and farmers, participation of concerned peer group, client groups and their associates are essential. The characteristics of the effective technologies are that they are technically sound, they can be disseminated effectively, they are economically viable and also socially acceptable."

Gogoi and Gogoi (1989) conducted a study on the adoption of recommended plant protection in rice in Jorhat district of Asam state in India. The recommended practices were selection, seed treatment, growing of tolerant or resistant variety prophylactic measures and chemical protection measures. The study revealed that among the respondents 50 percent had low-level adoption, 36.36 percent had medium level adoption and 13.64 percent had high level of adoption of the recommended plant protection practices.

Naika and Rao (1989) found in some selected villages of Mysore district that more area was brought under plant protection chemicals after adoption of recommended plant protection chemicals. The area increased from 45.75 acres to 104.75 acres in adopter villages and from 8 acres to 11 acres in non-adopter villages.

Juliana *et al.* (1991) undertook a study on the adoption of integrated pest management practices in five villages of vasudevanalhur block in Tirunelvi district, Tamilnadu, India. They found that about 50 percent of marginal farmers, 47.50 percent of small farmers, 52.50 percent of big farmers had medium adoption and 42.50 percent of big farmers, 22.50 percent of small farmers and 5 percent of marginal farmers had high level of adoption. In both cases, big farmers participation in adoption was higher in comparison to other categories of respondent farmers.

Okoro *et al.* (1992) stated, "Adoption of the new practices tended to be high for less complex and less readily available ones, while low for relatively more complex and expensive practices."

Kashem and Hossain (1992) conducted a research study on adoption behavior of sugarcane growers of Zilbangla Sugar Mill, Dewanganj, Jamalpur, Bangladesh. They found among the respondent growers, that 89 percent had high level of adoption of recommended practices of sugarcane.

Singh *et al.* (1992) undertook a research study in India on factors affecting the adoption of improved sugarcane production technology. They observed that majority of sugarcane growers had the medium level of adoption and were partial adoption of scientific recommendations of sugarcane production technology.

Kher (1992) conducted a study on the adoption of improved wheat cultivation practices in selected villages of Rajouri block. He found that 72 percent of the respondent had medium level of adoption, 17 percent low level of adoption and 11 percent high level of adoption.

Nikhade *et al.* (1993) observed in their study on the adoption of improved practices of soybean cultivation that cent percent adopted improved varieties. More than 82 percent had complete adoption of package practices like time showing, spacing and intercultural operations. Partial adoption was observed majority of the soybean growers (74.6 percent) with regard to recommended seed rate.

Hasan (1996) stated, "An increased rate and extent of adoption of selected technologies are vitally important for increasing the yield of field crops, vegetables production and forestry products."

Islam (1996) stated, "Farmers would show higher interest to those technologies where their economic safety is guaranteed."

Rahman (1999) studied the adoption of balanced fertilizer by the Boro rice farmers of Ishwarganj thana. He found that the extent of use of balanced nitrogenous fertilizer, 48.57 percent of the farmers had optimum adoption and above optimum respectively. In respect of extent of use of balanced phosphoric fertilizer, 79.05 percent of the farmers had below optimum adoption compared to 20.95 percent having optimum adoption regarding the extent of use of balanced Potassic fertilizer, 80.95 percent of the farmers had below optimum adoption compared to 18.10 and 0.95 percent having optimum and above optimum adoption, respectively.

Podder (1999) concluded a research study on the adoption of Mehersagar banana by the farmers. He found 47 percent of the respondents had medium adoption compared to 14 percent having low and 39 percent having high adoption.

Haidar and Hassan (2001) studied the adoption level of improved package for T Aman rice cultivation in Gouripur upazilla of Mymensingh district. He found that the 5 percent farmers were non-adopter, 62 percent had low adopter, 24.5 percent were medium adopter and 8.5 percent high adopter. A Vast majority (95 percent) of the farmer's adopted MV programmer of T Aman rice.

Hussen (2001) conducted an investigation on adoption of modern sugarcane cultivation by the farmers of Dewanganj upazila in Jamalpur district. The study revealed that about 91percent of the respondents had medium adoption of modern sugarcane cultivation practices compared to 7 percent having low and only 2 percent having high adoption of modern sugarcane cultivation.

Sardar (2002) studied on adoption of IPM practices by the farmers under PETRRA Project of RDRS. He observed that majority (45.9 percent) of the farmers had medium, 38.3 percent had low and 15.8 percent had high adoption of IPM practices.

Rahman (2003) revealed that about half (47 percent) of the growers had medium adoption, 44 percent had low and 1 percent had high adoption of year round homestead fruit cultivation practices .

Hossain (2003) found that majority (67 percent) of the Boro rice farmers had medium adoption, 17 percent had low adoption and 16 percent high adoption of modern Boro rice cultivation practices.

Hossain (2006) revealed that the highest proportion (49percent) of farmers felt under medium adoption category , while 26 percent had high adoption and 25 percent had low adoption of selected high yielding varieties of rice.

2.2 Research findings related to relationship between the farmers' characteristics and their adoption of innovations

2.2.1 Age and adoption of innovations

Haque (1984) studied adoption of improved sugarcane practices in some selected areas of Jessore district. The findings of the study indicated a positive relationship between the age and adoption of improved sugarcane cultivation practices.

Singh and Ranjendra (1990) in their study on adoption of improved sugarcane variety found that age were to have positive and significant associated of adoption of 767 variety of sugarcane.

Singh (1991) conducted a study to determine the extent of adoption of selected recommended practices. He found no relationship between the age of the farmers and their level of adoption of plant protection measures.

Pathak and Sasmal (1992) observed that there was positive and significant relationship between the age of the marginal farmers and their adoption of jute technologies. Similar findings were observed by Ali *et al.* (1986), Singh and Rajendra (1990), Okoro and Obibuaka (1992), Kashem and Hossain (1992), Kashem (1991), Sarder (2002), Hossain (2003) and (2006).

Islam (1993) conducted a study, which concluded that age of potato growers had no significant relationship with the adoption of improved practices in potato cultivation.

Islam (1993) observed that there was no relationship between the age of potato growers and their adoption of improved practices in potato cultivation. Similar results were observed by Karim and Mahaboob (1986), Rahman (1998), Singh (1982), Kher (1992), Pathak *et al.* (1992) Narwal *et al.* (1991), Hossain *et al.* (1991) and Rahman (2001).

Muttaleb (1995) reported that the age of the farmers had no relationship with overall adoption of potato technologies.

Islam (1996) conducted a study on farmer's use of indigenous technical knowledge (ITK) in the context of sustainable agricultural development. He found that age of the farmers had significant negative relationship with their extent of use of ITK.

2.2.2 Education and adoption of innovations

Hossain (1981) in his study found no significant relationship between education of the farmers and their adoption of improved farm practices.

Haque (1984) conducted that education of cane growers significantly influenced the adoption improved practices in sugarcane cultivation in some selected areas of Jessore district.

Kaur (1988) found that education influenced the opinion of the women about adoption of vegetable gardening, animal husbandry etc.

Mustafi *et al.* (1987) reported that education did not have any significant effect on the adoption of modern varieties of rice in Bangladesh.

Hasan (1996) concluded a study on adoption of some selected agricultural Technologies among the farmers perceived by the frontline GO and NGO workers. He observed that education have no significant relationship with the perceived adoption of selected agricultural technologies. Similar results were found by Kher (1992), Ali (1993), Islam (1996) and Hossain (1999).

Sarker (1997) conducted a study to determine the relationship between the characteristic of potato growers and their adoption of improved potato cultivation practices in five villages of Comilla district. He found that education of potato growers had significant relationship with their adoption of improved potato cultivation practices.

Alam (1997) observed that the level of education of the farmer had a positive and significant relationship with the use of improved farm practices. Sarder (1997) and Chowdhury (1997) also found similar findings about the relationship between education and adoption of improved technologies.

Chowdhury (1997) found a positive significant relationship between the education of the farmers and their adoption of selected BINA technologies. Similar results were

found by Halim (1989), Islam (1993), Haque (1993), Khan (1993), Hossain *et al.* (1997), Pal (1995) and Ali *et al.* (1986).

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that academic qualifications of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption and modern boro rice cultivation practices.

Hossain (2006) concluded that the education of the farmers had a significant and positive relationship with their adoption selected of HYV rice. Similar findings were also observed by Humid (1995), Khan (1993) and Haque (1993).

2.2.3 Farming experience and adoption of innovations

Chowdhury (1996) conducted a study in Nowabgong, Dhaka on the factors affecting adoption behavior of Boro rice growers. He reported that farming experience significantly influenced farmers in accepting production technology.

2.2.4 Family size and adoption of innovations

Hossain (1983) in his study in Bhabakhali union of Mymensingh district observed that family size of the farmers had no significant relationship with their adoption of HYV rice as transplanted aman. Though the relationship was not statistically significant, the chi square value for the relationship was quite large and approaching the level of significance. There was an appreciable trend of adoption of small family category, being much lower than that in the medium family and the big family categories.

Ali *et al.* (1986) in their study found that adoption of improved sugarcane production techniques significantly increased with increased family size.

Mustafi *et al.* (1987) in their study found that number of family had no significant effect on adoption of modern varieties of rice in Bangladesh.

Hossain (1991) in his study in Sadar thana of Jamalpur district observed that the family size of the farmers had no significant effect on the adoption of improved farm practices.

Alam (1997) in his study found that family size of the farmers had positive and significant relationship with their use of farm practices in rice cultivation.

Hussen (2001) conducted a study on farmer's knowledge and adoption of modern sugarcane cultivation practices. He found that the family size of the growers had no significant relationship with their adoption of modern sugarcane cultivation practices.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that family size of the farmers had no significant relationship with their adoption of Aalok 6201 hybrid rice.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was no relationship between family size and adoption of integrated homestead farming technologies.

Hossain (2003) found that family size of the farmers had no significant relationship with their adoption of modern Boro rice cultivation practices.

Hossain (2006) concluded that family size of the farmers had significant relationship with their adoption of HYV rice.

2.2.5 Farm size and adoption of innovations

Ogunfiditimi (1981) found that farm size had a negative correlation to adoption of the new farm practices.

Rahman (1986) observed that farm size had significant and positive relationship with their adoption of improved practices in transplanted aman rice.

Mustafi *et al.* (1987) in their study found that size of farm had significant and positive relationship with the adoption of modern varieties of rice in Bangladesh.

Gogoi and gogoi (1989) in their study observed that size of land holding of farmers had a significant relationship and positive effect on their adoption of plant protection practices.

Hossain (1991) found that size of farm had no significant relationship with adoption of improved farm practices in wheat cultivation.

Sarker (1997) found that farm size of the potato growers had a significant positive relationship with their adoption of improved potato cultivation practices. Similar findings between farm size and adoption of selected BINA technologies was also reported by Chowdhury (1997).

Alam (1997) studied the use of improved farm practices in rice cultivation by the farmers. The findings of the study showed that farm size of the farmers had a significant relationship with their use of improved farm practices in rice cultivation.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that farm size of the farmers had a significant and positive relationship with their adoption of Aalok 6201 hybrid rice.

Aurangozed (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was no relationship between homestead area and adoption of integrated farming technologies.

Hossain (2003) concluded that farm size of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation.

Hossain (2006) found that the farm size of the farmers had an insignificant relationship with their adoption of selected HYV rice.

2.2.6 Organizational participation and adoption of innovations

Hossain (1971) study revealed a positive significant relationship of organizational participation of the farmers with their adoption of recommended doses of fertilizers and plant protection measures. Similar result was also reported by Hossain (1991).

Hossain (1983) in his study found that organizational participation of transplanted aman growers had no relationship with their adoption of HYV rice.

Kher (1992) carried out a research study on the adoption of improved wheat cultivation practices by the farmers of selected village of Rajouri block, India. He observed that there was no significant relationship between the farmer's social participation and their adoption of improved wheat cultivation practices.

Khan (1993) found that organization participation of the farmers had positive relationship with their adoption of insecticides.

Islam (1996) reported that organizational participation of the farmers had no relationship with their extent of use of indigenous technical knowledge in the context of sustainable agricultural development.

Hussen (2001) concluded that organizational participation had positive significant relationship with their adoption of modern sugarcane cultivation practices.

Hossain (2003) concluded that organizational participation of the farmers had no significant relationship with their adoption of modern Boro rice cultivation.

Hossain (2006) revealed that organizational participation of the farmers had no significant relationship with their adoption of HYV rice.

2.2.7 Family income and adoption of innovations

Hossain (1981) found in his study a non-significant relationship between income of the farmers and their adoption of improved farm practices.

Hossain (1983) made an investigation in Mymensingh district and found that annual income of the farmers had a negative relationship with their adoption of HYV rice as transplanted aman.

Hoque (1993) found a negative and significant relationship between farm income and adoption of improved practices in sugarcane cultivation.

Pal (1995) in his study found a positive and significant relationship between income of the farmers and their adoption of recommended practices in sugarcane cultivation.

Sarker (1997) found that family income of potato growers had significant positive relations with their adoption of improved potato cultivation practices. Similar results were observed by Hossain (1999), Chowdury (1997), Sarker (1997), Alam(1997), Rahman (2001), Hussen (2001), Aurangozeb (2002), Hossain (2003), Hossain (2006), Rahman (1986) and Kashem (1991).

Chowdhury (1997) found that the annual income of the respondents had a positively significant relationship with their adoption of selected BINA technologies. Similar findings were reported by Sarker (1997) and Alam (1997) about relationship between annual income and adoption of improved technologies.

Hussen (2001) conducted a study on farmer's knowledge and adoption of modern sugarcane cultivation practices. He found that annual income of the cane growers had a positive significant relationship with their adoption of modern sugarcane cultivation practices.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in sadar upazilla of Mynensingh district. He found that annual income of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a positive relationship between annual income and adoption of integrated homestead farming technologies.

Rahman (2003) conducted a study on environmental impacts of modern agricultural technology diffusion in Bangladesh: an analysis of farmer's perception and their determinations. He found that annual income of the farmers had a positive relationship with their modern agricultural technologies diffusion in Bangladesh.

2.2.8 Extension media contact and adoption of innovations

Bezborra (1980) studied adoption of improved agricultural technology by the farmers of Assam. The study indicated a positive relationship between extension contact and adoption of improved cultivation practices.

Rahman (1986) conducted a study on correlates of adoption of improved practices in transplanted aman rice by the farmers. He observed a significant and positive relationship between the farmer's extension contact and their adoption of improved practices in transplanted aman rice.

Heong (1990) observed that the lack of adoption of IPM technologies in rice was frequently attributed to lack of sufficient extension.

Singh (1991) observed in his study that mass contact of the farmers had significant relationship with their level of adoption of plant protection measures.

Alam (1997) studied use of improved farm practices of rice cultivation by the farmers of Anwara thana of Chittagong district. The study indicated no significant relationship of extension contact of farmers with their use of improved farm practices in rice cultivation.

Hussen (2001) conduct a study on farmer's knowledge and adoption of modern sugarcane cultivation practices. He found that extension contact of the growers had significant relationship with their adoption of modern sugarcane cultivation practices.

Sardar (2002) concluded that the extension contact had positively significant relationship with their adoption of IPM practices.

Hossain (2003) concluded that communication exposure of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation.

Hossain (2006) concluded that the extension contact of the farmers had positive significant relationship with their adoption of selected HYV rice

2.2.9 Training experience and adoption of innovations

Hossain (1981) showed that proper training could raise the knowledge and skilled level of participants significantly.

Verma *et al.*(1989) found there was significant change in attitude of rural women from before training to after training in improved home making tasks. They said that due to gain in knowledge the attitude become more favorable.

Rahman (2001) observed in study that training received of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Islam (2002) conducted a study on farmer's knowledge and adoption of ecological agricultural practices under the supervision of Proshika. He found that agricultural training experience of the farmers had no significant relationship with their adoption ecological agricultural practices.

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He found that training experience of the farmers had a positive significant relationship with their adoption of IPM practices.

Haque (2003) found that training received of the respondent had positive significant relationship with their practices in farmer's adoption of modern maize cultivation technologies.

2.2.10 Agricultural knowledge and adoption of innovations

Most of the researchers found very high relationships between farmer's knowledge on a particular technology and its adoption.

Rahman (1995) in his study observed no significant relationship between farmer adoption of improved practices and their knowledge on improved practices of potato cultivation.

Moullik *et al.* (1996) conducted a study on predictive values of some factors of adopting nitrogenous fertilizers by the north Indian farmers in India. He found a significant positive relationship between agricultural knowledge and adoption of nitrogenous fertilizers among the cultivators.

Alam (1997) observed that agricultural knowledge of the rice growers had significant relationship with their use of farm practices in rice cultivation.

Sarkar (1997) found that potato production knowledge of potato growers had a positive and significant relationship with their adoption of improved potato cultivation practices.

2.3 The Conceptual Framework of the Study

The present study tried to focus two concepts: firstly the farmer's selected characteristics and secondly the adoption of selected recommended agronomic practices in boro rice cultivation. Adoption of an individual may be influenced and affected through interacting of many characteristics in his surroundings. It is

sometimes difficult to deal with all the factors in a single study. It was therefore, necessary to limit the characteristics which include age, education, farming experience, family size, family member involved in agriculture, farm size, organization participation, family income, extension media contact, training experience and agricultural knowledge.

An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A simple conceptual framework for the study is shown below:

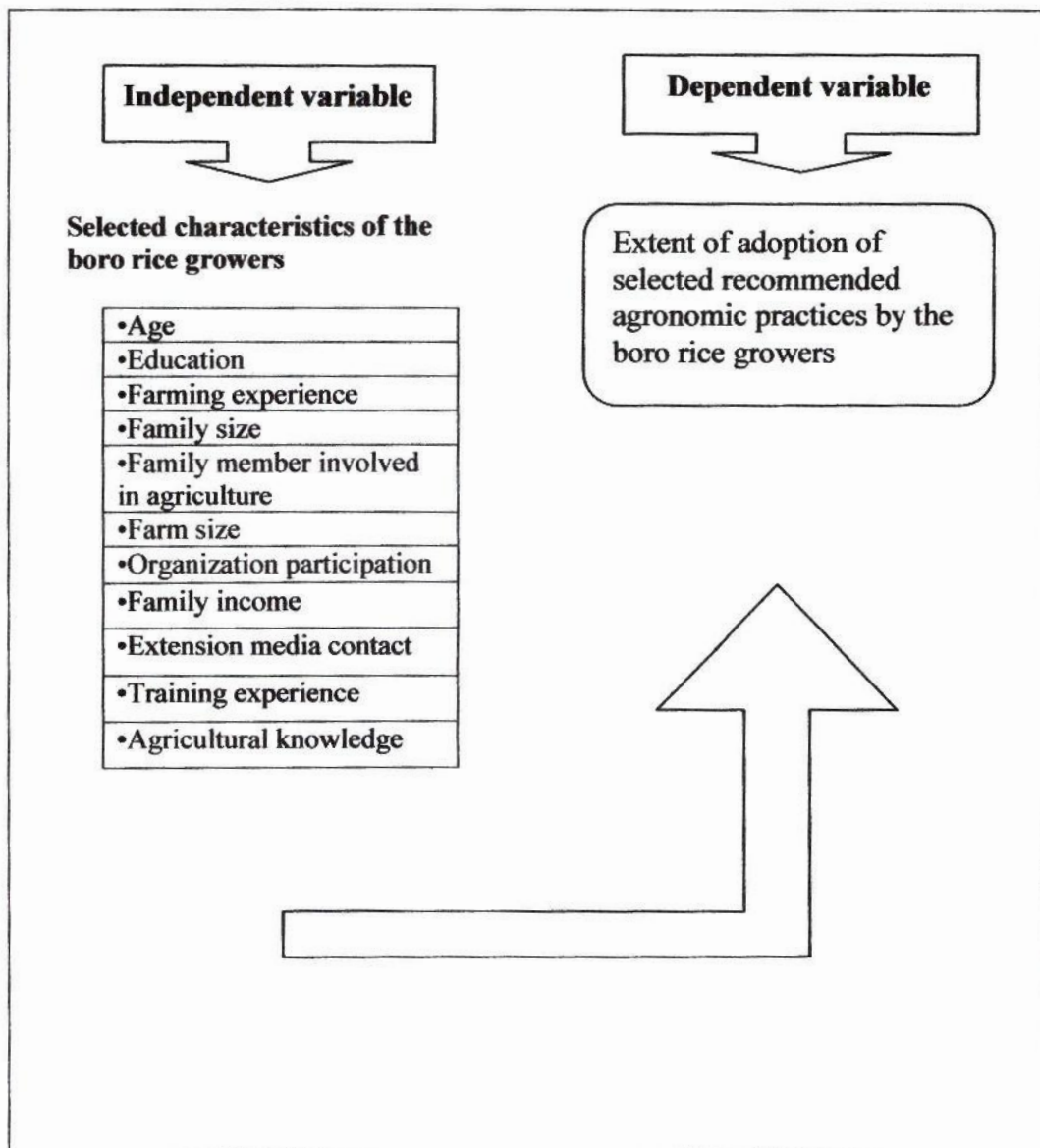


Figure 2.1 The Conceptual Model of the study

CHAPTER III METHODOLOGY

Methodology deserves a very careful consideration in conducting scientific research. For any scientific investigation methods and procedures are very important and require a very careful consideration. Importance of methodology in conducting any research cannot be undermined. Methodology enables the researcher to collect valid and reliable information and to analyze them properly to arrive at correct decisions. Keeping this point in view, the researcher took utmost care for using proper methods in all the aspects of this piece of research work. Methods and procedures followed in conducting the study have been discussed in this chapter. Further, the chapter includes the operational format and comparative reflection of some variables used in the study. Also statistical methods and their use have been mentioned in this chapter.

3.1 Locale of the Study

Four villages namely Nijkhamar, Bashbaria, Hogladanga and Krishnonagar of Jalma union of Batiaghata upazilla under Khulna district were purposively selected as the locale of the study. The area is just 12-14 kilometer away from the district head quarter. Total land area of Jalma union is 4650 ha and cultivated land area about 4080 ha. There are about 40 villages in the Jalma union and approximately 38000 people live in the union. The selected upazilla and its physical settings are shown in Figure 3.1.

3.2 Design of the Study

The study is a descriptive survey research. It was designed to determine the extent of adoption of selected recommended agronomic practices and to explore the relationship between the selected characteristics of the boro rice growers and their extent of adoption of selected recommended agronomic practices in boro rice cultivation.

the study (Table 3.1). Twenty (20%) percent of the population were selected through proportionate random sampling as the sample of the study by using random number table. Thus, the sample size of the study was 85 farmers. A reserve list of 20% farmers of sample respondents was also prepared by the same method so that the respondents of this list could be used for interview if the respondents included in the original sample were not available at the time of data collection. The distribution of the population and sample and number of farmers in the reserve lists are shown in Table 3.1.

Table 3.1 Distribution of population and sample of respondents

Serial	Name of the villages	Population (Boro rice growers)	Sample size (20% of the population)	Number of farmers in the reserve list
1	Hogladanga	125	25	5
2	Bashbaria	55	11	2
3	Nijkhamar	130	26	5
4	Krishnonagar	115	23	5
	Total	425	85	17

3.4.1 Development of the instrument

In order to collect relevant information from respondents an interview schedule was carefully designed focusing the objectives of the study. Both open and closed form, simple and direct questions were included in the interview schedule. The questions were systematically arranged to help the respondents to understand the consequence easily (Appendix A).

3.4.2 Pre-testing of the interview schedule

The interview schedule was pre-tested with 8 farmers and then it was finalized based on the experience of pre-test. The pre-testing facilitated the researcher to examine the suitability of different questions and status of the instrument in general. The final revised version of the instrument was prepared on the basis of suggestions and comments of the appropriate authority.

3.5 Data collection

Data were collected from randomly selected 85 farmers by the researcher himself through personal interview using an interview schedule. Data were collected from the respondent during the month of May to June of the year 2009.

3.6 Variables of the study:

In a descriptive social research, the selection of variables constitutes an important task. Success of a research to a considerable extent depends on the successful selection of the variables. A research hypothesis contains at least two elements independent variable and a dependent variable. Ezekiel and Fox (1959) stated variable as any measurable characteristics, which can assume varying or different values in successive individual cases. The researcher keeping in mind took adequate care in selecting the dependent and independent variables of the study. Before selecting variables, the researcher himself visited the study area and talked to the local farmers intimately and he was able to observe the various factors of the farmers, which might have influence on their adoption of selected recommended agronomic practices in boro rice production. Based on this experience, literature for the study, discussion with relevant experts and academicians and also with the research supervisor, the researcher selected the variables for this study. Two types of variables were concerned with the study such as Independent variables and Dependent variables.

i Independent variables:

An independent variable is that factor which cannot be manipulated by the experimenter in his attempt to ascertain the relationship to an observed phenomenon. The respondent's selected characteristics viz. age, education, farming experience, family size, family member involved in agriculture, farm size, organization participation, family income, extension media contact, training experience, agricultural knowledge were selected as independent variables.

ii Dependent variables:

A dependent variable is that factor which appears, disappears or varies as the experimenter introduces, removes or varies the independent variables. Extent of

adoption of selected recommended agronomic practices in boro rice cultivation was treated as dependent variable.

3.6.1 Measurement of variables

In order to conduct the study in accordance with the objectives, it was necessary to measure the selected variables. This section contains procedures for measurement of both independent as well as dependent variables of the study. The procedures followed in measuring the variables are presented below. The independent variables of this study were eleven (11) selected characteristics of the boro rice growers. These were: age, education, farming experience, family size, family member involved in agriculture, farm size, organization participation, family income, extension media contact, training experience, agricultural knowledge etc.

3.6.1.1 Age

The age of individual is one of the important factors pertaining to his personality make up which can play an important role in his adoption behavior. The age of a respondent farmer was measured by counting the actual years from his birth to the time of interview on the basis of his statement. A score of one (1) was assigned for each and every complete year of a respondent's age. Based on the information of the respondent's age they were classified into three categories, young aged (below 35 years), middle aged (36-50 years) and old aged (51 years and above).

3.6.1.2 Education

Education of a respondent was measured on the basis of his ability to read and write or received formal education up to a certain standard. Zero (0) for no schooling, one (1) score was assigned for each year of schooling. For example, if the respondent passed the final examination of HSC, his educational score was given as 12. Similarly if the respondents passed the final examination of class X ie S.S.C, his educational score was given as 10. Besides a score of one (01) was given to the respondents who could sign their name only.

3.6.1.3 Farming experience

The farming experience of a respondent was measured in terms of years of active involvement in farming activities on farm.

3.6.1.4 Family size

Family size of a respondent was measured in terms of actual number of dependent members assigning-score one (1) for each member of the family.

3.6.1.5 Family member involved in agriculture

No of family member involved in agriculture was determined in terms of actual number of family members who were involved in agricultural activities directly.

3.6.1.6 Farm size

Farm size was measured as the size of his farm (under boro rice and other crops) on which he continued his operations during the period of the study. The farm size of a respondent was measured in hectare by using the following formula:

$$Fs = A_1 + A_2 + \frac{1}{2} (A_3 + A_4) + A_5$$

Where,

Fs = Farm size

A₁ = Homestead area (with kitchen garden and pond)

A₂ = Own land under own cultivation

A₃ = Land taken from others on barga

A₄ = Own land given to others on barga

A₅ = Land taken from others on lease

3.6.1.7 Organizational participation

Organizational participation of a respondent was measured on the basis of nature of his participation in different organizations without considering the duration of participation. For participation, weight was assigned as 0, 1, 2 and 3 for no participation, general member, executive member and executive officer respectively. The score of participation of a respondent was determined by adding up the weighted scores for his participation in different organization.

3.6.1.8 Family income

Annual income of a respondent was measured on the basis of total yearly earning from agricultural and non-agricultural sources (business, service etc) earned by the respondent himself and other family members. For calculation of income score, one (1) was assigned for each one thousand taka income.

3.6.1.9 Extension media contact

Extension media contact refers to one's exposure to the influence of extension program through different communication media and sources. A four points rating scale like regularly, occasionally, rarely and not at all was employed against the 11 selected extension media. And a score of 3, 2, 1 and 0 was assigned against the rating scales respectively (item 9; interview schedule; Appendix A). Thus the extension contact score of a respondent was determined by adding the scores obtained by the individual against the selected extension media. The extension contact scores of individuals could range from 0-33, where 0 indicate no extension contact and 33 indicate very high extension contact.

3.6.1.10 Training experience:

Training experience of a respondent was determined in terms of actual numbers of training he has participated in his life. A score of '1' was assigned for each number of training he received. Thus the score for training experience was determined by summing up all the scores.

3.6.1.11 Agricultural knowledge

Agricultural knowledge of an individual was referred to the extent of knowledge about crops, livestock, fisheries, forestry etc. Agricultural knowledge of a farmer is the foundation of his farming business and is one of the important influencing factors on one's adoption behavior. Agricultural knowledge was measured by the total knowledge score about agriculture. The total assigned score was 28.

3.7 Measurement of dependent variables

The adoption of selected recommended agronomic practices by the boro rice growers was considered as dependent variable in this study. Adoption was measured on the basis of the use of nineteen (19) selected recommended agronomic practices of boro

rice. A 4-points rating scale such as strictly followed, moderately followed, partially followed and 'not at all' was employed to measure the extent of adoption and a score of 3, 2, 1 and 0 were assigned against the scales, respectively.

In another study of Islam (1996), a similar type of scale was used in determining the "Extent of Use of Indigenous Technical Knowledge (ITK) in the context of sustainable agricultural development". However, use of four-point scales identical to the above ones was strictly found in many studies employed to ascertain the "extent of communication media" by the respondents. The adoption scores of the respondents were computed on the basis of the respondents' uses of 19 selected agronomic practices.

The 19 selected recommended agronomic practices are:

1. Seed bed preparation (ploughing)
2. Seed bed size
3. Land preparation (ploughing)
4. Laddering
5. Fertilizer application
6. Variety
7. Seed rate
8. Source of seed
9. Transplanting
10. Spacing
11. Number of seedling per hill
12. Sowing time
13. Intercultural operation (weeding)
14. Irrigation
15. Pest control
16. Fertilizer (urea) application 2nd time
17. Fertilizer (urea) application 3rd time
18. Harvesting time
19. Threshing

As 19 recommended agronomic practices were selected for the study, so the range of selected recommended agronomic practices score of a respondent could vary from 0 to 57, where, '0' indicate no adoption and '57' indicate that the respondents strictly followed the selected recommended agronomic practices of boro rice. However, besides having calculated the "extent of adoption of selected recommended

agronomic practices" score for each of the 85 respondents, an effort was also made to compare the relative use of these practices. A Selected Recommended Agronomic Practices Adoption Index (SRAPAI) for each practice was developed to fulfill this objectives using the following formula:

$$\text{SRAPAI} = N_1 \times 3 + N_2 \times 2 + N_3 \times 1 + N_4 \times 0$$

Where,

SRAPAI= Selected recommended agronomic practices adoption index

N_1 = Number of farmers used/ followed strictly the selected recommended practices

N_2 = Number of farmers used/ followed moderately the selected recommended practices

N_3 = Number of farmers used/ followed partially the selected recommended practices

N_4 = Number of farmers not at all used/ followed the selected recommended practices

The SRAPAI for each of the selected recommended agronomic practices could range from 0 to 255, where 0 indicate no use of practices and 255 indicate highest use of the practices by each respondents.

3.8 Statistical treatment

Statistical measures, such as frequency, percentage, range, mean, standard deviation and rank order were used for descriptive data. The collected data were compiled, coded, tabulated and analyzed in accordance with the objectives of the study. Qualitative data were quantified by means of suitable scoring techniques. Correlation coefficient test was used to determine the relationship between the selected characteristics of the farmers and their extent of adoption of selected recommended

agronomic practices of boro rice production. Throughout the study the 0.01 and 0.05 levels of probability was used as the basis of rejection or accepting a null hypothesis. If the computed value of 'r' was equal to or greater than the table value of 'r' at 0.01 and 0.05 level for the relevant degrees of freedom, the null hypothesis was rejected and vice-versa for acceptance.

CHAPTER IV

FINDINGS AND DISCUSSION

The findings of the study and interpretations of the results have been presented in this chapter. Data obtained from 85 boro rice growers were compiled, tabulated and analyzed in line with the objectives. Data obtained from respondents by interviews were measured, analyzed and statistically treated according to the objectives of the study. This chapter deals with the findings of the study which have been discussed under the following headings: Socio-economic characteristics of the boro rice growers (farmers), extent of adoption of recommended agronomic practices in boro rice production by the farmers and relationships between the selected characteristics of the farmers and their extent of adoption of recommended agronomic practices in boro rice production.

4.1 Selected Characteristics of the Boro Rice Growers (Respondents)

Eleven characteristics of the respondents (boro rice growers) were selected to find out their relationship with their adoption of selected recommended agronomic practices in boro rice production. The selected characteristics included their age, education, farming experience, family size, family member involved in agriculture, farm size, organizational participation, family income, extension media contact, training experience and agricultural knowledge . These characteristics of the farmers have been described in this section.

4.1.1 Age

Age of the respondents was found to range from 20 to 75 years. The average age of the respondents was 45.55 years with the standard deviation 11.35. Based on their age, the respondents were classified into three categories as shown in Table 4.1.1

Table 4.1.1 Distribution of the respondents according to their age

Categories	Score(years)	Respondents	
		Number	Percentage
Young aged	Up to 35	18	21
Middle aged	(36-50)	45	53
Old aged	> 50	22	26
Total		85	100

Data furnished in Table 4.1.1 indicate that majority (53 percent) of the farmers fell in the middle age category, while 21 percent and 26 percent belonged to young and old age categories respectively. However, data also revealed that about three-fourths (74 percent) of the respondents in the study area were young to middle aged. Bashar (1993) and Hussien (2001) also found the similar findings in their study. Young people are generally receptive to new ideas and things. They have a favorable attitude towards use of new technology. However, the older farmers, because of their longer farming experience, might have valuable opinions in regard to adoption of recommended agronomic practices and modern agricultural technologies. The extension agents can make use of their views and opinions in designing their extension activities.

4.1.2 Education

Education of a respondent was measured by the level of his formal education i.e. highest grade (class) passed by him. The education score of the respondents ranged from 0 to 12, the average being 5.02 and the standard deviation was 3.13. Based on their level of education, the respondents were grouped into five categories as shown in Table 4.1.2.

Data presented in Table 4.1.2 indicate that a small proportion (5 percent) of the respondents fell under category of illiterate, 57 percent having primary education, 33 percent having secondary education and 05 percent above secondary education. As education can enlighten a family, it may contribute to the adoption of rice production practices.

Table 4.1.2 Distribution of the respondents according to their education

Categories	Score (year of study)	Respondents	
		Number	Percentage
Illiterate	0	4	05
Primary education	1-5	49	57
Secondary education	6-10	28	33
Higher secondary "	11-12	4	05
Total		85	100

Thus 95 percent of the respondents of the study area having primary to higher secondary level of education. The above picture of education of Jalma union under

Khulna district is good as compared to national average literacy (47.5 percent; Amnesty International, 2009).

4.1.3 Farming experience

The computed farming experience score of the farmers ranged from 3 to 50, the average being 23.98 and the standard deviation of 9.87. Based on their farming experience score, the farmers were grouped into three categories (Table 4.1.3)

Table 4.1.3 Distribution of the respondents according to their farming experience

Categories	Score(years)	Respondents	
		Number	Percentage
Low experience	Up to 15	17	20
Medium experience	16—30	48	56
High experience	>30	20	24
Total		85	100

Data presented in Table 4.1.3 reveal that majority (56%) of the respondents had medium farming experience compared to about one-fourth (24%) as high farming experience. Thus most (80%) of the respondents had medium to high farming experience. The farming experience of an individual helps him to learn new technologies and may lead him to take correct decisions.

4.1.4 Family size

The family size of the farmers ranged from 2 to 10 with an average of 5.03 and standard deviation of 1.56. On the basis of their family size, the farmers were classified into three categories as shown in Table 4.1.4

Table 4.1.4 Distribution of the respondents according to their family size

Categories	Score(number)	Respondents	
		Number	Percentage
Small size	1-4	43	51
Medium size	5-6	28	33
Large size	>6	14	16
Total		85	100

Data presented in Table 4.1.4 reveal that majority (51 percent) of the farmers fell under the small family category compared to 33 percent and 16 percent having

medium and large family category respectively. These findings indicate that most (84%) of the respondents had small to medium sized family. The data also indicate that the average family size (5.03 percent) of the respondents in the study area was lower than the national average of 5.4 (BBS, 1994). This may be due to the lack of proper adoption of family planning measures among the respondents.

4.1.5 Family member involved in agriculture

The family member involved in agriculture scores ranged from 1 to 4 with an average 1.28 and standard deviation 0.54. On the basis of their family member involved in agriculture, the farmers were classified into three categories as shown in Table 4.1.5

Table 4.1.5 Distribution of the respondents according to their family member involved in agriculture

Categories	Score(number)	Respondents	
		Number	Percentage
Low engagement	1	64	75
Medium engagement	2	19	22
High engagement	>2	2	03
Total		85	100

Data presented in Table 4.1.5 reveal that three fourths (75 percent) of the respondents family members had low engagement compared to 22 percent and 3 percent having medium and high engagement category respectively. This might be due to that the average family size of the respondents of the study area was lower (5.03) than that of national average (5.6) and most (84 percent) of the respondents had small to medium sized family (Table 4.1.4).

4.1.6 Farm size

Farm size was measured on the basis of the cultivated area either owned by a farmer or cultivated on barga system, the area being estimated in terms of full benefit to the farmers. The farm size varied from 0.01 to 8.13 hectares. The average farm size was 1.74 hectares with a standard deviation of 1.97. The respondents were classified into three categories based on their farm size (DAE, 1995). The distribution of the respondents according to their farm size is shown in Table 4.1.6.

Table 4.1.6 Distribution of the respondents according to their farm size

Categories	Score(ha)	Respondents	
		Number	Percentage
Landless	< 0.20	15	17
Marginal	0.20-0.40	11	13
Small	0.41-0.99	16	19
Medium	1.00-3.0	24	29
Large	>3.0	19	22
Total		85	100

Data presented in the Table 4.1.6 show that the highest proportion (29 percent) of the farmers had medium farm compared to 17 percent were landless and 13 percent having marginal and 19 percent having small farm. Majority of the farmers (51%) had medium to large sized farm. Ahmed (1977) also found the similar findings in their study.

The average farm size of the respondent farmers was 1.74 hectares, which is higher than the national average 0.81 hectare. Government Extension Department, (DAE, DOf, DLS), Development Agencies and Non- Government Organizations (NGOs) should pay attention to initiate programme for landless, marginal and farm holders on priority basis because those categories of farmers are also constituting a good percentage (49 percent) of the farmers in the study area.

4.1.7 Organizational participation

The observed organizational participation scores of the farmers ranged from 0 to 12 with an average 3.18 and standard deviation of 2.41. Depending on the organizational participation scores, the farmers were classified into four categories as shown Table 4.1.7

Table 4.1.7 Distribution of the respondents according to their organization participation

Categories	Score	Respondents	
		Number	Percentage
No participation	0	11	13
Low "	1-4	55	65
Medium "	5-8	16	19
High "	>8	3	3
Total		85	100

Data contained in Table 4.1.7 reveal that majority (65 percent) of the respondents had low organizational participation as compared to 13 percent no participation, 19 percent medium participation and 3 percent high organizational participation. It reveals that the most (84%) of the farmers in the study area were in low to medium organizational participation category. It means that the respondents are more or less interested in social participation.

4.1.8 Family income

The score was expressed in thousand “Taka”. The range of family income score was 70 to 270 with an average of 150.52 and standard deviation of 55.61. On the basis of annual income, the respondents were divided into three categories (Table 4.1.8)

Table 4.1.8 Distribution of the respondents according to their family income

Categories	Score(‘000 Tk)	Respondents	
		Number	Percentage
Low	<100	27	32
Medium	100-150	24	28
High	>150	34	40
Total		85	100

Data shown in Table 4.1.8 that highest proportion (40 percent) of the farmers had high annual income compared to (32 percent) had low annual income and (28 percent) having medium annual income. The average annual income of the farmers of the study area was much higher than the average per capita annual income of the country i.e.480 U.S. dollar (World Bank Development indicators 2007). This might be due to the fact that the respondents in the study area were not only engaged in agriculture but also earn from other sources, such as service, business etc.

4.1.9 Extension media contact

The computed extension media contact scores of the respondents ranged from 3 to 17 with an average 9.77 and standard deviation of 2.86 against the possible range of 0 to 33. On the basis of extension media contact scores, the respondents were classified into three categories: “no extension contact”(0), “low extension contact”(1-11), “medium extension contact” (12-22) and “high extension contact”(23 and above).The

distribution of the respondent according to their extension media contact is shown in Table 4.1.9

Table 4.1.9 Distribution of the respondents according to their extension media contact

Categories	Score	Respondents	
		Number	Percentage
No contact	0	0	0
Low "	1-11	21	25
Medium "	12-22	62	73
High "	≥ 23	2	2
Total		85	100

Data presented in Table 4.1.9 indicate that about three-fourths (73 percent) farmers of the study area had medium extension media contact, while 0 percent had no extension media contact, (25 percent) had low extension media contact and (2 percent) had high media contact. The findings of the study indicate that most of the respondents 98 percent had low and medium extension media contact with various information sources for getting necessary agricultural information. Bashar (1993), Pal (1995), Hussen (2001) and Islam (2002), observed almost the similar findings for getting necessary agricultural information.

4.1.10 Training experience

The computed training experience scores of the farmers ranged from 0 to 12, the average being 1.11 and the standard deviation 1.82 Based on their training experience scores, the farmers were grouped into three categories (Table 4.1.10)

Table 4.1.10 Distribution of the respondents according to their training experience

Categories	Score (No of Training)	Respondents	
		Number	Percentage
No experience	0	49	58
Low "	1-2	18	21
Medium "	3-4	16	19
High "	>4	2	2
Total		85	100

Data contained in Table 4.1.10 indicate that majority of the respondents (58 %) had no training experience compared to 21% having low training experience and 19% had medium training experience and 2 % had high training experience.

4.1.11 Agricultural knowledge

Agricultural knowledge score of the farmers were computed on the basis of their knowledge on 18 questions related to agricultural production (item no 11; interview schedule; Appendix A). The agricultural knowledge scores of the farmers ranged from 15 to 28 against the possible range 0 to 28 with an average of 21.55 and standard deviation of 2.95. On the basis of agricultural knowledge scores, the farmers were classified into three categories (Table 4.1.11). The distribution of the farmers according to their agricultural knowledge is shown in Table 4.1.11

Table 4.1.11 Distribution of the respondents according to their agricultural knowledge

Categories	Score	Respondents	
		Number	Percentage
Low knowledge	10	0	0
Medium "	11-20	36	42
High "	>20	49	58
Total		85	100

Data presented in Table 4.1.11 indicate that majority (58 percent) of the respondents had high agricultural knowledge compared to 42 percent had medium knowledge.

4.2 Adoption of selected recommended agronomic practices by the boro rice growers : Among the 19- selected recommended agronomic practices the boro rice growers adopted almost all practices with different extent.

4.2.1 Comparison among the extent of adoption of selected recommended agronomic practices

In order to compare the extent of adoption among the selected practices, a selected recommended agronomic practices adoption index (SRAPAI) was calculated based on the formula as described in chapter III. The (SRAPAI) along with their associated ranks appear in Table 4.2.1

Table 4.2.1 Comparison among the extent of adoption of selected recommended agronomic practices on boro rice production

SL. No.	Technologies	Frequency of Extent of adoption (N=85)					
		S	M	P	N	SRAPAI	Rank
1	Seed bed preparation	114(38)*	48(24)	14(14)	0(9)	176(85)	10
2	Seed bed size	0(0)	12(6)	39(39)	0(40)	51(85)	17
3	Land preparation (ploughing)	231(77)	10(5)	2(2)	0(1)	243(85)	4
4	Laddering	255(85)	0(0)	0(0)	0(0)	255(85)	1
5	Fertilizer application	3(1)	44(22)	60(60)	0(2)	107(85)	14
6	Variety	39(13)	74(37)	23(23)	0(12)	136(85)	13
7	Seed rate	78(26)	40(20)	24(24)	0(15)	142(85)	12
8	Source of seed	18(6)	20(10)	37(37)	0(32)	75(85)	15
9	Transplanting (Age of seedling)	174(58)	18(9)	16(16)	0(2)	208(85)	8
10	Spacing	18(6)	102(51)	28(28)	0(0)	148(85)	11
11	Number of seedling per hill	198(66)	32(16)	3(3)	0(0)	233(85)	6
12	Sowing time	93(31)	74(37)	17(17)	0(0)	184(85)	9
13	Intercultural operation (weeding)	192(64)	22(11)	10(10)	0(0)	224(85)	7
14	Irrigation	3(1)	28(14)	28(28)	0(42)	59(85)	16
15	Pest control	3(1)	4(2)	12(12)	0(70)	19(85)	18
16	Fertilizer (urea) 2 nd time	240(80)	6(3)	2(2)	0(0)	248(85)	3
17	Fertilizer (urea) 3 rd time	0(0)	0(0)	7(7)	0(78)	7(85)	19
18	Harvesting time	249(83)	4(2)	0(0)	0(0)	253(85)	2
19	Threshing	216(72)	24(12)	1(1)	0(0)	241(85)	5

*Figure in the parenthesis indicates the number of respondents

(Abbreviation: S=Strictly, M= Moderately, P =Partially, N= Not at all, SRAPAI= Selected Recommended Agronomic Practices Adoption Index)

A particular technology might be proved beneficial or suitable for a farmer but he may not be in a position to accept it due to his varied mental make-up and situational factors. Among the identified 19 selected recommended practices “laddering is the only selected recommended agronomic practice in boro rice cultivation followed by all the respondents found as strictly adopted practices (Table 4.2.1 and Supp Tab 1; Appendix B)”. Because the farmers know that if the land is not made level by laddering the irrigated water will not reach every where of the rice field. The other highly/ strictly followed recommended practices were land preparation, number of seedling per hill, intercultural operation (weeding), fertilizer (urea) application 2nd

time, harvesting time and threshing (Table 4.2.1 and Supp Tab 1; Appendix B). The findings also indicate that the farmers are conscious about harvesting time because they know that delay harvest results in yield loss. Besides the farmers were interested to follow urea fertilizer application (2nd time) because it helps in more tiller initiation and increases the number of tillers which result in more grain production. On the other hand seed bed preparation, variety, seed rate, transplanting, spacing and sowing date are the moderately adopted practices (Table 4.2.1 and Supp Table 1; Appendix B). So the serial number of moderately adopted 6 practices are 1, 6, 7, 9, 10 and 12 (Supp Table 1; Appendix B). The partially adopted practices were seed bed size, fertilizer application, source of seed, irrigation, pest control and fertilizer (urea) application at 3rd times (Table 4.2.1 and Supp Table 1; Appendix B).

Among the 19 identified recommended agronomic practices the highest adopted practice was found laddering and the lowest adopted practice was found fertilizer (urea) application at 3rd time. Laddering was the top adopted practice which was strictly followed by all the respondents while none of the respondents strictly followed the seed bed size and recommended use of fertilizer (urea) at 3rd time.

The extent of adoption of 19-selected recommended agronomic practices by the boro rice growers are diagrammatically shown in Figure 4.1.

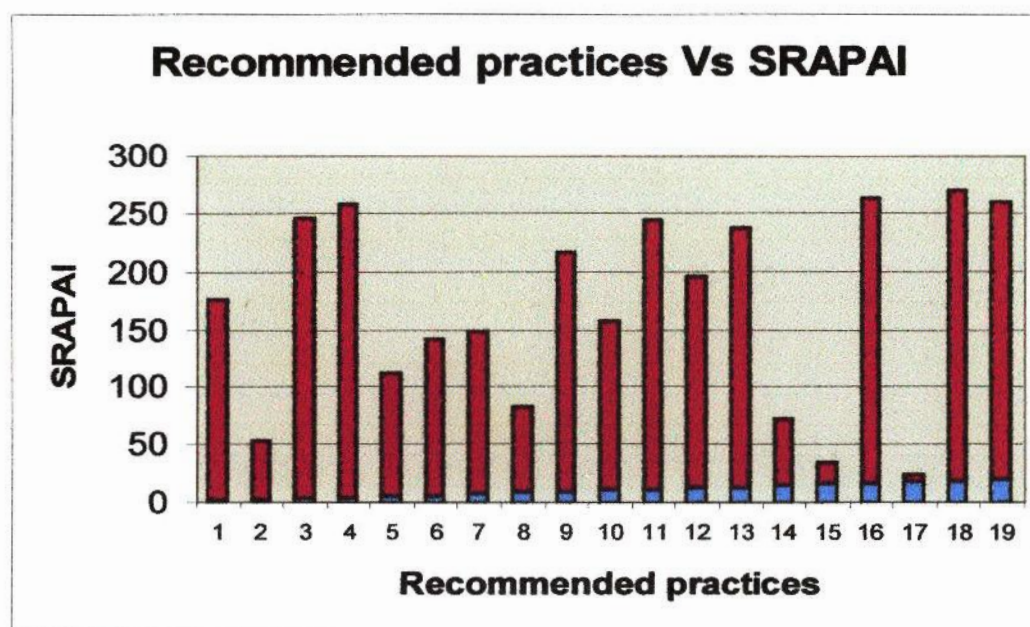


Figure 4.1 Bar graph showing the extent of adoption of selected recommended agronomic practices

(1= Seed bed preparation, 2= Seed bed size, 3= Land preparation (ploughing), 4= Laddering, 5=Fertilizer application, 6=Variety, 7=Seed rate, 8=Source of seed, 9=Transplanting (age of seedling) 10=Spacing, 11=Number of seedling per hill, 12= Sowing time, 13=Intercultural operation (weeding), 14=Irrigation, 15=Pest control, 16=Fertilizer (urea)2nd time, 17= Fertilizer (urea) 3rd time, 18=Harvesting time and 19= Threshing).

The top seven recommended practices (Table 4.2.1 and Supp Table 1; Appendix B) in the rank order were found more popular among the farmers, because they, in general, observed the benefits of following these practices. These technologies are not so costly, easy to adopt. Farmers had appropriate knowledge about how to apply these practices in their field. They got adequate help from extension agents for using these practices.

4.2.2 Overall adoption of selected recommended agronomic practices

Scores of the adoption of selected recommended agronomic practices of boro rice growers ranged from 28 to 49 with an average of 40.45 and standard deviation 5.18. The boro rice farmers were classified into three categories on the basis of their adoption of selected recommended agronomic practices, such as low (0 to 19), medium (20 to 38), and high (39 to 57). Data shows that there are no farmer had low adoption categories.

Which compared to 39% (33 farmers) medium and 61% (52 farmers) had high adoption of selected recommended agronomic practices. The findings are diagrammatically shown in Figure 4.2 (Supp Table 2; Appendix B)

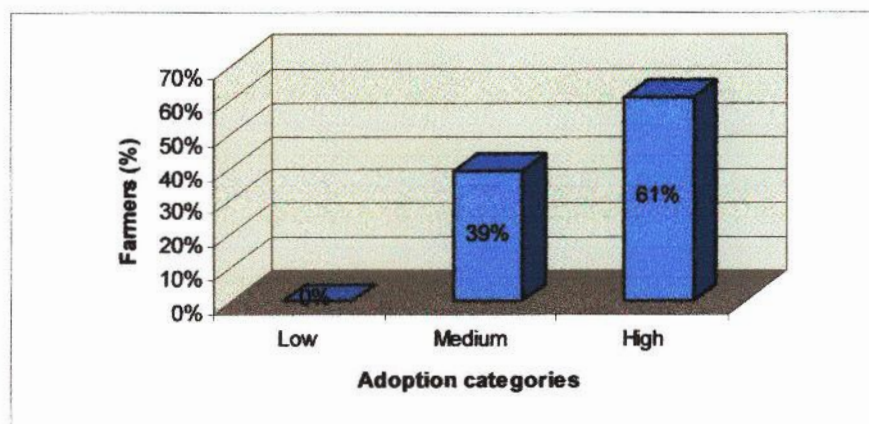


Figure 4.2 Bar graph showing the categories of respondents on the basis of their adoption of selected recommended agronomic practices of boro rice growers

Data contained in Figure 4.2 indicated that three-fifths (61%) of the respondents belonged to high adoption category while about two-fifths (39%) of the respondents were under medium adoption of selected recommended agronomic practices in boro rice cultivation. The result obtained in the adoption of practices can be explained as the individual characteristics of the farmers varied greatly and the various factors might have influence on their adoption of selected recommended practices. Farmers use modern technologies when they find those useful in their own socio-economic set-up and agro-economic settings.

4.3 Relationships between the selected characteristics of the farmers and their adoption of selected recommended agronomic practices

This section deals with the relationships with eleven selected characteristics of the farmers and their adoption of selected recommended agronomic practices by the farmers considered as dependent variable.

Person's product moment correlation co-efficient 'r' has been used to test the hypothesis concerning the relationship between two variables 0.05 and 0.01 level of significance were used as the basis for acceptance or rejection of a hypothesis.

The summary of the results of the correlations co-efficient relationships between the selected characteristics of the respondents and their adoption of selected recommended agronomic practices of boro rice is shown in Table 4.3.1

Table 4.3.1 Relationship between the selected characteristics of the respondents/ farmers and their adoption of selected recommended agronomic practices of Boro rice production

Dependent Variable	Independent variable	Computed Value of "r"	Table value of "r" at 84 degree of freedom	
			0.05%	0.01%
Extent of adoption of selected recommended agronomic practices	Age	0.358**	0.211	0.275
	Education	-0.053ns		
	Farming experience	0.332**		
	Family size	0.086ns		
	Family member involved in agriculture	0.029ns		
	Farm size	0.247*		
	Organization participation	-0.082ns		
	Family income	0.033ns		
	Extension media contact	0.025ns		
	Training experience	-0.138ns		
	Agricultural knowledge	0.048ns		

NS = Not significant

* = Significant at 0.05 level of probability

**=Significant at 0.01 level of probability

4.3.1 Relationship between age of the farmers and their adoption of selected recommended agronomic practices

The relationship between age of the farmers and their adoption of selected recommended agronomic practices of boro rice was examined by testing the concerned null hypothesis. Co-efficient of correlation between the concerned variables was found to be "r"= 0.358 as shown in Table 4.3.1. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of "r" (0.358) was greater than the tabulated value with 84 degrees of freedom at 0.05 level and 0.01 level of probability.

On the basis of above findings, the null hypothesis was rejected. Hence, the researcher concluded that age of the farmers had a positive significant relationship with their adoption of selected recommended agronomic practices of boro rice. It means that the higher is the age of the respondents, the higher is the extent of adoption. Similar findings were also observed by Rahman (1986), Kher (1992), Islam (1993), Chowdhury (1997), Mostofa (1999) and Rahman (2001).

4.3.2 Relationship between education of the farmers and their adoption of selected recommended agronomic practices

The relationship between the level of education of the farmers and their adoption of selected rice production practices were measured by testing the following null hypothesis :

“There is no relationship between level of education of the farmers and their adoption of selected rice production practices.”

Computed value of the co-efficient of correlation between the level of education of the farmers and their adoption of selected recommended agronomic practices of boro rice was found to be ($r = -0.053$) as shown in Table 4.3.1. The following observations were recorded regarding the relationships between the two variables on the basis of the co-efficient of correlation:

- a) The relationship showed a negative trend.
- b) The computed value of “ r ” ($r = -0.053$) was found to be smaller than the table value ($r = 0.211$) with 84 degrees of freedom at 0.05 level of probability.
- c) The co-efficient of correlation between the concerned variables was not significant.
- d) The concerned null hypothesis could not be rejected.

The findings indicate that education of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice. Similar findings were also observed by Hossain (1981) and Bavalatti and Sundaraswamy (1990). The reason behind the negative relation might be that the majority of the respondents had up to primary level of education.

4.3.3 Relationship between farming experience of the farmers and their adoption of selected recommended agronomic practices of Boro rice

Farming experience of the farmers and their adoption of selected recommended agronomic practices of boro rice were measured by testing the following null hypothesis:

“There is no relationship between farming experience of the farmers and their adoption of selected recommended agronomic practices of boro rice.”

Computed value of co-efficient of correlation between the concerned farming experience of the farmers and their adoption of selected recommended agronomic practices of boro rice were found to be ($r = 0.332$) as shown in the Table 4.3.1. The following observations are recorded regarding the relationship between these two variables on the basis of co-efficient of correlation.

- * Relationship showed a tendency in positive direction.
- * The computed value of “ r ” ($r = 0.332$) was greater than tabular value ($r = \pm 0.211$) with 84 degree of freedom at 0.05 level and 0.01 level of probability.
- * Hence the null hypothesis was rejected.

Based on the above findings, researcher concluded that farming experience of the farmers had a significant relationship with their adoption of selected recommended agronomic practices of Boro rice. It means that the higher is the farming experience the higher is the adoption of selected recommended agronomic practices in boro rice production. Chowdhury (1996) also observed similar findings in his studies.

4.3.4 Relationship between family size and adoption of selected recommended agronomic practices of Boro rice

The relationship between family size of the farmers and their adoption of selected recommended agronomic practices of boro rice was examined. Co-efficient of correlation between the concerned variables was found to be “ r ” (.086) as shown in

Table 4.3.1. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The computed value of “r” (0.086) was smaller than the tabulated value with 84 degrees of freedom even at 0.05 level of probability.

On the basis of above findings, the null hypothesis could not be rejected. Hence, the researcher concluded that family size of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice. Similar findings were observed by Haque (1993), Hossain (1991) and Islam (1993) but Singh (1991) and Muttaleb (1995) found significant relationship.

4.3.5 Relationship between family member involved in agriculture and adoption of selected recommended agronomic practices of Boro rice

The relationship between the family member involved in agriculture of the farmers and their adoption of selected recommended agronomic practices of boro rice were examined by testing the concerned null hypothesis. Co-efficient of correlation between the concerned variables was found to be ($r=.029$) as shown in the Table 4.3.1. This led to the following observations regarding the relationship between the two variables under consideration.

- The relationship showed a positive trend.
- The computed value of ($r=.029$) was smaller than the tabulated value with 84 degree of freedom at 0.05 level of probability.

On the basis of above findings, the null hypothesis could not be rejected. Hence, the researcher concluded that family member involved in agriculture had no significant relationship with their adoption of the selected recommended agronomic practices of boro rice.

4.3.6 Relationship between farm size of the farmers and their adoption of selected recommended agronomic practices of Boro rice

Farm size of the farmers and their adoption of selected recommended agronomic practices of boro rice were tested by examining the following null hypothesis:

“There is no relationship between farm size of the farmers and adoption of selected recommended agronomic practices of boro rice.”

The computed value of co-efficient of correlation between farm size and their adoption of selected recommended agronomic practices of boro rice were found to be 0.247 (Table 4.3.1). The following observations were recorded regarding the relationship between these two variables on the basis of co-efficient of correlation.

- The relationship showed a tendency in positive direction between concerned variables.
- The compute value of “r” ($r = 0.247$) was found to be greater than tabular value ($r = \pm 0.211$) with 84 degree of freedom at 0.05 level of probability.
- Hence the relationship was significant.

On the basis of these findings, null hypothesis was rejected and hence researcher concluded that the farm size of the farmers had a significant and positive relationship with their adoption of selected recommended agronomic practices of boro rice. It means that the higher is the farm size of the respondents the higher is their adoption of selected recommended agronomic practices. Hosain (2003), Alam (1997) and Islam (1996) observed similar findings in their studies.

4.3.7 Relationship between organization participation of the farmers and their adoption of selected recommended agronomic practices of Boro rice

In order to determine the relationship between organizational participation of the farmers and their adoption of selected recommended agronomic practices of boro rice, the following null hypothesis was tested :

“There is no relationship between organizational participation of the farmers and their adoption of selected recommended agronomic practices of boro rice.”

To find out relationship, the correlation co-efficient was computed and found to be

-0.082 as shown in Table 4.3.1 which led to the following observations between the concerned variables under consideration:

- * The relationship showed negative trends of relationship was found between the two variables.
- * The computed value of "r" ($r = -0.082$) was smaller than the table value ($r = \pm 0.211$) with 84 degrees of freedom at 0.05 level of probability.
- * The co-efficient of correlation between the two concerned variable was not significant at 0.05 level of probability.
- * The null hypothesis could not be rejected.

From the above observations, it might be concluded that there was no significant relationship between organizational participation of the farmers and their adoption of selected recommended agronomic practices of boro rice. This might be due to that most (78%) of the respondents had no to low organizational participation (Table 4.1.7). Sarder (2002) observed the similar significant but positive relationship between these two variables.

4.3.8 Relationship between family income of the farmers and their adoption of selected recommended agronomic practices of Boro rice

Family income of the farmers and their adoption of selected recommended agronomic practices of boro rice were measured by testing the following null hypothesis:

"There is no relationship between family income of the farmers and their adoption of selected recommended agronomic practices of boro rice."

Computed value of co-efficient of correlation between the concerned annual income of the farmers and their adoption of selected recommended agronomic practices of boro rice was found to be 0.033 (Table 4.3.1). The following observations are recorded regarding the relationship between these two variables on the basis of co-efficient of correlation.

- * Relationship showed a positive tendency.

* The computed value of “r” ($r = 0.033$) was smaller than tabular value ($r = \pm 0.211$) with 84 degree of freedom at 0.05 level of probability.

* Hence the relationship was not statistically significant.

Based on the above findings, null hypothesis was not rejected and hence researcher concluded that annual income of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice. It means that the annual income did not have any influence on their adoption of selected recommended agronomic practices of boro rice. Sarder (2002) and Hoque (1993) indicated that the annual income of the farmers had no significant relationship with their adoption of IPM practices.

4.3.9 Relationship between extension media contact of the farmers and their adoption of selected recommended agronomic practices of Boro rice

The relationship between extension contact of the farmers and their adoption of selected recommended agronomic practices of boro rice was examined by testing the concerned null hypothesis. Co-efficient of correlation between the concerned variables was found to be “r” = 0.025 as shown in Table 4.3.1. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The relationship value or “r” 0.025 was smaller than the tabulated value with 84 degrees of freedom at 0.05 level of probability.

On the basis of above findings, the null hypothesis was accepted. Hence, the researcher concluded that extension contact of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice.

Farmers become aware of the improved agricultural practices through the various extension communication media. Farmers having no or low extension contact are expected to be low in adoption of improved cultural practices because of their unawareness about the practices. It is likely that if with high extension contact received more information on farm affairs which strengthened the base of their

agricultural knowledge. Such knowledge was probably conducive to motivate the farmers towards adoption of selected recommended agronomic practices of boro rice production technologies. Kashem *et al* (1990) , Bashar (1993), Pal (1995) and Sarker (1997) also found the similar results.

4.3.10 Relationship between training experience of the farmers and their adoption of selected recommended agronomic practices of Boro rice

Training experience of the farmers and their adoption of selected recommended agronomic practices of boro rice were measured by testing the following null hypothesis:

“There is no relationship between training experience of the farmers and their adoption of selected recommended agronomic practices of boro rice.”

Compute value of co-efficient of correlation between the concerned training experience of the farmers and their adoption of selected recommended agronomic practices of boro rice were found to be -0.138 (Table 4.3.1). The following observations are recorded regarding the relationship between these two variables on the basis of co-efficient of correlation.

- Relationship showed a tendency in negative direction.
- The computed value or “r” ($r = -0.138$) was smaller than tabular value ($r = \pm 0.211$) with 84 degree of freedom at 0.05 level of probability.
- Hence the relationship was statistically insignificant.

Based on the above findings, null hypothesis was accepted and hence researcher concluded that training experience of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice. This might be due to that probably the respondents (42%) received training in other than agriculture. Consequently the training had no influence in adoption. Hossain (1981), Rahman (2001), Sarder (2002) and Haque (2003) observed similar findings in their studies.

4.3.11 Relationship between agricultural knowledge of the farmers and their adoption of selected recommended agronomic practices of Boro rice

In order to determine the relationship between agricultural knowledge of the farmers and their adoption of selected recommended agronomic practices of boro rice were measured by testing the following null hypothesis was tested :

“There is no relationship between agricultural knowledge of the farmers and their adoption of selected recommended agronomic practices of boro rice .”

The calculated value of the correlation co-efficient between the two concerned variables was found to be ($r = .048$) as shown in Table 4.3.1. This led to the following observations regarding the relationship between the two variables under consideration.

- The computed value or “r” ($r = 0.048$) was smaller than tabular value ($r = \pm 0.211$) with 84 degree of freedom at 0.05 level of probability.
- The concerned null hypothesis was not rejected.

From the above observations, it might be concluded that there was no significant relationship with agricultural knowledge of the farmers and their adoption of selected recommended agronomic practices of boro rice. The findings are quite rational, because adoption of selected recommended agronomic practices of boro rice is relatively intellectual. Hence, an intelligent farmer can accept technology earlier than the non-intelligent farmers. Many researchers Ali (1993), Bashar (1993) and Islam (2002) observed the similar results.

CHAPTER V

SUMMARY

5.1 SUMMARY

The adoption of recommended agronomic practices of boro rice growers depends upon a numbers of factors including farmer's characteristics. An understanding of the factors influencing this adoption behavior of the farmers is necessary to study the adoption and diffusion process in the country. Therefore, the present study was conducted in Jalma union under Khulna district to attain the following specific objectives:

- (1) To determine and describe the selected characteristics of the boro rice growers.
- (2) To identify the selected recommended agronomic practices that have been adopted by the farmers.
- (3) To determine the extent of adoption of the selected recommended agronomic practices by the boro rice growers.
- (4) To explore the relationships between the selected characteristics of the boro rice growers and their extent of adoption of selected recommended agronomic practices of boro rice.

The study was conducted in four villages of Jalma union under Khulna district. From a population of 425, a total number of 85 boro rice growers were selected for interview. Data were collected by using a pre-tested interview schedule. Data were collected on the selected characteristics (independent variables) viz. age, education, farming experience, family member, family member involved in agriculture, farm size, organization participation, family income, extension media contact, training experience and agricultural knowledge.

Data were also collected on the adoption of selected recommended agronomic practices (dependent variable) by the boro rice growers. The selected recommended agronomic practices were: seed bed preparation, seed bed size, land preparation, laddering, fertilizer application, variety, seed rate, source of seed, transplanting, spacing, number of seedling per hill, sowing time, intercultural operation, irrigation, pest control, fertilizer 2nd time, fertilizer 3rd time, harvesting and threshing.

Collected data were decoded, compiled, tabulated and analyzed in accordance with the objectives of the study. Statistical measures such as percentage distribution, range, rank order, average, standard deviation and adoption index were used to determine the extent of adoption of selected recommended agronomic practices of boro rice by the farmers and their selected characteristics. Co-efficient of correlation were calculated to explore the relationship between the selected characteristics and the extent of adoption of selected recommended agronomic practices of boro rice.

5.1.1 Major findings

According to the objectives of the study, the findings were summarized as follows:

Selected characteristics of Boro rice growers

Age

Age of the farmers ranged from 20 to 75 years. The average being 45.55 years with a standard deviation 11.35. The majority (53 %) of the farmers were middle aged, while (21 %) were young and (26%) old.

Education

Level of education of the farmers ranged from 0 to 12. The average score being 5.02 and standard deviation was 3.13. The majority (57 %) of the farmers had primary education compared to (05 %) illiterate, (33%) having secondary education, (5%) have above secondary education.

Farming experience

Farming experience of the farmers score ranged from 3 to 50, the average being 23.98 and the standard deviation 9.87. The majority (56%) of the of the respondents farmers had medium farming experience compare to (20 %) as low and (24%) as high farming experience. Thus almost (80%) of the farmers had medium to high farming experience.

Family size

The family size of the farmers ranged from 2 to 10 with an average of 5.03 and standard deviation of 1.56. The majority (51 %) of the respondents had small family

compared to (33 %) medium family size and (16 %) large family size categories. Small and medium family were found to be large in number.

Family member involved in agriculture

Family member involved in agriculture of the respondents ranged from 1 to 4 with the average of 1.28 and standard deviation of 0.54. Three-fourths (75%) of the respondents had low engagement compared to (22%) medium engagement and (3%) high engagement categories. Low and medium family member involved in agriculture were found to be large in number.

Farm size :

Farm size of the farmers ranged from 0.01 to 8.13 hectares with an average of 1.74 and the standard deviation was 1.97. The highest proportion (29 %) of the farmers had medium sized farm compared to (17 %) having landless, (13 %) having marginal, (19 %) having small and (22 %) having large farm.

Organizational participation

Organizational participation of the farmers ranged from 0 to 12 with an average of 3.18 and standard deviation 2.41. The majority (65%) of the farmers were in low participation category compared to (19%) medium organizational participation and (3%) high organizational participation. It may also be revealed that majority (84 %) of the farmers were under low to medium organizational participation.

Family income

Family income scores of the farmers ranged from 70 to 270 thousand with an average of 150.52 thousand and the standard deviation 55.61. The highest proportion (40%) of the farmers had high annual income compared to (32%) having low annual income and (28%) having medium annual income.

Extension media contact:

Extension media contact scores of the farmers ranged from 3 to 17 against the possible range of 0 to 33. The average extension media contact score was found to be 9.77 with a standard deviation of 2.86. About three fourths (73 %) of the respondents

had medium extension contact compared to (25 %) having low and only (2 %) having high extension media contact.

Training experience

Training experience of the farmers ranged from 0 to 12, the average being 1.11 and the standard deviation 1.82. The majority of the farmers were no training experience category. Majority (58 %) of the respondents had no training experience compared to (21%) having low training, (19%) having medium training experience. Data also revealed that (2%) of the farmers were under high training experience.

Agricultural knowledge:

Agricultural knowledge scores of the farmers ranged from 15 to 28, against the possible range of 0 to 28 with an average of 21.55 and the standard deviation of 2.95. Majority (58 %) of the farmers had high agricultural knowledge as compared to (42 %) medium agricultural knowledge and there are no respondents having low agricultural knowledge.

5.1.2 Adoption of selected recommended agronomic practices:

Adoption of selected recommended agronomic practices of boro rice was the main focus of the study. Farmers adopted the 19-selected recommended agronomic practices of boro rice to different extent. All of the respondent farmers adopted/ followed strictly the laddering while none of the farmers followed recommended time regarding fertilizer (urea) 3rd time application. The other highly adopted/strictly followed selected recommended agronomic practices were land preparation, number of seedling per hill, intercultural operation (weeding), fertilizer (urea) application 2nd time, harvesting time and threshing. These scores of the respondent could range from 28 to 49 against the possible range of 0 to 57 with an average of 40.45 and the standard deviation of 5.18. Three-fifths (61 %) of the farmers were under the high adoption category while about two fifths (39 %) had medium adoption of the selected recommended agronomic practices of boro rice.

5.1.3 Relationships between the selected characteristics of the boro rice growers and their extent of adoption of selected recommended agronomic practices of boro rice:

Among the selected 11-characteristics only age, farming experience and farm size of boro rice growers showed a positive significant relationship with their extent of adoption of selected recommended agronomic practices of boro rice. The rest characteristics showed a non-significant relationship with the extent of adoption of selected recommended agronomic practices of boro rice.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

Findings of the study and the logical, interpretations of their meaning in light of other relevant facts prompted the researcher to draw the following conclusions:

1) Majority of the respondents were middle aged (53%), possess primary level of education (57%), had medium farming experience (56%), small family (51%). Three-fourths (75%) of the respondent's family member had low engagement in agriculture. Majority of them (65%) had low organization participation, highest proportion (40%) of them had high family income. About three-fourths of the respondents (73%) had medium extension media contact. Majority of the respondents (58%) had no training experience but had high agricultural knowledge.

2) All of the respondent farmers adopted/ followed strictly the laddering while none of the farmers followed recommended time regarding fertilizer (urea) 3rd time application. The other highly adopted / strictly followed selected recommended agronomic practices were land preparation, number of seedling per hill, intercultural operation (weeding), fertilizer (urea) application 2nd time, harvesting and threshing. Moderately adopted practices were seed bed preparation, variety, seed rate, transplanting (age of seedling), spacing and sowing time. Partially adopted/ followed practices were seed bed size, fertilizer application, source of seed, irrigation, pest control and fertilizer (urea) application 3rd time.

3) Among the selected 11-characteristics of the boro rice growers age, farming experience and farm size showed a positive significant relationship with their adoption of selected recommended agronomic practices in boro rice cultivation.

6.2 Recommendations

On the basis of the findings and conclusion of the study, the following recommendations for policy implication are made:

6.2.1 Recommendations for policy implications

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

1. The level of using improved technologies in boro rice cultivation was encouraging. However, there is a need of efforts for even wide using of improved technologies in boro rice cultivation by the farmers.
2. In view of the presence of a relationship between age of the farmers and their adoption of selected recommended agronomic practices of boro rice, it is recommended that the extension workers should work with the farmers of all age groups to promote the cultivation of Boro rice. However, they will have to work more with comparatively larger member of middle aged farmers as majority of the farmers belonged to this group.
3. Education of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice. It indicates the importance of education among the farmers for rapid use of modern technologies. The findings also indicate that (57 %) of the farmers have primary education. Under the above situation, it may be recommended that the arrangements should be made for increasing the literacy level of the boro rice farmers by the concerned authorities through establishing night school, adult education program and other extension teaching methods.
4. Farming experience of the farmers had positive significant correlation with their adoption of selected recommended agronomic practices of boro rice, it is recommended that the concerned authorities should take necessary steps to share their knowledge and use this knowledge to increase the cultivation. This will facilitate them to solve their problems collectively to adopt new ideas and technologies.
5. Farm size and family size are the two important influential aspects of adoption of innovation. Farm size and family size whether they are small or medium should be equally emphasized during diffusion of innovation. So it is recommended that the extension workers of GO and NGO should work with the all categories of farmers. It is also one of the principles of NAEP.

6. Since organizational participation had no significant relationship with the adoption of selected recommended agronomic practices of boro rice, it is recommended that the concerned authorities should take necessary steps to mobilize the local organizations for the farmers. This will facilitate them to solve their problems collectively to adopt new ideas and technologies.

7. Family income of the farmers in the study area was found to show no significant relationship with their adoption of selected recommended agronomic practices of boro rice. It leads to the recommendation that extension service should provide adequate farm management advice to the farmers for increasing their farm income. It is the real fact that if income be increased, farmer receptive capacity to adopt improved technologies will be increased and thereby production will be increased.

8. Extension media contact of the farmers in the study area was found to show no significant relationship with their adoption of selected recommended agronomic practices of boro rice. Hence, the concerned authorities should take cognizance of these facts and necessary steps to increase the extension contact of the farmers.

9. Agricultural training experience of the farmers had no significant relationship with their extent of adoption of selected recommended agronomic practices of boro rice and 58% of the farmers having no experience. Therefore, it is recommended that adequate and relevant training facilities should be made available to the farmers by the government and non-government organizations.

10. Agricultural knowledge of the farmers had no significant relationship with their adoption of selected recommended agronomic practices of boro rice. Hence, the concerned authorities should take cognizance of these facts and necessary steps to increase the agricultural knowledge of the farmers.

6.2.2 Recommendations for further research

Short term and sporadic study being conducted in some specific location cannot provide all information for proper understanding about different activities and related

matters. Future studies should be undertaken covering more dimensions in the related matters. The following recommendations are suggested in this connection:

1. The relationship of three characteristics of the farmers with their extent of adoption of selected recommended agronomic practices of boro rice have been investigated in this study viz. age, farming experience and farm size about boro rice. But besides these three characteristics of the farmers, which influence the adoption of selected recommended agronomic practices, there might be other factors. Therefore further research should be conducted to explore the relationship of such other characteristics of the farmers with their adoption of selected recommended agronomic practices of boro rice.
2. The present study was conducted in 4 villages of Jalma union of Botiaghata upazilla under Khulna district. So similar attempts may be undertaken in other villages of the union to verify the study.
3. In the present study education, family size, family member involved in agriculture, organization participation, family income, extension media contact, training experience and agricultural knowledge had no significant relationship with the adoption of selected recommended agronomic practices of boro rice. In this connection, further verification is necessary.
4. A negative trend of relationship with education of the farmers, organizational participation and training experience was found. Also, the relationships were statistically not significant. Generally a significant positive relationship is expected to be observed between educations, organizational participation and training experience of the respondents and their adoption of selected recommended agronomic practices of boro rice production. Hence, further studies are necessary to find out the relationship between the concerned variables.
5. Findings of the study indicate the need for establishment of new technologies in the rural areas of the country. Research is necessary to evolve effective principles and procedure for management.

6. Research should be undertaken to study the effectiveness of agricultural extension service and other related organizations in helping people to solve their problem confrontation in boro rice production of the farmers.

7. Research should also be undertaken to identify the factors causing hindrance to high adoption of selected recommended agronomic practices of boro rice production.

CHAPTER VII

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APPENDIX-A
INTERVIEW SCHEDULE

AGROTECHNOLOGY DISCIPLINE
KHULNA UNIVERSITY
KHULNA

**ADOPTION OF SELECTED RECOMMENDED AGRONOMIC PRACTICES BY
THE BORO RICE GROWERS OF JALMA UNION UNDER KHULNA DISTRICT**

Sample no :-----

Date:

Personal information:

Name:-----

Father's name:-----

Village:-----

Union:-----

Upazila: -----

District:-----

1.Age of the respondents: -----years.

2.Educational qualification/Level of education:

Please mention your educational qualification/status:

a) Don't know to read and write

b) I have passed ----- class.

3.Farming experience:-----years.

4.Family size/Family members: ----- persons.

5.No. of family members involved in agriculture:-----persons.

6.Farm size:

Please furnish information about your lands according to use

Sl. No	Use of land	Area of land		
		Local unit	Acre	Hectare
1.	Homestead			
2.	Own land under own cultivation			
3.	Land given to others on barga			
4.	Land taken from others on barga			
5.	Land given to others lease			
6.	Land taken from others on lease			
7.	Others			
Total				

7.Organization participation:

Are you involved in any organization?

Yes----- No-----

If yes, please mention the nature of your participation in the following organizations:

Sl. No	Name of Organization	Nature of participation		
		Ordinary member (1)	Executive committee member (2)	Executive committee officer (3)
1.	Farmers cooperative committee			
2.	School committee			
3.	Mosque/mondir committee			
4.	Madrashah committee			
5.	N.G.O committee			
6.	Union parishad			
7.	Youth club			
8.	Bazar committee			
9.	Cultural or sports club			
10.	Others			

8.Family income (Annual):

Please furnish information about your family income (annual)from different sources.

Sl. No	Sources of income	Amount(Tk)
1	Rice	
2	Fish	
3	Poultry	
4	Service	
5	Business	
6	Daily labor	
7.	Others	
Total		

9.Extension media contact:

Please mention the extent of contact with the following media in respect of various information related to your crops cultivation:

Sl. No	Extension media	Extent of contact			
		Regularly (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1	Sub Assistant Agriculture Officer (SAAO)				
2	Farmers Field School(FFS)				
3	Neighbor				
4	Relative				
5	Friends				
6	Radio(Farm radio program)				
7	Television (Farm TV program)				
8	Upazilla Agriculture Officer				
9	Additional Agriculture Officer/Agriculture Extension Officer.				
10	Agricultural related magazine/Newspaper.				
11	Others				

10. Training experience:

please mention your participation in different training activities:

Sl. No	Title of the training	Duration of training	Name of the training organization	Venue of the training
1.				
2.				
3.				
4.				
5.				

11. Agricultural knowledge:

Please answer the following questions:

Sl. No	Question	Total Marks	Mark Obtained
1.	What do you know about Boro rice?	1	
2.	Mention three seasons of rice cultivation.	1	
3.	When Boro rice are cultivated?	1	
4.	How many times are you ploughing for Boro rice cultivation?	2	
5.	Mention at least 4 HYV cultivars of Boro rice?	1	
6.	Mention the names of the fertilizers used in Boro rice cultivation?	1	
7.	When do you apply urea fertilizer in Boro rice cultivation and how much?	2	
8.	How much seed rate do you generally use for per bigha?	2	
9.	From where do you collect the seeds?	2	
10.	Mention the age of seedling which is used for transplanting?	2	
11.	What is the spacing of the seedling?	1	
12.	How many seedling is used per hill?	2	
13.	What is the particular showing time of Boro rice?	2	
14.	When the weeding is needed?	2	
15.	When the irrigation is needed?	2	
16.	When the top dressing of urea fertilizer is needed?	1	
17.	What is the maturity symptoms of Boro rice to harvest?	1	
18.	What is the process of threshing?	2	
	Total		

12. Adoption of Selected Recommended Agronomic Practices in Boro Rice Cultivation

(Please indicate extent of use of the following selected recommended agronomic practices by you in boro rice cultivation.)

Practice	Sub practice	Recommendation	Extent of Use				
			Used	Strictly followed (3)	Moderately (2)	Partially (1)	None (0)
1. Seed bed preparation	Ploughing	5-6 Times					
2. Seed bed size		10 m X 125 cm					
3. Land preparation (ploughing)		3-5 Times					
4. Laddering		1					
5. Fertilizers application	(Kg/ha) a) Cow dung b) Urea c) TSP d) MoP e) Gypsum	10-12 ton 1/3 of 220 kg/ha 120 " 85 " 60 "					
6. Variety		BR-26, Brri dhan-28, Brri dhan -29, Brri dhan -35, Brri dhan -36					
7. Seed rate		25-30 Kg/ha					
8. Source of seed		BADC					
9. Transplanting	(Age of seedling)	40-50 days					
10. Spacing	R-R and P-P	10-30 cm & 10-30 cm					
11. Number of seedling per hill		2-3					
12. Sowing time		Dec-Jan					
13. Intercultural operation (weeding)		15-20 days(1 st) 25-30 days(2 nd) 35-40 days(3 rd)					
14. Irrigation		2-5 cm					
15. Pest control		a) Diajion60Ec b) Dimecrone c) others					
16. Fertilizer (Urea) 2 nd time		a) Maximum tillering stage(2 nd part)					
17. Fertilizer (Urea) 3 rd time		b) Panicle initiation stage(3 rd part)					
18. Harvesting time		80% seed matured/ April -May					
19. Threshing		By hand/Machine					

(Thank you for your nice cooperation)

Date: _____

Signature of the Enumerator

APPENDIX- B

Supplementary Table 1: Distribution of selected recommended agronomic practices based on their Adoption Index

Categories	Score (SRAPAI)	Number (According to serial no Table 4.2.1)	Percentage
Partially adopted	Up to < 128	6 (2, 5, 8, 14, 15 & 17)	32
Moderately adopted	128 - 213	6 (1, 6, 7, 9, 10 & 12)	32
Highly/Strictly adopted	> 213	7 (3, 4, 11, 13, 16, 18 & 19)	36
Total		19	100

Supplementary Table 2. Distribution of the respondents according to their adoption of selected recommended agronomic practices

Categories	Score	Respondents	
		Number	Percentage
Low adoption	0-19	0	0
Medium adoption	20-38	33	39
High adoption	39-57	52	61
Total		85	100