FARMERS' KNOWLEDGE, ATTITUDE AND ADOPTION REGARDING SALINE TOLERANT RICE VARIETIES

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SHER-E-BANGLA NAGAR, DHAKA-1207.

JUNE, 2016

FARMERS' KNOWLEDGE, ATTITUDE AND ADOPTION REGARDING SALINE TOLERANT RICE VARIETIES

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REGISTRATION NO.: 10-04048

A Thesis

Submitted to the Faculty of Agriculture,
Sher-e-Bangla Agricultural University, Dhaka,
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE (MS)

IN

AGRICULTURAL EXTENSION

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CERTIFICATE

This is to certify that the thesis entitled, **"FARMERS' KNOWLEDGE, ATTITUDE AND ADOPTION REGARDING SALINE TOLERANT RICE VARIETIES"** submitted to the faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **Master of Science (MS) in Agricultural Extension,** embodies the result of a piece of bona fide research work carried out by **Md. Bellal Hossain**, Registration No. 10-04048, under my supervision and guidance. No part of this thesis has been submitted for any other degree or diploma.

I further certify that any help or sources of information, as has been availed of during the course of investigation have been duly acknowledged.

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ACKNOWLEDGEMENTS

All praises are due to almighty the merciful Allah who enabled the researcher to complete the study successfully. Guidance, help and co-operation have been received from several persons or authority during the tenure of the study; the author is immensely grateful to all of them. The author with a sense of respect, expresses his heart felt gratitude to his Supervisor Professor **Dr. Md. Sekender Ali**, Department of Agricultural Extension and Information System, Sher-e- Bangla Agricultural University, Dhaka for his untiring and painstaking guidance, innovative suggestions, continuous supervision, timely instructions and inspirations throughout the tenure of research work.

The author deems it a proud privilege to express his deep sense of gratitude, sincere appreciation and immense thanks to his co-supervisor **Md. Mahbubul Alam, Ph.D,** Associate Professor and Chairman, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka, for his continuous guidance, cooperation, constructive criticism and helpful suggestions in carrying out the research work and preparation of this thesis, without his intense co-operation this work would not have been possible.

Heartfelt thanks and appreciations are also expressed to the Upazila Agriculture Officer and SAAOs of Satkhira sadar upazila in the study area for their benevolent help and cooperation in data collection period. The researcher is especially grateful to all the respondents in the study area for their cooperation and help in accomplishing the objectives of this research work.

The researcher expresses heartfelt thanks and sincere appreciations to all other departmental and out of departmental teachers of Sher-e-Bangla Agricultural University for their help and encouragement. Last but not the least, the author expresses his immense indebtedness, deepest senses of gratitude to his beloved parents, brother and sisters who sacrificed all their happiness during the whole study period especially during his MS study.

Finally, the wishes, heartfelt thanks and gratitude to extend to all his relatives, well-wishers especially friends for their inspiration, blessing, cooperation and encouragement in all phases of academic pursuit from the beginning to end.

June, 2016 **The Researcher**

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LIST OF ABBREVIATIONS AND GLOSSARY

Abbreviation	Full word
AQ	Adoption Quotient
Ag. Ext. Ed.	Agricultural Extension Education
BBS	Bangladesh Bureau of Statistics
DAE	Department of Agriculture Extension
et. al.	All Others
SAAO	Sub Assistant Agriculture Officer
SPSS	Statistical Package for Social Science
Σ	Standard Deviation
x□	Mean

FARMERS' KNOWLEDGE, ATTITUDE AND ADOPTION REGARDING SALINE TOLERANT RICE VARIETIES

MD. BELLAL HOSSAIN

ABSTRACT

The research examines the status of farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties and to explore the relationship of the selected characteristics of the farmers with their knowledge, attitude and adoption regarding saline tolerant rice varieties. The methodology of this study is an integration of quantitative and qualitative methods based on data collection in Chadpur, Kamorpur and Dorista of Dhaliur union of Satkhira sadar upazila. Data were collected from 113 saline tolerant rice farmers from January18 to February 20, 2017. Descriptive statistics and Pearson product moment correlation (r) were used for analysis. Most of the farmers (54.9 percent) belong to medium knowledge, 20.4 percent had low knowledge and 24.8 percent had high knowledge on saline tolerant rice varieties. Most of the farmers (61.9 percent) had favorable attitude towards saline tolerant rice varieties. The highest (48.7 percent) proportion of rice farmers belong to the group of high adoption and the lowest proportion (6.2 percent) of them had medium adoption of saline tolerant rice varieties. Among the influential variables- level of education, training experience of farmers had significant positive relationship with their knowledge on saline tolerant rice varieties and their attitude towards saline tolerant rice varieties. Agricultural extension media contact of farmers had significant positive relationship and problem faced in saline tolerant rice cultivation by the farmers had significant negative relationship with their attitude towards saline tolerant rice cultivation and adoption of saline tolerant rice varieties.

Key words: knowledge, attitude, adoption, saline tolerant rice varieties

CHAPTER I

INTRODUCTION

1.1 General Background

Salinity causes unfavorable environment and hydrological situation that restrict normal crop production throughout the year. The freshly deposited alluviums from upstream in the coastal areas of Bangladesh become saline as it comes in contact with the sea water and continues to be inundated during high tides and ingress of sea water through creeks. The factors which contribute significantly to the development of saline soils are tidal flooding during wet season (June-October), direct inundation by saline or brackish water and upward or lateral movement of saline ground water during dry season (November-May). Salinity intrusion in soil caused by climate-induced hazards, especially cyclones and sea level rise (SLR) is adversely affecting rice production in coastal Bangladesh. The southwest coastal district of Satkhira is one of the most vulnerable areas because of its high exposure to salinity intrusion and widespread poverty. Based on a survey of 360 farming households in four villages and on focus group discussions, in-depth interviews and community consultations, this paper explores how salinity intrusion affects rice production. This research demonstrates that salinity levels in the soil have increased sharply over the last 20 years. The introduction of saline-tolerant rice cultivars has been the most important adaptation measure being practiced. These adaptation measures, however, have not been enough to deal with the sudden increase in salinity after cyclone Aila hit the area in 2009, with devastating consequences. In that year, farmers in the study areas lost their entire potential yield of Aman rice production. In general, soil salinity is believed to be mainly responsible for low land use as well as cropping intensity in the area (Rahman and Mainuddin, 2013).

Salinity intrusion is a growing problem in the coastal areas around the globe, especially in the low-lying developing countries. The problem becomes exacerbated particularly in the dry season when rainfall is inadequate and incapable of lowering the concentration of salinity on surface water and leaching out salt from soil. Coastal agriculture experiences a yield reduction or in some cases devastation due to tidal inundation and salinity. Climate change associated hazards like sea level rise, cyclone and storm surge have been contributing to aggravate the problem. IPCC predicts that the sea level rise is likely to persist for centuries, resulting from the process and feedback of climate, even though the concentration of Green House Gases (GHGs) is to become steady. The sea level rise is not indistinguishable in every geographical location. The rise may be expected a little more in some regions than to others depending on some factors and these are not limited to some climate independent factors like land subsidence and climate dependent factors like thermal expansion. However, the climate dependent factor seems to be more influential. Moreover, the impact of sea level rise also varies depending on geographic location as well as socio-economic factors like population density, livelihood option, poor infrastructure, inadequate policy and inefficient technology.

Rice (*Oryza sativa* L.) is the most important cereal crops of the world and more than half of the world population used as a staple food. More than 110 countries in the world occupy rice almost 160 million hectares, 700 million tons of rice is being produced every year (IRRI, 2010).The total area under rice in Bangladesh is almost 11.35 million hectares with an average production 31.98 million metric tons. Now-a-days, increasing population is one of the key factors in Bangladesh. To provide residence of huge population, cultivable area decrease gradually. However, average rice yield in Bangladesh is only 4.34 t ha-1 (BRRI, 2011).To. Moreover, rice yield should be increased by using high yielding varieties (HYV) like saline tolerant varieties and its proper management technique.

The coastal saline area spread in 64 supazila under 13 districts of Bangladesh. A huge part of coastal area is covered by the Sundarbans, remaining land used in agriculture.The coastal area like Satkhira, Khulna, Bagerhat, Barguna, Patuakhali, Bhola, Noakhali, Chittagong and Feni in Bangladesh affected by varying degrees of salinity. Salinity is one of the most serious environmental problems limiting the productivity of agricultural crops. Salinity affects more than 25% of worth land (Levigneron *et al.*, 1995; Chahine *et. al.*, 2013), and desertification and salinization are rapidly increasing on a global scale declining average yields for most major crop plants by more than 25% (Bray *et al.*, 2000). BRRI dhan53 variety can be able to tolerate 8-10 ds m-1 salinity. It is cultivated in Aman season (T. Aman variety). Yield of this variety is 5-ton ha-1. BRRI dhan54 variety can be able to tolerate 8-10 ds/m salinity. It is cultivated in Aman season (T. Aman variety). Yield of this variety is 5.5-ton ha-1. BRRI dhan55 variety also tolerant to drought and cold. It is cultivated in Aus season and also in Boro season. Yield of this variety is 4-5-ton ha-1 in Aus season 7-ton ha-1 in Boro season (BRRI, 2011).

Chowdhury *et. al.* (2012) reported that the BRRI dhan47 is more suitable to salinity (12-14 dsm-1) comparison with the conventional HYV (4dsm-1). However saline tolerant variety is allowed to secure poor farmers to sustain their income and also save landholding which seems as low profitable land or unused land. Due to lack of income a large number of people migrated to cities to work as day laborers increase their livelihood status. It is expected that continuous population increase, coastal population is also supposed to be increased. Adoption of saline tolerant paddy in coastal region will generate more scope of income among the poor farmers as well as limit the tendencies migrate into urban areas (Suryanarayanan, 2010). BRRI dhan47 has high performance during Boro season on coastal districts. Thus, need to disseminated this salt tolerant variety to all the coastal farmers for increase rice production on salt affected area and this should be a huge effect illustrate on national economy. So, all the socio-economy, cultural, physiological condition work as vital factor when delivered a new situation. BRRI dhan47 is most

appropriate salt tolerant variety at this occasion in that area. Studies on individual, group and society revealed that acceptance of modern technologies is conditional upon many factors. While conducting research, the entire factor like social, economic and situational factors takes into account. The dominant land use in coastal Bangladesh is also for agriculture. The gross and the net-cropped area in the coastal zone of Bangladesh is 144,085 and 83,416 hector respectively. However, the net-cropped area of coastal zone in Bangladesh has been decreasing over the years due to various purposes and the most common one is the land inundation and salinity intrusion by tidal water. Fresh water reduction along with intrusion of saline water is perhaps the most devastating consequence of climate change in the coastal Bangladesh. Already, 830,000 million hectares of land have been identified which are affected by soil salinity at different degrees. It is estimated that a net reduction of 0.5 million metric tons of rice production will take place due to a 0.3-meter sea level rise in coastal areas of Bangladesh (World bank, 2011).

Knowledge means the factual understanding of an issue that effects human attitude reflected in behavior. Attitude means opinion, action of knowing of a person or a group of people. Farmers are not so skilled about new innovation although they are being influenced by a number of GOs and NGOs to improve their knowledge. Use of agricultural practices is being increased in Bangladesh day by day. Satkhira locale is considered as salt tolerant rice generation zone of the nation, where BRRI Dhan53 was a noteworthy endeavor. Satkhira Sadar upazila range, in this manner, considered a most reasonable area to concentrate the marvels of selection of salt tolerant innovations by the rice cultivators. Contemplates on individual, gathering and society uncovered that acknowledgment of modem innovations is restrictive upon many variables. Some of these are social, individual, practical and situational components. While directing any review on the reception of modem advancements, these elements should be considered. An extremely couple of past research work attempted to discover the above certainties. Subsequently, the present examine

felt need to lead an exploration entitled “Farmers’ Knowledge, Attitude and Adoption regarding Saline Tolerant Rice Varieties.”

1.2 Statement of the Problem

The achievement of any innovation relies on upon its dissemination among the potential clients, which eventually is measured by the level of selection of that innovation. Whenever an advancement is acquainted with the farmer, it might be promptly or somewhat or completely acknowledged and it might likewise happen that the reception of advancement is stopped or completely ceased.The success of any practices depends on its dissemination among the potential users, which ultimately is measured by the level of knowledge, attitude and adoption of those practices. It is assumed that notable improvements can take place in Bangladesh agriculture if the available practices are accepted by the farmers. Among various varieties, BRRI dhan47, BRRI dhan54, BRRI dhan55 and BRRI dhan61 etc. and BINA dhan8, BINA dhan10 are quite suitable for our sustainable agriculture.

These happenings are unquestionably because of various variables. Selection of saline tolerant innovations are impacted by the farmer's statistic and financial position. A comprehension about a similar will be helpful to the specialists, organizers and augmentation specialists in doing exploration, arranging and execution of expansion projects for upgrading adoption of saline tolerant rice cultivation. The motivation behind this review along these lines, was to investigate the connections between various qualities of the agriculturists and their selection of saline tolerant rice varieties development. This was finished by looking for answers to the accompanying queries:

i. What are the socio-economic characteristics of the farmers?
ii. What are the extent of knowledge, attitude and adoption of farmers regarding of saline tolerant rice varieties?
iii. Is there any relationship of the farmers’ selected characteristics with their knowledge, attitude and adoption regarding saline tolerant rice varieties?

The above-mentioned questions obviously impel the researcher for conducting the present research entitled “Farmers’ Knowledge, Attitude and Adoption regarding Saline Tolerant Rice Varieties”.

1.3 Objectives of the Study

The focal point of the research work was to explore the trends of farmers’ knowledge, attitude and adoption regarding saline tolerant rice varieties. This is why the following objectives were structured out in order to provide an appropriate track to the research work:

- To describe the selected socio-economic characteristics of farmers:
  - Age
  - Level of education
  - Family size
  - Rice cultivation experience
  - Annual family income
  - Training Experience
  - Agricultural Extension media contact
  - Problem faced in saline tolerant rice cultivation
- To determine the extent of knowledge, attitude and adoption regarding saline tolerant rice varieties
- To explore the correlation among each of the selected characteristics of farmers and their i) knowledge, ii) attitude and iii) adoption of saline tolerant rice varieties
- To explore the inter-correlation among knowledge, attitude and adoption of saline tolerant rice varieties by the farmers

1.4 Scope or rationale of the study

The present study was designed to have an understanding of knowledge, attitude and adoption regarding saline tolerant rice varieties and to explore of the relationship among knowledge, attitude and adoption of farmers regarding saline rice varieties with their selected characteristics.

i. The findings of the study will, in particular, be applicable to the study area at Sadar upazila of Satkhira district. The findings may also be applicable to other locale of Bangladesh where socio-cultural, psychological and economic circumstance do not differ much than those of the study areas.

ii. The findings of the study may also be subsidiary to the field worker of extension service to enhance their action strategies for adoption.

iii. The findings of the study will be conducive to accelerate the improvement in agriculture, farmers' logistic supports, information needs and the way of dissemination especially tuned to key role players in the society as well as knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmers. The outcomes might also be helpful to the planners and policy makers, extension workers and beneficiaries of the agriculture.

iv. To the academicians, it may help in the further conceptualization of the systems model for analyzing the knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmers. In addition, the findings of this study may have other empirical evidence to all aspects of knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmers which may be used to build an adequate theory of knowledge, attitude and adoption.

1.5. Justification of the study

Rice cultivation plays a vital role towards guaranteeing food security in Bangladesh. Presently impressive exertion is being made through research and extension delivery system to expand rice production. The actual increase in production will depend on the activities of the rice cultivators and also the adoption of modern varieties in rice cultivation in our country. For that to enhance rice production efficiency, modern varieties play a great role. The concept and benefits of the rice cultivation should be disseminated to the farmers in a convincing and attractive manner, so that farmers' response quickly to adopt modern varieties of rice cultivation. This is indisputably an

educative process and it possible through Extension Education System, concerned mainly with increasing agricultural production and promoting living standards of the farmers.

The major focus of the study is to assess the knowledge, attitude and adoption of the farmers regarding saline tolerant rice varieties. Recently, BRRI and BINA have released different saline tolerant rice varieties especially for coastal area of the country. Government and different non-government organizations are currently putting effort and allocating resources for production oriented research in coastal area. They encourage people in the coastal area to undertake saline tolerant rice varieties in cultivation. Hence, evaluation of knowledge, attitude and adoption of the concerned farmers is necessary. Though saline tolerant rice varieties become popular at farmers' level, there are a few researches conducted on knowledge, attitudes and adoption of farmers towards these saline tolerant rice varieties. Considering the above factors, the researcher became interested to undertake a study to determine knowledge, attitude and adoption of the farmers regarding cultivation of saline tolerant rice varieties.

1.6. Assumptions of the study

An assumption is the supposition that an apparent fact or principle is true in the light of available evidence. The researcher had considered the following assumptions while undertaking the study:

i. The respondents were efficient of furnishing proper answers to the questions contained in the interview schedule.

ii. The data collected by the researcher were free from favor and they were normally distributed.

iii. The responses answered by the respondents were valid and reliable.

iv. Information sought by the researcher revealed the real condition and was the representative of the whole population of the study area to gratify the objectives of the study.

v. The researcher was well adjusted to himself with the social surroundings of the study area. Hence, the collected data from the respondents were free from bias.

vi. The selected characteristics and the adoption of the farmers of the study were normally and independently allotted with respective means and standard deviation.

1.7 Limitations of the study

Considering the time, respondents, communication facilities and other necessary resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as mentioned bellow-

i. The study was confined to Chadpur, Kamorpur and Dorista of Dhaliur union of Satkhira Sadar Upazila.

ii. It is difficult to get accurate information regarding adoption indicator from the farmers as many of them are illiterate.

iii. Characteristics of the farmers were many and varied, but only eight characteristics were selected for the research study.

iv. There were embarrassment situations at the time of data collection. So, the researcher had to manage proper rapport with the respondents to collect maximum accurate information.

1.8 Definition of the related terms

In this study, the certain terms have been frequently used. These are defined and explained below for clarity of understanding to the investigator and readers.

Age: Age of the respondent refers to the period of the time in actual years from his birth to the time of interview.

Level of education: Empirically it was defined to the development of desirable changes in knowledge, skill and attitudes in an individual through

reading, writing, walking, observation and other selected activities. It was measured on the basis of classes a farmer has passed from a formal educational institution.

Family size: Family size referred to the number including the respondent himself, his wife, children and other permanent dependents, who lived and lived together in a family unit.

Annual family income: The term annual family income referred to the total earning by the earning members of a farm family from agriculture, livestock, fisheries and other accessible sources (business, service, daily labor etc.) during a year. It was expressed in Thousand Taka.

Agricultural Extension media contact: The term extension media contact refers to ones exposure to the influence of different extension media such as interpersonal channels and mass media channels etc.

Rice cultivation experience: Rice cultivation experience refers to the experience of a farmer in agricultural works and expressed in years.

Problem: By the word problem it was meant any difficult situation which required some actions to minimize the gap between "what ought to be" and "what is". The term problem referred to different difficulties faced by the farmers in case ofsaline tolerant rice varieties cultivation.

Knowledge on saline tolerant rice varieties: It referred to the extent of basic understanding of the farmers in different aspects of salt tolerant rice varieties cultivation i.e. varieties, soil condition, seed rate, suitable time for cultivation, fertilizers, diseases, insects, fungicides, harvesting time etc.

Attitude towards saline tolerant rice varieties cultivation: Attitude is the mental predisposition of an individual to act in a particular way. In other words, it refers to one's favorable or unfavorable feelings, beliefs, and actions towards an object and concept. Attitude towards cultivation of salt tolerant rice varieties referred to one's feeling towards that variety in various aspects.

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).

CHAPTER II

REVIEW OF LITERTURE

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

Section 1: Concept of knowledge, attitude and adoption

Section 2: Factors related the adoption

Section 3: Past research related to knowledge, attitude and adoption

Section 4: Relationships between each of the characteristics of the respondents and their knowledge on saline tolerant rice varieties

Section 5: Relationships between each of the characteristics of the respondents and their attitude towards saline tolerant rice varieties

Section 6: Relationships between each of the characteristics of the respondents and their adoption of saline tolerant rice varieties

Section 7: Research gap of the study

Section 8: Conceptual framework of the study

2.1 Concept of knowledge, attitude and adoption

2.1.1 Concept of Knowledge

Knowledge can be defined as the 'understanding obtained through the process of experience or appropriate study'. Knowledge can also be an accumulation of facts, procedural rules, or heuristics. Here-

- A fact is generally a statement representing truth about a subject matter or domain.
- A procedural rule is a rule that describes a sequence of actions
- A heuristic is a rule of thumb based on years of experience

Knowledge is the result of some activity such as generation, storage, dissemination and utilization of something that entails either information or data. It is usually based on learning, thinking, and proper understanding of the problem area. It is not information and information is not data. Knowledge is derived from information in the same way information is derived from data when processed or patterned in human mind. It can be considered as the integration of human mind. It can be considered as the integration of human perceptive processes that helps them to draw meaningful conclusions.

Bhuiyan (2012) indicated that "Knowledge may be defined as the scientific fact of an idea which is experimentally or empirically verified."

According to Oxford dictionary "facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject."

Knowledge is often defined as a belief that is true and justified. This definition has led to its measurement by methods that rely solely on the correctness of answers. A correct or incorrect answer is interpreted to mean simply that a person knows or does not know something. Such methods of measurements have serious deficiencies that can be alleviated by expanding the definition of knowledge to include the test-tarer's certainty.

2.1.2 Concept of attitude

An attitude is an evaluation of an attitude object, ranging from extremely negative to extremely positive. Most contemporary perspectives on attitudes also permit that people can also be conflicted or ambivalent toward an object by simultaneously holding both positive and negative attitudes toward the same object. This has led to some discussion of whether individual can hold multiple attitudes toward the same object. An attitude can be as a positive or negative evaluation of people, objects, events, activities, and ideas. It could be concrete, abstract or just about anything in your environment, but there is a debate about precise definitions.

Attitude may be thought of as a person's perspective toward a specific target and way of predisposition to act, perceive, think and feel in relation to something's. It is expressed as one's views regarding an object as positive or negative, favorable or unfavorable, like or dislike etc. with varying degrees, according to (Bhuiyan, 2012).

Thurstone (1928) defined attitude as the effect for or against a psychological object. According to Morgan, Holmes and Bundy (1929) attitude means one's feeling towards persons, ideas, institution, and practices of facts.

Warren (1934) refers to attitude as a specific mental disposition towards an incoming or arising experience, whereby that experience is modified, or in other words, it is a condition of readiness for a certain type activity.

Green (1954) distinguished three kinds of attitude universe to represent three different classes of individual responses to sets of social objects. These are: i) verbal attitudes, given in response to question, ii) spontaneous verbal attitude, usually expressed in normal conversation and iii) action attitudes which include both verbal and non-verbal behavior directed towards and object in the referent class. Sherif and Sherif (1956) defined the term attitude as a relatively stable tendency to respond with a positive or negative affect to a specific referent.

McGrawth (1966) defined attitude as the learned orientations towards objects, or predisposition to behave in certain ways towards a given objects or a class of objects. An attitude has always in object, person, thing or concept and it may be general or specific.

Drever (1968) defined an attitude as more or less a stable set or disposition of opinion, interest or purpose, involving expectancy of certain kind of experience and readiness with appropriate kind of response.

According to Allport (1935), an attitude is that disposition to act which is built up by the integration of numerous specific responses of similar type, but which exists as a general neutral set when activated by a specific stimulus, it results in behavior that is more obviously, a function of the disposition than of the stimulus. According to Allport, the chief weakness of the most of the definition lies in their failure to distinguish between attitudes, which are often very general, and habits, which are limited in their scope. However, it is justified to admit that, in spite of existence of disagreements among psychologists, they contributed towards securing greater agreement in future.

Eagly and Chaiken, for example, define an attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor. Though it is sometimes common to define an attitude as affect toward an object, affect (i.e., discrete emotions or overall arousal) is generally understood to be distinct from attitude as a measure of favorability. Attitude may influence the attention to attitude objects, the use of categories for encoding information and the interpretation, judgement and recall of attitude-relevant information. These influences tend to be more powerful for strong attitudes which are easily accessible and based an elaborate knowledge structure. Attitudes may guide attention and encoding automatically, even if the individual is pursuing unrelated goals.

2.1.2.1 Attitude component models

Multicomponent model is the most influential model of attitude. Where attitudes are evaluations of an object that have cognitive, affective, and behavioral components. These components are also known as taxi CAB that will get you where you want to go.

Cognitive component: The cognitive component of attitudes refers to the beliefs, thoughts, and attributes that we would associate with an object. Many times, a person's attitude might be based on the negative and positive attributes they associate with an object.

Affective component: The affective component of attitudes refers to your feelings or emotions linked to an attitude object. Affective responses influence attitudes in a number of ways. For example, many people are afraid/scared of spiders. So, this negative affective response is likely to cause you to have a negative attitude towards spiders.

Behavioral component: The behavioral component of attitudes refers to past behaviors or experiences regarding an attitude object. The idea that people might infer their attitudes from their previous actions. This idea was the best articulated by Bem.

2.1.3 Concept of adoption

Adoption is the implementation of a decision to continue the full use of an innovation.

“Adoption is an Individual matter or phenomenon or behavioral socio-economical phenomenon or mental process.”

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, then phenomenon is known as adoption (Ray, 1991).

2.1.3.1 Elements of adoption process

(a) Innovation

(b) Diffusion

(c) Motivation

(d) Adoption

2.1.3.2 Stages of adoption

i. Awareness stage:Individuals know of the new idea but lacks information, which need to be provided.

ii. Interest stage:Individual becomes interested in the new idea and seeks more information.

iii. Evaluation stage: Individual evaluates the idea with information, and plans future course of action.

iv. Trial stage:Individual uses the new idea on a small scale into to determine its utility in his own situations.

v. Adoption stage:Individual uses new ideas continuously on a full scale.

2.1.3.3 Categories of adopters

i. Innovators:Such people are called innovators who adopt immediately after getting knowledge. In India Innovators constitutes only 2.5% of the total population.

ii. Early adopters:Such people adopt through local leaders and constitute only 13.5% of the total population.

iii. Early majority:Such people adopt just before adopting the common people and not through the local leaders and constitute 34% of the total population.

iv. Late Majority:Such people adopt after seeing their relatives and neighbors and constitute 34% of the total population.

v. Laggards:Such people adopt in the last and constitute only 16% of the total Indian population.

2.2 Factors related to adoption

There were a number of factors identified in the literature, which have influenced the adoption. Drawing on several studies on technology adoption such as Adesina and Zinnah (1992); Aguila-Obra and Melendez (2006); Chau and Tam (1997); Doorman (1991); Feder, Just and Zilberman (1985); Rogers (1995). It can be ascertained that the factors, which influence the farmers' decision to either adopt or not to adopt can be grouped under three major headings: 1) the characteristics of the technology; 2) internal factors; and 3) external factors. These factors are discussed in the following section.

2.2.1 Characteristic of technology as well as innovation

Rogers (1995) identified five characteristics of a technology or innovation that influenced adoption. These are: 1) relative advantage; 2) compatibility; 3) complexity; 4) trialability; and 5) observability. Feder *et. al.*, (1985) identified three others and classified these technologies in relation to resource use. These characteristics included: 1) capital-saving or capital intensive; 2) land-saving or land-using; and 3) labor-saving or labor using. Feder and Umali (1993), Leathers and Smale (1991), and Pannell *et al.*, (2006) also identified associated risks with a new technology as an important factor that influenced adoption decisions of individuals. The following sections draw on the relevant literature to describe in detail each of these factors and their impacts on the adoption decisions of individuals.

a) Relative advantage

Relative advantage is the degree to which an innovation is perceived to be better than the idea it supersedes (Rogers, 1995). Relative advantage can also be described as the advantage of an innovation to achieve goals better (or at a lower cost) than previously (Van Den Ban and Hawkins, 1996). The degree of relative advantage is commonly expressed as economic profit, social prestige or other benefits (Rogers, 1995). It has been found that agricultural practices, which are believed to be profitable, have an increased likelihood of adoption,

whilst those that are believed to provide less return are less likely to be adopted (Barr and Cary, 1992).

b) Compatibility

Compatibility refers to the degree to which an innovation is perceived as consistent with existing values, past experience, and the needs of the potential adopter (Roger, 1995). The more compatible an innovation is to a potential farmer's life experiences and situation, the more familiar they will be with the innovation and the less uncertain they will be about adopting the innovation (Deressa *et. al*., 2009). Ogunlana (2004) also defined compatibility as being the ease by which the farmers can integrate the new practices into their farming system and access other relevant inputs that would help in its adoption.

c) Complexity

The complexity factor is the degree to which a technology is perceived to be difficult to understand and use (Rogers, 2003). The greater the complexity of an innovation the more negatively a new farmer may view the technology. For example, the discontinuation of a system of rice intensification program, which was introduced in Madagascar for rice farmers, was largely due to the difficulties faced by farmers in understanding the application of the new practices and methods (Moser and Barrett, 2002). Gibson (1994) shared a similar view and reported that farmers in Papua New Guinea rejected growing rice because rice cultivation was seen as complex and difficult to manage.

d) Trialability

Trialability is the degree to which the technology can be tested on a small scale (Rogers, 2003). Ogunlana (2004) pointed out that farmers are always keen to adopt technologies which they have first trialed on a limited basis on their farm, compared to one they have to adopt on a larger scale - which might fail. Floyd *et al.*, (2003) and Rogers (2003) added that a technology, which can be gradually implemented without a large capital investment from outside, is important, since it will certainly enhance the farmers' decision to adopt the technology.

e) Observability

Observability is the degree to which the results of a technology can be visible to others (Rogers, 1995). Cary et al., (2002) argued that a profitable outcome is an important factor that influences the adoption decision. A lack of observable profit, as result of adopting a technology would inhibit the adoption of the technology by others. The more observable the outcomes of an innovation offers and is perceived as being suitable by the farmer, the rate of adoption will become more positive (Rogers, 2003). For example, in a study on mangrove swamp rice varieties in Sierra Leone, Adesina and Zinnah (1992) found that farmers adopted a new variety of rice introduced to the area because they observed that the results were highly visible.

2.2.2 Internal factors

Several authors (Bantel and Jackson, 1989; Deressa *et. al.*, 2009; Knowler and Bradshar, 2006; Pannell *et al.*, 2006; Staal *et. al.*, 2002) suggested that there are four key internal factors that influence the adoption of technology. These factors include: 1) characteristics of the farmer; 2) on-farm factors; 3) cultural factors; and 4) leadership characteristics. The following sections draw on the relevant literature to describe in detail each internal factor that can influence a farmer's adoption decision.

2.2.2.1 Characteristics of the farmer

2.2.2.1.1 Age

The personal characteristics that may influence the adoption decision of a farmer include age, gender, education, and level of farming experience (Deressa *et. al.*, 2009; Doss and Morris, 2000). These personal factors can affect the innovativeness of an individual and thus contribute to determining the rate at which farmers' will adopt new technology (Adesina and Zinnah, 1992; Deressa *et. al.*, 2009; Spence, 1994).

2.2.2.1.2 Level of education

Education improves human capital, farm management capacity, the ability to understand and adopt recommended agricultural practices (Bezuayehu *et. al.*, 2002). It is expected that better educated farmers are more likely to adopt recommended agricultural practices than less educated farmers (Cary *et al.*, 2002). Mwaseba *et. al.* (2006) reported that, education of household head has influence on adoption of recommended agricultural practices especially when the recommended agricultural practices require managerial skills.

2.2.2.1.3 Income

Income may enhance labor and ability to purchase and therefore low level of income implies difficulties in buying farm inputs like improved seed, fertilizers and herbicides (Msuya, 2005).

2.2.2.1.4 Farmers' attitude

Attitude is the process by which a person receives information or stimuli from the environment and transforms it into psychological awareness (Van de Ban and Hawkin, 1988). According to Duvel (1991) perception is understood to be of more specific nature and is analyzed based on attribute of innovation. The attributes that can be directly associated with field forces are; prominence and relative advantages.

2.2.2.1.5 Agricultural extension media contact

Hossain (2006) concluded that the extension contact of the farmers had positive significant relationship with their adoption of selected HYV rice. Hossain (2003) concluded that communication exposure of the farmers had a significant and positive relationship with their adoption of modem Boro rice cultivation.

2.2.2.1.6 Organizational participation

Amin (2015) conducted a study at Rajapur upazila under Jhalokathi district in Bangladesh that showed a non-significant contribution of organizational participation on adoption of modern technologies by the rice cultivators.

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

2.2.2.1.7 Farmers' knowledge

In this study knowledge refers to as an awareness of recommended practices or the optimum that is achievable in terms of efficiency. In this case refer to as awareness of recommended rice production practices in the study area. A lack of understanding or knowledge about the recommended practices is often cited as a strong barrier to the adoption of recommended practices or innovations (Duvel, 1991). Amin (2015) conducted a study at Rajapur upazila under Jhalokathi district in Bangladesh that showed a significant contribution of knowledge on modern technologies on adoption of modern technologies by the rice cultivators.

2.2.2.2 On-farm factors

On-farm factors include farm size, location, and land tenure (Daberkow and Mcbride, 2003; Knowler and Bradshar, 2007; Staal *et. al.*, 2002). These factors exist within the farm environment in which farmers carry out their daily activities (Spence, 1994). The effect of farm size on adoption has been frequently analyzed in many adoption studies (Erenstein and Faroog, 2009; Daku, 2002; Doss and Morris, 2001). Evidence from various sources has indicated that there is a positive relationship between farm size and adoption (Erenstein and Farooq, 2009; Deressa *et. al.,* 2009; Kasenge, 1998). In a number of studies, it was found that those with larger farms have a greater probability of adopting an innovation than owners of smaller sized farms (Azilah, 2007; Deressa *et. al.,* 2009). Farmers operating larger farms tend to have greater financial resources and their opportunities to obtain credit are higher compared with those with smaller farms. In Kenya for example, a study by Gabre-Madhin and Haggblade (2001) found that large commercial farmers adopted new high-yielding maize varieties more rapidly than smallholders did. The location of the farm is also an important factor, which influences the adoption of a technology. For example, Zeller *et. al.*, (1998), in a study on

market access in Malawi found that farmers who had their farms located close to major markets adopted maize faster than those whose farms were located far from the market.

2.2.2.3 Cultural factors

Cultural factors have also been identified as having influenced adoption decisions by farmers. These factors include: 1) norms and 2) the traditions of a society (Herbig and Miller, 1991; Pannell *et al.*, 2006; Roger, 1995; Sommers and Napier, 1993; Straub, 1994; Twati and Tripoli, 2008; Wejnert, 2002). The cultural norms of a society are also an important factor that influences an adoption decision. Wejnert (2002) argued that technologies, which are not compatible with cultural norms, are adopted only by a relatively small percentage of potential, individual adopters. For example, Rogers (1995) found that the residents of Los Molino in Peru did not adopt the practice of boiling drinkable water because it conflicted with their norm of serving such water only to sick people. Similarly, in Costa Rica, the rate of adoption of fertility-control practices by married couples was low because they conflicted with their cultural values relating to optimum family size (Rosero-Bixby and Casterline, 1993). The traditions of a society are one of the factors that play an important role in affecting farmers' decision-making, which includes the likelihood of them adopting new practices (Stanley *et al.*, 2000). For example, Sommer and Napier (1993) found that the adoption of sustainable agriculture practices by farmers in Amish communities was influenced by their cultural traditions towards land and soil protection. However, in contrast, Wejnert (2002) stated that the cultural traditionalism associated with social inertia when adopting new practices and ideas can negatively affect the adoption of technology. Lawrence *et. al.*, (2004) argued that society's resistance to discarding long-held traditions would lead to a strong resistance (within that society) to change the adoption of new technology. In the following section, the leadership characteristics that influenced adoption decision are discussed.

2.2.2.4 Leadership characteristics

Leadership characteristic is another internal factor, which has been found to influence the decision to adopt new technology (Bantel and Jackson, 1989; Damanpour and Schneider, 2009; Howell and Higgins, 1990; Levi and Litwin, 1986; Scott and Bruce, 1994; West and Anderson, 1996). Ross and Lappin (1967) referred to leadership characteristics as attitudes and behaviors of those individuals who perform leadership roles. They believe that good leaders need to possess a positive identification with their people and also with others outside their community. Based on their work on community and cooperatives in participatory development Levi and Litwin (1986), supported this view. They found that good leaders are those who know their people intimately, who share with them their problems, and who lead their people towards common goals. Onyx and Leonard (2010) further support this view, in their study on complex systems leadership in emergent community projects in Australia, Uruguay, Sweden, and Peru. They found that the five community projects studied in five different countries were successful because the leadership of these community projects was open to their members in relation to shared decision making with members, honesty with members, and committed to their communities. The other important characteristics of leaders, which influence adoption decisions, are skills and knowledge (Cernea and Meinzen-Dick, 1995). According to Cernea and Meinzen-Dick (1995), these characteristics can be further divided into two types: 1) those that are required in an organizational role; and 2) those that are required in a technical role.

2.2.3 External factors

Apart from the internal factors, the adoption decision of farmers is also influenced by external factors. Several authors such as Akpabio and Inyang (2007); Anderson and Feder (2007); Caswell *et al.,* (2001); D'Emden *et. al.*, (2008); Fliegel (1993); Saltiel*et al.,* (1994); Sunding and Zilberman (2001); and Zeller *et. al.,* (1998) identified five main external factors to have influenced the adoption decision of farmers. These were: 1) government policy;

2) infrastructure development; 3) agro-climatic condition; 4) extension support; and 5) market access.

2.3 Past research related to knowledge, attitude and adoption

2.3.1 Past research related to knowledge

Rahman (2015) studied on knowledge of BRRI dhan47 cultivation and found that majority (75%) of the farmers possessed medium knowledge and 20.37 and 4.63 percent of the farmers possessed high and low knowledge on rice cultivation respectively.

Khan (2005) studied on knowledge of maize cultivation and found that majority (68 percent) of the farmers had relatively low level of knowledge and 32 percent of the farmers possessed relatively high level of knowledge.

Sana (2003) studied farmers' knowledge of shrimp culture and showed that majority (61percent) of them had medium level of knowledge, while 30 percent had low and rest 9 percent possessed high knowledge.

Hassan (2004) reported that the highest proportion of the respondents had medium knowledge on partnership extension approach (70.4 percent) followed by 16.9 percent had low knowledge an 13.3 percent had high knowledge.

Rahman (2004) found in his study that the highest proportion (62.22 percent) of the respondents had medium knowledge compared to 25.56 percent having low knowledge and only 12.22 percent had high knowledge on HYV boro rice cultivation.

Hussen (2001) found in his study on farmers' knowledge and adoption of modern sugarcane cultivation practices found that highest proportion (84 percent) of the farmers possessed medium knowledge, 13 percent high knowledge and lowest proportion (3 percent) possessed low knowledge.

Saha (2001) made an attempt on farmers' knowledge in improved practices of pineapple cultivation and found that the majority (62 percent) of the farmers

possessed good knowledge, 33 percent poor knowledge and only 5 percent possessed excellent knowledge.

Khan (1996) conducted a research on the effectiveness of a farmer primer on growing rice in knowledge change of the farmers in Shaktipur Thana and found that 67 percent farmers had good knowledge at initial stage, where 21 percent had excellent knowledge and 12 percent had poor knowledge.

Parvene (1995) in her study found that 58 percent of the farm women had moderate knowledge while 35 percent had high and 7 percent had poor knowledge on the use of fertilizer, pesticides and irrigation water.

2.3.2 Past research related to attitude

Rahman (2015) showed that about 77.78 percent of the respondents had high favorable attitude towards the rice cultivation and 22.22 percent of the respondents had low favorable attitude towards the rice cultivation.

Monalesa (2014) found that about half (49.5 percent) of the formers had favorable attitude towards summer tomato cultivation.

Sarkar (2002) revealed that 28.75 percent of the imams had favorable attitude towards crop cultivation, while 51.25 percent had moderately favorable attitude and the rest 20 percent had less favorable attitude towards crop cultivation.

Chowdhury (2003) found that majority of the farmers in progressive village held moderately favorable attitude (52 percent) compared to farmers of traditional village of whom 43 percent held moderately favorable and 29 percent held moderately unfavorable attitude towards crop diversification.

Afrad (2002) found that majority (59.1 percent) of the farmers had favorable attitude towards vegetable cultivation while 40.9 percent had moderately favorable attitude towards vegetable cultivation.

Rahman (1993) investigated that the highest proportion (49 percent) of the Binadhan-6 growers had unfavorable, 24 percent highly unfavorable and 26 percent had favorable attitude towards Binadhan-6.

2.3.3 Past research related to adoption

Hoque (1993) indicated that 70.2 percent of the respondents had medium adoption, 16.8 percent high adoption and only a few percent had low adoption of BR-14 nee variety.

Khan (1993) observed that among the respondent farmers, 7 percent had no adoption, 57 percent had low adoption, 32 percent had medium adoption and only 4 percent had high adoption of insecticides.

Rahman (1993) revealed that 76 percent of the farmers had medium adoption of improved farm practices on Boro cultivation whereas 11 percent had low and 13 percent of the participants had high adoption.

Islam (2002) found in his study that majority (87 percent) of the ecological farmers of Proshika had medium adoption while only one percent had low and 12 percent had high adoption of ecological agricultural practices.

2.4 Relationships between each of the selected characteristics of the respondents and their knowledge on innovation

2.4.1 Age and knowledge

Islam (2002) in his study concluded that age of the BSs had no significant relationship with their knowledge on modern agricultural technologies.

Kashem (2004) in his study on the small farmers' constraints to the adoption of modern rice technology found that age of the farmers had significant negative correlation with their agricultural knowledge. This men that generally younger farmers gained more agricultural knowledge than their older counterpart.

Rahman *et. al.* (1993), found positive significant relationship between age and knowledge in their research.

Saha (2001), Sana (2003), Sarker (2002), Rahman (2001), Hossain (2006) and Islam (1997) found no relationship between age and knowledge in their studies.

2.4.2 Education and knowledge

Saha (2001), Sana (2003), Sarker (2002), Saha (2001), Hossain (2004) found that education of the farmers was positively and significantly related with their knowledge in their research work.

Islam (2002) found that the general education of the BSs had no significant relationship with their knowledge on modern agricultural technologies.

Kashem (2004) in his study revealed that there was no significant relationship between education of the farmer and their agricultural knowledge.

Amin (2015) found that education of PETRRA and non-PETRRA beneficiaries had positive significant relationship with their knowledge on organic cocoon and skills on production and storing of rice seeds.

2.4.3 Family size and knowledge

Hossain (2003) found that family size of the farmers was not significantly related to farmers' knowledge on modern Boro rice cultivation practices.

Sana (2003) revealed that family size of the farmers was not related to their knowledge of shrimp culture.

Parveen (1995) revealed that family size of the farm women had a positive significant relationship with their knowledge on the use of fertilizer, pesticides and irrigation water.

Kashem (1987) in his study, however, did not find any significant relationship between family size and agricultural knowledge of the farmers.

2.4.4 Rice cultivation experience and knowledge

No literature was found related to relationship between rice cultivation experience and knowledge of farmers.

2.4.5 Income from rice cultivation and knowledge

No literature was found related to relationship between income from rice cultivation and knowledge of farmers.

2.4.6 Training experience and knowledge

No literature was found related to relationship between Training experience and knowledge of farmers.

2.4.7 Extension media contact and knowledge

Sana (2003), Sarker (2002) and Rahman (2001) found in their study that media contact of farmers was highly positive significant relationships with their knowledge.

2.4.8 Problem faced and knowledge

Ali (1999) concluded that problems of the farmers had a significant relationship with their knowledge.

Raha (1989) concluded that problems of the farmers had no significant relationship with their knowledge.

Anwar (1994) concluded that problems of the farmers had no significant relationship with their knowledge.

2.5 Relationships between each of the selected characteristics of the respondents and their attitude towards innovation

2.5.1 Age and attitude

Chowdhury (2003), Sarker (2002) found in their study that there is no relationship between age and attitude.

Kashem (1987) in his study also found that there was no relationship between the age and attitude towards community of the farmers.

Ali (2002), Singh and Kunzroo (1985) found that age of the farmers had negative significant relationship with their attitude in their research studies.

Parveen (1995), Verma and Kumar (1991) found that age of the respondents had positive relationship with their attitude towards ecological agriculture.

Singh (1982) observed that attitude of irrigated and non-irrigated groups of farmers towards improved crop production technology were heavily skewed into favourable category. However, the differences between mean attitude

scores of the two groups of farmers were significant and were in favour of farmers who had irrigated farm holdings.

Singh and Kunzroo (1985) found that there was a negatively significant relationship between age of the farmers and their attitude towards goat and sheep farming.

Verma and Kumar (1991) conducted a study on comparison of farmer's attitude towards buffalo management practice in adopted and nonadopted villages revealed that there was relationship between age and attitude towards buffalo management in case of adopted village and they found no significant relationship between age and attitude of the farmers of non-adopted village.

Parveen (1995) found that age of the modern village women influenced their attitude towards homestead agricultural production. But in case of the women of the traditional village, age was not associated with their attitude towards homestead agriculture production.

Noor (1995) found that age of the relationship with their attitude towards the cultivation of high yielding varieties of potato.

Islam and Kashem (1997) observed that age of the farmers had negative relationship with their attitude towards agrochemical.

Habib (2000) found that age of the BSs had no significant relationship with their attitude towards the use of agro-chemicals.

Nurzaman (2000) observed in his study that age of the FFS and non-FFS farmers had no significant relationship with their attitude towards IPM.

BARI (2000) reported in his study that age of the farmers had no significant relationship with their attitude towards hybrid rice AALOK 6201.

Paul (2000) found that there was negatively significant relationship between age of the farmers and their attitude towards the use of USG.

Mannan (2001) found that age of Proshika farmers had no significant relationship with their attitude towards the Ecological Agricultural Programs.

Chowdhury (2003) found that age of farmers had no significant relationship with their attitude towards crop diversification.

2.5.2 Education and attitude

Chowdhury (2003), Khan (2005) and Kashem (1987) found that education of the farmers had a positive significant relationship with their attitude.

Rogers and Leuthold (1962) in their study on farm demonstration found that the farmer demonstrators, who were characterized by more years of level of education, were characterized by more favourable attitudes towards fertilizer.

Ali (2002) found that education qualification of Block Supervisor's had negative relationship with their attitude.

Singh (1982) observed that family education of the farmers were positively related to their attitude towards agricultural technology and this relationship was significant statistically.

Singh and Kunzroo's (1985) study revealed that there was a positive and significant relationship between education of farmers and attitude towards sheep and farming.

Kashem (1987) found that attitude towards community of the small farmers had significant positive correlation with their educational level.

Kumari (1988) found the study on communication effectiveness of selected mix-media concluded that there was a significant association between education of the respondents (women) and their attitude towards the massage and knowledge level.

Sulakshna (1988) found that the educational qualification if the extension personnel was positively related with their attitude towards extension work.

Verma and Kumar (1991) reported that there was positive and significant relationship between education of farmers and their attitudes towards buffalo management in non-adopted village but the relationship was not significant in adopted village.

Noor (1995) in his study found that education of the farmers had positive significant relationship with their attitude towards HYV of potato.

Habib (2000) observed in his study that education of the BSs had significant positive relationship with their attitude towards agrochemicals.

Nurzaman (2000) found that education of the FFS and non-FFS farmers were positively correlated with their attitude on IPM.

Paul (2000) in his study found that academic qualification of the farmers had positive significant relationship with their attitude towards the use of USG.

Chowdhury (2003) found that academic qualification of the farmers had positive significant relationship with their attitude towards crop diversification.

Sadat (2002) found similar relationship towards education and attitude of farmers.

2.5.3 Family size with attitude

Ahmed (2006) reported that family size of the farmers had non-significant and positive relationship with the attitude towards shrimp farming.

Chowdhury (2003) conducted a study on farmers' attitude towards crop diversification. The study revealed that family size of the farmers had non-significant and negative relationship with farmers' attitude towards crop diversification.

Paul(2000) found no relationship between family size and attitude towards use of Urea Super Granule. Similar results were also found by Bari (2000), Habib (2000), Noor (1995) in their respective studies.

2.5.4 Rice cultivation experience and attitude

No literature was found related to relationship between rice cultivation experience and attitude of farmers.

2.5.5 Annual family Income and attitude

No literature was found related to relationship between annual family income and attitude of farmers.

2.5.6 Training experience and attitude

Paul (2000) reported that training experience of the farmers had a positive significant relationship with the attitude.

BARI (2001) reported that training experience of the farmers had no relationship with their attitude.

2.5.7 Extension media contact and attitude

BARI (2000) also reported that there is no relationship between extension media contact and attitude of farmers towards hybrid rice ALOK 6201.

Chowdhury (2003) observed no relationship between extension media contact and attitude of farmers towards crop diversification.

Shehrawat (2002), Sadat (2002) and Siddique (2002) reported in their studies that there was a significant and positive relationship between extension contact and attitude of farmers.

2.5.8 Problem faced and attitude

Karim *et. al.* (1997) found that problems of the farmers had a significant relationship with their attitude, 1`Muttaleb *et. al.* (1998) revealed that problems of the farmers had a significant relationship with their attitude.

2.6 Relationships between each of the selected characteristics of the respondents and their adoption of innovation

2.6.1 Age and Adoption

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

Aurangozeb (2002) observed that there was significant negative relationship between age and adoption of integrated homestead farming technologies.

Sardat (2002) found that age of the farmer had significant positive relationship with their adoption of IPM practices.

Hassan (2004) found that there was no relationship between age and adoption of improved practice in pineapple cultivation.

Islam (2008) study revealed that the age of the farmers had no relationship with their adoption of IPNS by the small farmers towards sustainable crop production.

2.6.2 Education and adoption

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that education of the farmers had a significant and positive relationship with their adoption of modern technologies.

Aurangozeb (2002) observed that there was positive relationship between education and adoption of integrated homestead farming technologies.

Sadar (2002) found that the education of the farmer had significant positive relationship with their adoption of IPM practices.

Miajy (2005) found that there was no significant relationship between education and adoption of hybrid varieties of maize.

Akter (2007) observed that the education of the farmers had significant positive relationship with their adoption on improved potato varieties.

2.6.3 Family size and adoption

Hussen (2001) found that the family size had no significant relation with their adoption of modern sugarcane cultivation practices.

Aurangozeb (2002) observed that there was no relationship between family size and adoption of integrated homestead farming technologies.

Sardar (2002) found that the family size of the farmer had no significant relationship with their adoption of IPM practices.

Reza (2007) found that family size of the farmers had significant value with their adoption of modern maize cultivation technologies.

Islam (2008) revealed that the family size of the farmers had no relationship with their adoption of integrated plant nutrient system by the small famers.

2.6.4 Rice cultivation experience and adoption

No literature was found related to relationship between rice cultivation area and adoption.

2.6.5 Annual income and adoption

Sardar (2002) found that the farm size of the farmers had significant positive relationship with their adoption of IPM practices.

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

Miajy (2005) found that the annual income of the farmers had no significant relationship with their adoption of hybrid varieties of maize.

Reza (2007) found that the annual income of the farmers had significant relationship with their adoption of modern maize cultivation of technologies.

2.6.6 Training experience and adoption

Reza (2007) found that the training experience of the farmers had significant relationship with their adoption of modern maize cultivation of technologies.

2.6.7 Extension media contact and adoption

Hussen (2001) found that he extension media contact had positive significant relationship with their adoption of modem sugarcane cultivation practices.

Aurangozeb (2002) observed that there was significant relationship between Contact with extension media and adoption of integrated farming technologies.

Sardar (2002) concluded that the extension contact had positive significant relationship with their adoption of 1PM practices.

Hossain (2006) observed that the extension contact of the farmer had significant relationship with their adoption of improved practices in soybean cultivation.

Islam (2008) found that there was no significant relationship between extension contact and adoption of integrated nutrient system.

2.6.8 Problem faced and adoption

Islam (2008) found that there was negative significant relationship between problem faced by farmers and adoption of integrated nutrient system.

2.7 Research gap of the study

There are lots of researches on knowledge, attitude and adoption of rice to enrich the food safety but very few researches had been done to solely assess the extent of knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmers. Moreover, among the limited studies on knowledge, attitude and adoption regarding saline tolerant rice varietiesbut only a few researchers followed systematic method to assess the extent of knowledge, attitude and adoption regarding saline tolerant rice varietiesby the farmers. This was one of the research gaps of the study. Hence, the researcher carried out the present study to assess the extent of knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmersfollowing the method which is important to be able to identify and understand the research approach suitable for any given study because the selection of a research approach influences the methods chosen, the statistical analyses used, the inferences made and the ultimate goal of the research. Furthermore, according to an area can be explored in two ways, with an unstructured approach to data collection in

which participants' meaning are the focus of attention, and more structured approach of quantitative research to investigate a specific set of issues.

Therefore, no research was undertaken previously following the methodology which was followed by the researcher. This was also a significant research gap of the study. The methodology of the present work was very unique in this regard. So, the researcher implemented the research program following the methodology as mentioned.

Additionally, no research was carried out taking the indicators of knowledge, attitude and adoption into consideration which were carried out by the researcher in the present study. This is another research gap of the present work. Hence, the researcher followed the current research program using those indicators to assess the extent of knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmers. Lastly, very few researches were conducted to assess the extent of knowledge, attitude and adoption regarding saline tolerant rice varieties by the farmerstaking the variables which were used in the present study. This is also a research gap of the present research. Therefore, the researcher carried out the present study using the variables as mentioned.

2.8 Conceptual framework of the study

In scientific research, selection and measurement of variables constitute an important task. Studies on individual, group and society revealed that acceptance of modem technologies is conditional upon many factors. Some of these are social, personal, economical and situational factors and the behavior of rice cultivators are influenced by these characteristics.

This study is concerned with the 'farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties. Thus, the knowledge, attitude and adoption regarding saline tolerant rice varieties by the rice cultivators in the selected area of Satkhira Sadar upazila was the main focus of the study and 8 selected characteristics of the rice cultivators were considered as the casual variables under the study. Farmers' knowledge, attitude and adoption regarding

saline tolerant rice varieties may be affected through interacting forces of many causal variables. It is not possible to deal with all of the casual variables in a single study. It was therefore, necessary to limit the casual variables, which include age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact, problem faced in saline tolerant rice cultivation for this study.

Considering the above-mentioned situation and discussion, a conceptual framework has been developed for this study, which is diagrammatically presented in the following Figure 2.1.

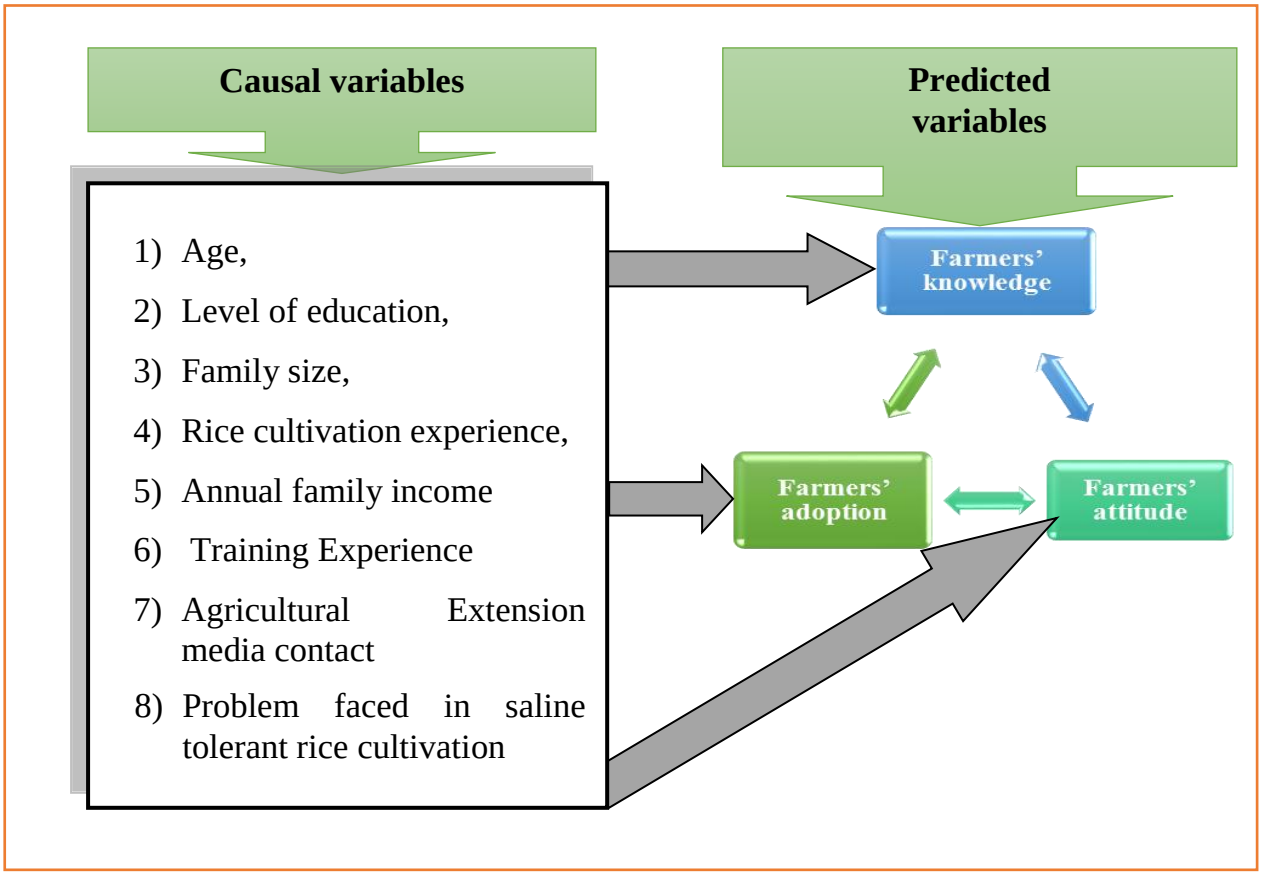

Figure 2.1 The conceptual framework of the study

CHAPTER III

MATERIALS AND METHODS

Methods play an important role in a scientific research. To fulfill the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. According to Mingers (2001), research method is a structured set of guidelines or activities to generate valid and reliable research results. This chapter of the thesis illustrates the research methods and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g. selection of study area, sampling procedures, instrumentation, categorization of variables, collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

3.1 Locale of the study

The study was conducted in the Sadar upazila under Satkhira district. The area of Satkhira Sadar upazila (Satkhira district) area is 197.75 sq km, located in between 24°41' and 24°59' north latitudes and in between 89°16' and 89°30' east longitudes.The features of the farmers and agriculture at Sadar upazila are like- main sources of income is Agriculture (35.09%), main crops are Paddy, jute, potato, corn, mustard, vegetables etc. Sadar upazila has 11 unions; out of these Dhulior union was selected purposively the study area. Three villages namely Chadpur, Kamorpur and Dorista of Dhaliur union of Satkhira sadar upazila under Satkhira district were purposively selected as the locale of the study. These villages have a great reputation of saline tolerant rice varieties cultivation activities for decades. A map of Satkhira District and a map of Satkhira sadar upazilla showing the study areas have been presented in Figures 3.1 and 3.2 respectively.

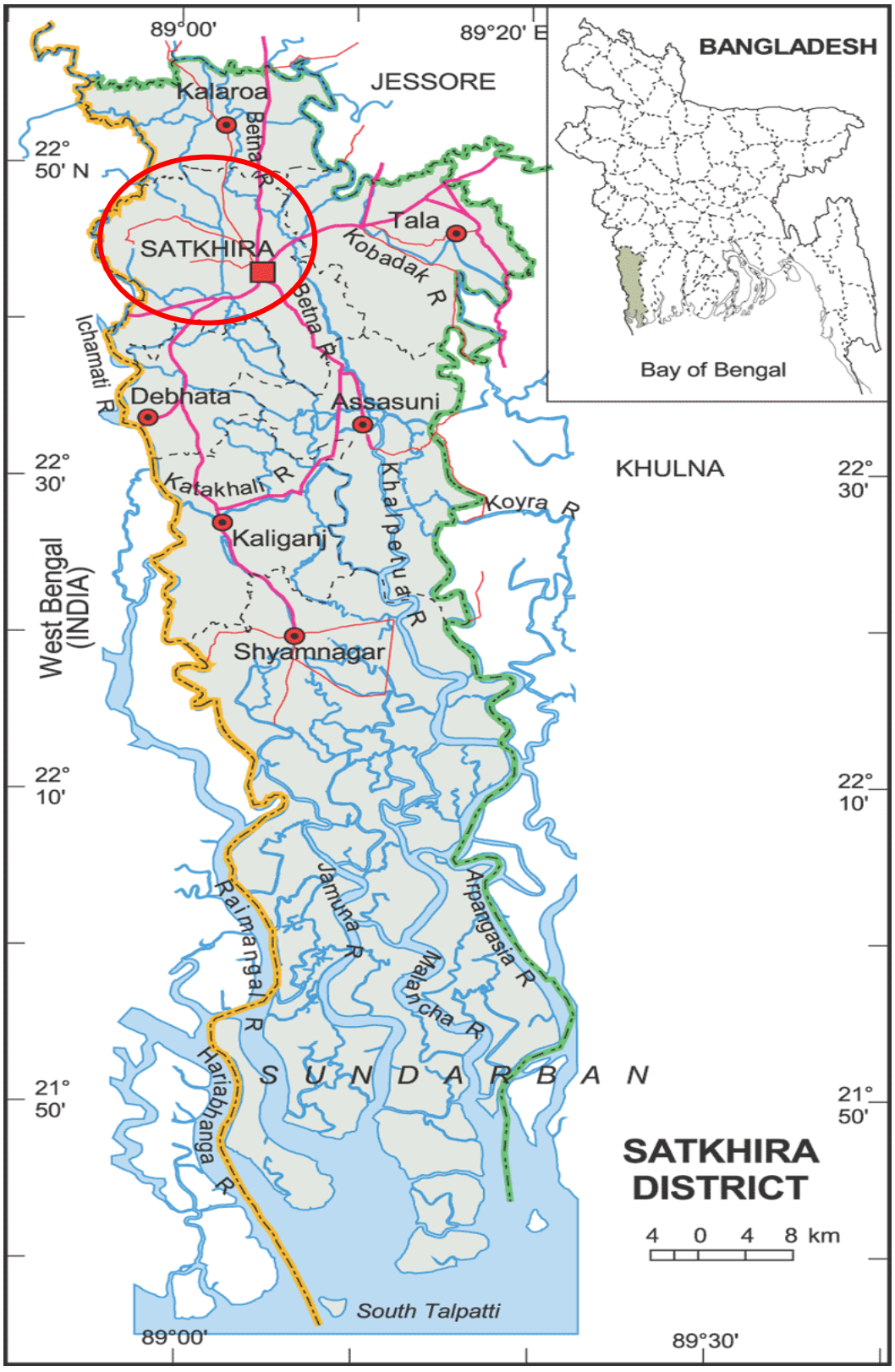

Figure 3.1 Map of Satkhira district showing the study area of Sadar upazila

Figure 3.2 Map of Sadar upazila showing the study area of Dhulihar union

3.2 Population and sample of the study

People who permanently reside in the selected villages constituted the active population of this study. As all population of the study area could not possible to measure, head of the farm families of three villages namely Chadpur, Kamorpur and Dorista of Dhaliur union of Satkhira sadar upazila under Satkhira district were the population of the study. However, representative sample from the population were taken for collection of data following random sampling technique. One farmer (who mainly operated the farming activities of the family) from each of the farm families was considered as the respondent. Updated lists of all farm families who cultivated saline tolerant rice of the selected villages were prepared with the help of SAAO and local leader (Matobbor). The total number of rice cultivators in these villages was 226; where 108 farm family heads from Chadpur village, 58 farm family heads from Kamurpur village, 60 farming family heads from Dorista village under the union of Dhaliur which constituted the population of the study. Thus, 226 saline tolerant rice cultivators constituted the population of the study.

3.2.1 Distribution of the population, sample size and reserve list

Half of the population, i.e. 113 saline tolerant rice cultivatorswere selected as the sample of the study. A reserve list of 12 rice cultivators (ten percent of the sample size) were also prepared so that the rice cultivators of this list could be used for interview if the rice cultivators included in the original sample were not available at the time of conduction of interview. The distribution of the population, sample and number of respondents in the reserve list are given in Table 3.1

Table 3.1 Distribution of the rice cultivators according to population and reserve list

Name of union	Name of villages	Population of rice cultivators	Sample size	Farmers number in the reserve list
Dhaliur	Chadpur	108	54	6
	Kamurpur	58	29	3
	Dorista	60	30	3
Total		226	113	12

3.3 Data collection tools

Structured interview schedules were prepared to reach the objectives of the study. A structured interview schedule was prepared containing open and closed questions. The open questions allowed for the respondents to give answers using their own language and categories. The questions in this schedule were formulated in a simple and unambiguous way and arranged in a logical order to make it more attractive and comprehensive. The instruments were first developed in English and then translated into Bengali. The survey tools were initially constructed based on an extensive literature reviews and pre-tested. The schedule was pre-tested with 15 randomly selected farmers of the study area. The pre-test was helpful in identifying faulty questions and statements in the draft schedule. Thus, necessary additions, deletions, modifications and adjustments were made in the schedule on the basis of experiences gained from pre-test. The questionnaires were also checked for validity by supervisor and educational experts at Sher-e-Bangla Agricultural University (SAU). Finally, based on background information, an expert appraisal and the pre-test, the interview schedule was finalized. Data was gathered by the researcher personally. During data collection, necessary cooperation was obtained from field staff of different GOs and NGOs and local leader. The pre-test was conducted from 10 January to 15 January, 2017. Books, journals, reports and internet documents were used as secondary sources of data supporting or supplementing the empirical findings of the study. The final data collection was done from 18 January, 2017 to 20 February, 2017.

3.4 Variables and their measurement techniques

The variable is a characteristic, which can assume varying, or different values in successive individual cases. In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. The

variables like: age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact, problem faced in saline tolerant rice cultivation were considered as the explanatory variables of this study. Farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties' were the main focus variable of the study. The methods and procedures in measuring the variables of this study are presented below:

3.4.1 Measurement of causal variables

The 8 characteristics of the rice cultivators mentioned above constituted the causal variables of this study. The following procedures were followed for measuring the variables.

3.4.1.1 Age

Age of the farmers was measured in terms of actual years from their birth to the time of the interview, which was found on the basis of the verbal response of the farmers (Rashid, 2014). A score of one (1) was assigned for each year of one's age. This variable appears in item number 1 in the interview schedule as presented in Appendix-I.

3.4.1.2 Level of education

Education was measured by assigning score against successful years of schooling by a farmer. One score was given for passing each level in an educational institution (Rashid, 2014).

For example, if a farmer passed the final examination of class five or equivalent examination, his/her education score has given five (5). A score of zero (0) was given to those who could not read or write. A score of 0.5 was given to those who could not sign his/her name only.If a farmer did not go to school but took non-formal education, his educational status was determined as the equivalent to a formal school student. This variable appears in item number 2 in the interview schedule as presented in Appendix-I.

3.4.1.3 Family size

Family size of a farmers was determined by the total number of members in his/her family including him/her, children and other dependents. The scoring was made by the actual number of family members expressed by the farmers. For example, if a farmer had five members in his/her family, his/her score was given as 5. This variable appears in item number 3 in the interview schedule as presented in Appendix-I.

3.4.1.4 Rice cultivation experience

Rice cultivation experience was determined by the total number of year involved in rice cultivation. A score of one (1) was assigned for each year rice cultivation experience. This variable appears in item number 4 in the interview schedule as presented in Appendix-I.

3.4.1.5 Annual family income

The term annual income refers to the annual gross income of rice cultivators and the members of his family from different sources. It was expressed in thousand taka. In measuring this variable, total earning taka of an individual rice cultivator was converted into score. A score of one was given for every one thousand taka. The method of ascertaining income involved three phases. Firstly, the income from agricultural crops in the preceding year was noted and converted into taka. Secondly, Income from animals and fish resources. Thirdly, other source income included earning form small business, service, other family members' income, day laborer, fishing and others if any. This variable appears in item number 5 (five) in the interview schedule as presented in Appendix-I.

3.4.1.6 Training experience

Training experience of a rice cultivator was determined by the total number of day(s) when s/he attended in different training programs in his/her life. A score of one (1) was assigned for each day of training attended. This variable appears in item number six (6) in the interview schedule as presented in Appendix-I.

3.4.1.7Agricultural extension media contact

It was defined as one's extent of exposure to different communication media related to farming activities. Agricultural extension media contact of a farmers was measured by computing extension media contact score on the basis of their nature of contact with ten extension media. Each farmer was asked to indicate his nature of contact with four alternative responses, like regularly', 'occasionally', 'rarely' and 'not at all' basis and weights were assigned as 3, 2, 1 and 0 respectively. These four options for each medium were defined specially to each medium considering the situation, rationality and result of pre-test. Logical frequencies were assigned for each of the four-alternative nature of contact. Extension media contact of the farmers was measured by adding the scores of ten selected source of information. Thus, extension media contact score of a farmer could range from 0 to 30, where zero indicated no extension media contact and 30 indicated highest level of extension media contact. This variable appears in item number 7 (seven) in the interview schedule as presented in Appendix-I.

3.4.1.8 Problem faced in saline tolerant rice cultivation

Ten problems were selected for the study after thorough consultation with supervisor and relevant experts. The respondents were asked to respond to four alternative responses as 'severe problem', 'moderate problem', 'low problem' and 'no problem at all' for each of ten selected problems. Scores were assigned to those alternative responses as 3, 2, 1, and 0. Score of problem faced in saline rice cultivation of a respondent was computed by adding all the scores obtained by those responses from all the ten problem items. Thus, the score of problem faced in saline rice cultivation of the rice growers could range from 0 to 30 where '0' indicated no problem and 30 indicated highest problem in saline rice cultivation.

3.4.2 Measurement of predicted variable

3.4.2.1 Knowledge on saline tolerant rice varieties

After thorough consultation with relevant experts and reviewing of related literature, 10 questions regarding salt tolerant variety of rice cultivation were selected and those were asked to the respondent rice farmers to determine their knowledge on rice cultivation. Two (2) score was assigned for each correct answer and zero (0) for wrong or no answer. Partial score was also assigned for partially correct answer. Thus, the knowledge on rice cultivation score of the respondents could range from 0 to 20, where zero indicating very low knowledge and 20 indicate the very high knowledge on saline rice cultivation.

3.4.2.2 Attitude towards saline tolerant rice cultivation

Attitude of a respondent towards saline tolerant rice cultivation was measured by developing an attitude scale of the attitude of village extension workers towards training and visit system in Indian context. Here five-point Likert method of summated ratings was used to find out the farmers' attitude towards salt tolerant rice cultivation. Ten statements expressing positive and negative feelings towards saline tolerant rice cultivation were constructed. A statement was considered positive if it indicated a favorable attitude towards salt tolerant rice cultivation. If the case was reverse, it was considered as a negative statement. Out of these ten statements five were positive and five were negative. Scoring was done by assigning 4, 3, 2, 1 and 0 scores to the five alternative responses as "strongly agreed", "agreed", " No opinion ", "disagreed", and "strongly disagreed", respectively in case of a positive statement. Reverse score was assigned for a negative statement. However, attitude towards rice cultivation of a farmer was obtained by summing up his/her scores for all the ten statements in item no. 10 in the interview schedule. Attitude score, thus, obtained for a respondent could range from zero (0) to 40, where zero (0) indicated very unfavorable attitude, 20 indicated neutral attitude and 40 indicated highest level of favorable attitude towards saline tolerant rice cultivation.

3.4.2.3 Adoption of saline tolerant rice varieties

Adoption of saline tolerant rice varieties was measured by Adoption Quotient as the following formula:

$$\text{Adoption Quotient (}\mathbf{AQ}\text{)} = \frac{\sum c/p}{y} \times 100$$

Where,c = cultivated areas

P = Potential area

y = Years of saline tolerant rice varieties cultivation

Using above formula, adoption of saline tolerant rice varietiesscore of a respondent could range from 0-100, while 0 indicating no adoption and 100 indicating highestadoption.This variable appears in item number 11 in the interview schedule as presented in Appendix-I.

3.5 Hypothesis of the study

Hypothesis is a conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form and they are related, either generally or specifically from variables to variables. In broad sense hypotheses are divided into two categories: (a) Research hypothesis and (b) Null hypothesis.

3.5.1 Research hypothesis

Based on review of literature and development of conceptual framework, the following research hypothesis was formulated:

“Each of the 8 selected characteristics (age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact, problem faced in saline tolerant rice cultivation)of the farmers will have significant relationship with their i) knowledge, ii) attitude and iii) adoption regarding cultivation of saline tolerant rice varieties.”

However, when a researcher tries to perform statistical tests, then it becomes necessary to formulate null hypothesis.

3.5.2 Null hypothesis

A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis was formulated to explore the relationship between each of the selected characteristics on farmers' with their i) knowledge, ii) attitude and iii) adoption regarding saline tolerant rice varieties. Hence, in order to conduct tests, the earlier research hypothesis was converted into null form as follows:

"There is no relationshipbetween each of the selected characteristics (age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact, problem faced in saline tolerant rice cultivation) of the farmers with their i) knowledge, ii) attitude and iii) adoption regarding cultivation of saline tolerant rice varieties."

3.6 Data processing and analysis

Data analysis is an on-going part of data collection. Initially, all collected data were carefully entered in Access, exported to Microsoft Excel. Exported data were checked randomly against original completed interview schedule. Errors were detected and necessary corrections were made accordingly after exporting. Further consultation with research assistants and in some cases with the community people were required. Finally, data were exported from the program Microsoft Excel to SPSS/windows version 22.0, which offered statistical tools applied to social sciences. Qualitative data were converted into quantitative numbers, if required, after processing, scaling and indexing of the necessary and relevant variables to perform subsequent statistical analysis for drawing inferences.

3.7 Statistical analysis

As outlined earlier, there are many different forms and methods that can be used to analyze both quantitative and qualitative data in accordance with the objectives of the study. Both descriptive and analytical methods were employed in order to analyze the data. Descriptive techniques have been used to illustrate current situations, describe different variables separately and construct tables and graphs presented in results. These included: frequency distribution, percentage, range, mean, and standard deviation (SD).

In most cases the respondents were grouped in broader categories. Analytical techniques have been utilized to investigate the relationship of each of the selected characteristics of the farmers with their i) knowledge, ii) attitude and iii) adoption regarding saline tolerant rice varieties. Statistical test like Pearson Product Moment Correlation was used in this study. Each statistical technique is used to explore the relationships. Five percent (0.05) level of probability was the basis for rejecting any null hypothesis throughout the study. The SPSS computer package was used to perform all these process.

CHAPTER IV

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion of the findings was made with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this chapter. These are presented in four sections according to the objective of the study. The first section deals with the selected characteristics of the farmers, while the second section deals with the farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties. The third section deals with relationship of each of the selected characteristics of the farmers with their i) knowledge, ii) attitude and iii) adoption regarding saline tolerant rice varieties. The fourth section deals with the inter co-relationship among farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties.

4.1 Characteristics of the farmers

Behavior of an individual is determined to a large extent by one's personal characteristics. There were various characteristics of the farmers that might have relationship with their knowledge, attitude and adoption regarding saline tolerant rice varieties. In this study, eight characteristics of them were selected as the causal variables, which was included their age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact and problem faced in saline tolerant rice cultivation. Salient features of these selected characteristics of the farmers are presented below:

4.1.1 Age

The age of the farmers has been varied from 27 to 67 years with a mean and standard deviation of 40.26 and 7.59 respectively. Considering the recorded age the farmers were classified into three categories namely 'young', 'middle'

and ‘old’ aged. The distribution of the farmers in accordance of their age is presented in Table 4.1.

Table 4.1 Distribution of the farmers according to their age

Category	Range (years)	Farmers		Mean	SD
		Number	Percent		
Young aged	27-35	31	27.4	40.26	7.59
Middle aged	36-50	72	63.7		
Old aged	51-67	10	8.8		
Total		113	100.0		

From Table 4.1, it was revealed that the middle-aged farmers comprised the highest proportion (63.7 percent) followed by young aged category (27.4 percent) and the lowest proportion (8.8 percent) were made by the old aged category. Data also indicates that the middle and young aged category constitute 91.2 percent of total farmers. The middle and young aged farmers were generally more involved in farm activities than the old.

4.1.2 Level of education

The level of education scores of the farmers ranged from 0 to 10 with a mean and standard deviation of 4.38 and 3.50. Based on the score of educational level, the farmers were classified into three categories. The distributions of the categories of the farmers according to their level of education are presented in Table 4.2.

Table 4.2 Distribution of the farmers according to their level of education

Category	Range (score)	Farmers		Mean	SD
		Number	Percent		
Illiterate	0-0.5	45	39.8	4.38	3.50
Primary educations	1-5	16	14.2		
Secondary education	6-10	52	46.0		
Total		113	100.0		

Table 4.2 shows that farmers under secondary education category constituted the highest proportion (46.0 percent) followed by illiterate (39.8 percent). On the other hand, the lowest (14.2 percent) proportion was in primary education category.

4.1.3 Family size

Family size of the farmers ranged from 4 to 9 with the mean and standard deviation of 6.23and 1.26. According to family size the farmers were classified into three categories, namely 'small', 'medium' and 'large' family. The distribution of farmers according to their family size is presented in Table 4.3.

Table 4.3 Distribution of the farmers according to their family size

Category	Range (score)	Farmers		Mean	SD
		Number	Percent		
Small family	4 (<Mean –1SD)	11	9.7	6.23	1.26
Medium family	5-7 (Mean ± 1SD)	81	71.7		
Large family	8-9 (>Mean+1SD)	21	18.6		
Total		113	100.0		

Data in Table 4.3 indicate that the medium size family constituted the highest proportion (71.7 percent) followed by the large size family (18.6 percent). Only 9.7 percent farmers had small family size.

4.1.4 Rice cultivation experience

Score of rice cultivation experience of rice cultivators ranged from 10 to 40 with mean and standard deviation of 22.35 and 5.82. On the basis of rice cultivation experience scores, the rice cultivators were classified into two categories namely medium and high experience. The distribution of the rice cultivators according to their rice cultivation experience is given in Table 4.4.

Table 4.4 Distribution of the farmers according to their rice cultivation experiences

Category	Range (year)	Farmers		Mean	SD
		Number	Percent		
Medium experience	10- 20	50	44.2	22.35	5.82
High experience	21-40	63	55.8		
Total		113	100.0		

Data of Table 4.4 reveals that the majority (55.8 percent) of the cultivatorshad high rice cultivation experience category and the rest 44.2 percent had medium rice cultivation experience. In the study area, all the farmers had medium to high rice cultivation experience.

4.1.5 Annual family income

The score of annual family income of the rice cultivators ranged from 91 to 270 thousand BDT with a mean and standard deviation of 155.95 and 35.32. On the basis of annual family income, the rice cultivators were classified into three categories namely 'low', 'medium' and 'high' annual family income. The distribution of the rice cultivators according to their annual family income is presented in Table 4.5.

Table 4.5 Distribution of the farmers according to their annual family income

Category	Range ('000' BDT)	Farmers		Mean	SD
		Number	Percent		
Low income	91-120	22	19.5	155.95	81.08
Medium income	121-250	90	79.6		
High income	251-270	1	0.9		
Total		113	100.0		

Data reveals that the rice cultivators having medium annual income constituted the highest proportion (79.6 percent), while the lowest proportion (0.9 percent) in low annual family income and 19.5 percent of the farmers were in low income category.

4.1.6 Training experience

Training experience score of the rice cultivators ranged from 0 to 15 with a mean and standard deviation of 5.18 and 4.89 respectively. Based on the training experience score, the rice cultivators were classified into four categories namely no training, low, medium and high training experience. The distribution of the rice cultivators according to their training experienceis presented in Table 4.6.

Table 4.6 Distribution of the rice cultivators according to their training experience

Category	Range (score)	Farmers		Mean	SD
		Number	Percent		
No training	0	43	38.1	5.18	4.89
Low training	1-5	28	24.8		
Medium training	6-10	34	30.1		
High training	11-15	8	7.1		
Total		113	100.0		

Table 4.6 indicates that the highest proportion (38.1 percent) of the rice cultivators had no training experience followed by 30.1 percent had medium training experience.The lowest proportion (7.1 percent) had high training experience while 24.8 percent had low training experience.

4.1.7 Agricultural extension media contact

The observed score of agricultural extension media contact of the farmers ranged from 5 to 20 against the possible range of 0-30. The average score of the farmers was 13.65 with a standard deviation of 3.07 (Table 4.7). The farmers were classified into three categories on the basis of their agricultural extension media contact scores and distribution of the three categories, namely ‘low’, ‘medium’ and ‘high’ agricultural extension media contact of the farmers are shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their extension media contact

Category	Range (score)	Farmers		Mean	SD
		Number	Percent		
Low contact	5-10 (<Mean-1SD)	20	17.7	13.65	3.07
Medium contact	11-16 (Mean ± 1SD)	73	64.6		
High contact	17-20 (>Mean+1SD)	20	17.7		
Total		113	100.0		

Data shows that the highest proportion (64.6 percent) of the farmers had medium agricultural extension contact as compared to 17.7 percent of them had low agricultural extension contact and 17.7 percent had high extension media contact.

3.5.1.8 Problem faced in saline tolerant rice cultivation

Problem faced in saline tolerant rice cultivation scores of the farmers ranged from 14 to 26 against possible score of 0 to 30. The average score and standard deviation were 21.54 and 3.04 respectively. Based on the problem faced in saline tolerant rice cultivation scores, the farmers were classified into three categories, namely low problem, medium problem and high problem faced in saline tolerant rice cultivation (Table 4.8).

Table 4.8 Distribution of the farmers according to their problem faced in saline tolerant rice cultivation

Category	Range (score)	Farmers		Mean	SD
		Number	Percent		
Low problem	14-18 (<Mean-1SD)	30	26.5	21.54	3.04
Moderate problem	19-24 (Mean ± 1SD)	62	54.9		
High problem	25-26 (>Mean+1SD)	21	18.6		
Total		113	100.0		

Data presented in the Table 4.8 reveals that 54.9 percent of the farmers faced medium problem, 26.5percent faced low problem and 18.6 percent faced high problem in saline tolerant rice cultivation category.

4.2 Knowledge, attitude and adoption regarding saline tolerant rice varieties

4.2.1 Knowledge on saline tolerant rice varieties

Knowledge on saline tolerant rice varieties scores of the farmers ranged from 9 to 19 against the possible range of 0-20. The average score and standard deviation were 13.81 and 2.42 respectively. Based on the knowledge on saline tolerant rice varieties scores, the farmers were classified into three categories,

namely low knowledge, medium knowledge and high knowledge on saline tolerant rice varieties (Table 4.9).

Table 4.9 Distribution of the farmers according to their knowledge on saline tolerant rice varieties

Category	Range (Score)	Farmers		Mean	SD
		Number	Percent		
Low knowledge	9-11 (<Mean-1SD)	23	20.4	13.81	2.42
Medium knowledge	12-15 (Mean ± 1SD)	62	54.9		
High knowledge	16-19 (>Mean+1SD)	28	24.8		
Total		113	100.0		

Data presented in the Table 4.9 revealed that 54.9 percent of the farmers had medium knowledge, 20.4percent had low knowledge and 24.8 percent had high Knowledge on saline tolerant rice varieties.

4.2.2 Attitude towards saline tolerant rice cultivation

Attitude towards saline tolerant rice cultivation of the farmers ranged from 14 to 32 against the possible range of 0-40. The average and standard deviation were 21.85 and 4.23 respectively (Table 4.10). On the basis of scores on attitude towards saline tolerant rice cultivation, the respondents were categorized into four classes' namely unfavorable attitude, neutral attitude, lowfavorable attitude and high favorable towards salt tolerant rice varieties (Table 4.10).

Table 4.10 Distribution of the farmers according to their attitude towards saline tolerant rice varieties

Category	Range (score)	Farmers		Mean	SD
		Number	Percent		
Unfavorable attitude	14-19	30	26.5	21.85	4.23
Neutral attitude	20	13	11.5		
Low favorable attitude	21-30	64	56.6		
High favorable attitude	30-32	6	5.3		
Total		113	100		

The observed data showed that most of the farmers (61.9 percent) had favorable attitude towards saline tolerant rice varieties while 26.5 percent of them had unfavorable attitude and11.5 percent of them had neutral attitude towards saline tolerant rice varieties.

4.2.3 Adoption of saline tolerant rice varieties

Adoption of saline tolerant rice varieties by the rice cultivators score varied from 55.56 to 100 against the possible range of 0-100 with the mean and standard deviation of 92.62 and 9.59 respectively. On the basis of adoption scores, the rice cultivators were classified into three categories namely medium, high and full adoption of saline tolerant rice varieties. The distribution of the rice cultivators according to their adoption of saline tolerant rice varieties score is given in Table 4.11.

Table 4.11 Distribution of the rice cultivators according to their adoption of saline tolerant rice varieties

Category	Range (Score)	Farmers		Mean	SD
		Number	Percent		
Medium adoption	55.56-75	7	6.2	92.62	9.59
High adoption	75.1-99.99	55	48.7		
Full adoption	≥ 100	51	45.1		
Total		113	100.0		

Table 4.13 indicates that among the respondents, the highest (48.7 percent) proportion of the rice cultivators belong to the group of high followed by 45.1 percent full adoption. The rest 6.2 percent of the farmers belong to medium adoption of saline tolerant rice varieties. The farmers of this area had no alternative to cultivate saline tolerant rice varieties which was the reason for overwhelming majority (93.8 percent) of the farmers had high to full adoption of saline tolerant rice varieties.

4.3 Relationships between each of the selected characteristics of the farmers and their knowledge on saline tolerant rice varieties

This section deals with exploring the relationships between the causal and predicted variables of the study. The causal variables were age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact and problem faced in saline tolerant rice cultivation. Knowledge on saline tolerant rice varieties was one of the predicted variable.

Pearson's Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between each of the selected characteristics of the farmers with their knowledge on saline tolerant rice varieties. Five percent (0.05) level of probability was used as the basis for acceptance or rejecting the null hypothesis at 111(113-2) degrees of freedom. The results of correlation of coefficient (r) between the causal and predicted variables have been shown in Table 4.12. The details of inter correlation among all the variables have been shown in Appendix-II.

Table 4.12 Co-efficient of correlation between each of the selected characteristics of the farmers with their knowledge on saline tolerant rice varieties

(n = 113)

Causal variable	Predicted variables	Computed values (r)	Tabulated value of 'r' with 111df	
			0.05(level)	0.01(level)
Knowledge on saline tolerant rice varieties	Age	0.052 ^{NS}	0.194	0.242
	Level of education	0.358 **		
	Family size	0.021 ^{NS}		
	Rice cultivation experience	0.080 ^{NS}		
	Annual family income	-0.024 ^{NS}		
	Training experience	0.214*		
	Agricultural extension media contact	0.159 ^{NS}		
	Problem faced in saline tolerant rice cultivation	-0.171^{NS}		

^{NS} Not Significant; * Significant at 0.05 level; ** Significant at 0.01 level;

4.3.1 Relationships between age of the farmers and their knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between age of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.052) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the age of the farmers was not an important factor for their knowledge on saline tolerant rice varieties. This means that age of the farmers and their knowledge on saline tolerant rice varieties were independent to each other.

4.3.2 Relationships between level of education of farmers and knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between level of education of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.358) was found to be greater than the tabulated value (0.242) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that the level of education of the farmers was an important factor for their knowledge on saline tolerant rice varieties. This means that level of education of the farmers and their knowledge

on saline tolerant rice varietieswere not independent to each other. It means that knowledge on saline tolerant rice varieties was found more among those farmers who had more education than the farmers with lowereducation.

4.3.3 Relationships between family size of the farmers and their knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between family size of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.021) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the family size of the farmers was not an important factor for their knowledge on saline tolerant rice varieties. This means that family sizeof the farmers and their knowledge on saline tolerant rice varietieswere independent to each other.

4.3.4 Relationships between rice cultivation experience of the farmers and knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between rice cultivation experience of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.080) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in table 4.12.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the rice cultivation experience of the farmers was not an important factor for their knowledge on saline tolerant rice varieties. This means that rice cultivation experience of the farmers and their knowledge on saline tolerant rice varietieswere independent to each other.

4.3.5 Relationships between annual family income of the farmers and Knowledgeon saline tolerant rice varieties

The following observations were recorded regarding relationship between annual family income of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (-0.024) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the annual family income of the farmers was not an important factor for their knowledge on saline tolerant rice varieties. This means that the annual family income of the farmers and their knowledge on saline tolerant rice varieties were independent to each other.

4.3.6 Relationships between training experience of the farmers and knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between training experience of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.214) was found to be greater than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that the training experience of the farmers was an important factor for their knowledge on saline tolerant rice varieties. This means that training experience of the farmers and their knowledge on saline tolerant rice varieties were not independent to each other. It means that knowledge on saline tolerant rice varieties was found more among those farmers who had more training experience than the farmers with lower training experience.

4.3.7 Relationships between agricultural extension media contact of the farmers and knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between agricultural extension media contact of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.159) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the agricultural extension media contact of the farmers was an important factor for their knowledge on saline tolerant rice varieties. This means that agricultural extension media contact of the farmers and their knowledge on saline tolerant rice varieties were independent to each other.

4.3.8 Relationships between problem faced in saline tolerant rice cultivation and their knowledge on saline tolerant rice varieties

The following observations were recorded regarding relationship between problem faced in saline tolerant rice cultivation of the farmers and their knowledge on saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (-0.171) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.12.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that problem faced in saline tolerant rice cultivation of the farmers had non-significant negative relationship with their knowledge on saline tolerant rice varieties. This means that problem faced in saline tolerant rice cultivation of the farmers and their knowledge on saline tolerant rice varietieswere independent to each other.

4.4 Relationship between each of the selected characteristics of the farmers and their attitude towards saline tolerant rice cultivation

This section deals with exploring the relationships between the causal and predicted variables of the study. The causal variables were age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact and problem faced in saline tolerant rice cultivation. Attitude towards saline tolerant rice cultivation was one of the predicted variable.

Pearson's Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between each of the selected characteristics of the farmers and their attitude towards saline tolerant rice cultivation. Five percent (0.05) level of probability was used as the basis for acceptance or rejecting the null hypothesis at 111(113-2) degrees of freedom.

The results of correlation of coefficient (r) between the causal and predicted variables have been shown in Table 4.12. The details of inter correlation among all the variables have been shown in Appendix-II.

Table 4.13 Co-efficient of correlation between each of the selected characteristics of the farmers and their attitude towards saline tolerant rice cultivation

(n = 113)

Causal variable	**Predicted variables**	**Computed values (r)**	**Tabulated value of 'r' with 111 df**	
			0.05(level)	**0.01(level)**
Attitude towards saline tolerant rice cultivation	Age	0.073^{NS}	0.194	0.242
	Level of education	0.295**		
	Family size	-0.110^{NS}		
	Rice cultivation experience	-0.029^{NS}		
	Annual family income	-0.100^{NS}		
	Training experience	0.181^{NS}		
	Agricultural extension media contact	0.334**		
	Problem faced in saline tolerant rice cultivation	-0.414**		

NS Not Significant

* Significant at 0.05 level, (5 percent);

** Significant at 0.01 level (1 percent)

4.4.1 Relationships between age of the farmers and their attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between age of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (0.073) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the age of the farmers was not an important factor for their attitude towards saline tolerant rice cultivation. This means that both the variables were independent to each other.

4.4.2 Relationships between level of education of the farmers and their Attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between level of educationof the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (0.295) was found to be greater than the tabulated value (0.242) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that the level of education of the farmers was an important factor for their attitude towards saline tolerant rice cultivation. This means that between level of educationof the farmers and their attitude towards saline tolerant rice cultivation were not independent to each other. It means that attitude towards saline tolerant rice cultivation was found more among those farmers who had more education than the farmers with their lower education.

4.4.3 Relationships between family size of the farmers and their attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between family size of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (-0.110) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the family size of the farmers was not an important factor fortheir attitude towards saline tolerant rice cultivation. This means that both the variables were independent to each other.

4.4.4 Relationships between rice cultivation experience of the farmers and their attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between rice cultivation experience of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (-0.029) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the rice cultivation experience of the farmers was not an important factor fortheir attitude towards saline tolerant rice cultivation. This means that both the variables were independent to each other.

4.4.5 Relationships between annual family income of the farmers and their attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between annual family income of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (-0.100) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the annual family income of the farmers was not an important factor for their attitude towards saline tolerant rice cultivation. This means that both the variables were independent to each other.

4.4.6 Relationships between training experience of the farmers and their Attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between training experience of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (0.181) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the training experience of the farmers was an important factor for their attitude towards saline tolerant

rice cultivation. This means that both the variables were independent to each other.

4.4.7 Relationships between agricultural extension media contact of the farmers and their attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between agricultural extension media contact of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of 'r' (0.334) was found to be greater than the tabulated value (0.242) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a positive trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that the agricultural extension media contact of the farmers was not an important factor for their attitude towards saline tolerant rice cultivation. This means that between agricultural extension media contact of the farmers and their attitude towards saline tolerant rice cultivation were not independent to each other. It means that attitude towards saline tolerant rice cultivation was found more among those farmers who had more agricultural extension media contact than the farmers with their loweragricultural extension media contact.

4.4.8 Relationships between problem faced in saline tolerant rice cultivation of the farmers and their attitude towards saline tolerant rice cultivation

The following observations were recorded regarding relationship between problem faced in saline tolerant rice cultivation of the farmers and their attitude towards saline tolerant rice cultivation on the basis of correlation coefficient:

i. The computed value of ‘r’ (-0.414) was found to be greater than the tabulated value (0.242) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.13.

ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that problem faced in saline tolerant rice cultivation of the farmers had significant negative relationship with their attitude towards saline tolerant rice cultivation. This means that between problem faced in saline tolerant rice cultivation of the farmers and their attitude towards saline tolerant rice cultivation were not independent to each other. It means that attitude towards saline tolerant rice cultivation was found more among those farmers who had faced less problem in saline tolerant rice cultivation than the farmers with higher problem faced in saline tolerant rice cultivation.

4.5 Relationship between each of the selected characteristics of the farmers and their adoption of saline tolerant rice varieties

This section deals with exploring the relationships between the causal and predicted variables of the study. The causal variables were age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact and problem faced in saline tolerant rice cultivation. Adoption of saline tolerant rice varieties was one of the predicted variable.

Pearson’s Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between each of the selected characteristics of the farmers and their adoption of saline tolerant rice varieties. Five percent (0.05) level of probability was used as the basis for acceptance or rejecting the null hypothesis at 111(113-2) degrees of freedom. The results of correlation of coefficient (r) test between the causal and predicted variables

have been shown in Table 4.12. The details of inter correlation among all the variables have been shown in Appendix-II.

Table 4.14 Co-efficient of correlation between each of the selected characteristics of the farmers and their adoption of saline tolerant rice varieties

(n = 113)

Causal variable	Predicted variables	Computed values (r)	Tabulated value of 'r' with 111 df	
			0.05(level)	0.01(level)
Adoption of saline tolerant rice varieties	Age	0.014^{NS}	0.194	0.242
	Level of education	0.138^{NS}		
	Family size	0.084^{NS}		
	Rice cultivation experience	0.093^{NS}		
	Annual family income	-0.020^{NS}		
	Training experience	-0.057^{NS}		
	Agricultural extension media contact	0.229*		
	Problem faced in saline tolerant rice cultivation	-0.416**		

^{NS} Not Significant

* Significant at 0.05 level, (5 percent);

** Significant at 0.01 level (1 percent)

4.5.1 Relationships between age of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between age of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.014) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the age of the farmers was not an important factor fortheir adoption of saline tolerant rice varieties. This means that age of the farmers and their adoption of saline tolerant rice varieties were independent to each other.

4.5.2 Relationships between level of education of farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between level of education of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.138) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the level of education of the farmers was not an important factor for their adoption of saline tolerant rice varieties. This means that level of educationof the farmers and their adoption of saline tolerant rice varieties were independent to each other.

4.5.3 Relationships between family size of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between family size of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.084) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the family size of the farmers was not an important factor fortheir adoption of saline tolerant rice varieties. This means that family size of the farmers and theiradoption of saline tolerant rice varieties were independent to each other.

4.5.4 Relationships between rice cultivation experience of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between rice cultivation experience of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.093) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the rice cultivation experience of the farmers was not an important factor fortheir adoption of saline tolerant rice varieties. This means that rice cultivation experience of the farmers and theiradoption of saline tolerant rice varieties were independent to each other.

4.5.5 Relationships between annual family income of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between annual family income of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of ‘r’ (-0.020) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the annual family income of the farmers was not an important factor for their adoption of saline tolerant rice varieties. This means that annual family income of the farmers and theiradoption of saline tolerant rice varieties were independent to each other.

4.5.6 Relationships between training experience of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between training experience of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of ‘r’ (-0.057) was found to be lower than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was non-significant at 0.05 level of probability and showed a negative trend.

iii. The null hypothesis could be accepted.

Based on the above findings, it was concluded that the training experience of the farmers was an important factor for their adoption of saline tolerant rice varieties. This means that training experience of the farmers and their adoption of saline tolerant rice varieties were independent to each other.

4.5.7 Relationships between agricultural extension media contact of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between agricultural extension media contact of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.229) was found to be greater than the tabulated value (0.194) with 111 degrees of freedom at 0.05 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was significant at 0.05 level of probability and showed a positive trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that the agricultural extension media contact of the farmers was an important factor for their adoption of saline tolerant rice varieties. This means that adoption of saline tolerant rice varieties was found more among those farmers who had more agricultural extension media contact than the farmers with lower agricultural extension media contact.

4.5.8 Relationships between problem faced in saline tolerant rice cultivation of the farmers and their adoption of saline tolerant rice varieties

The following observations were recorded regarding relationship between problem faced in saline tolerant rice cultivation of the farmers and their adoption of saline tolerant rice varieties on the basis of correlation coefficient:

i. The computed value of 'r' (0.416) was found to be greater than the tabulated value (0.242) with 111 degrees of freedom at 0.01 level of probability as shown in Table 4.14.

ii. The relationship between the concerned variables was significant at 0.01 level of probability and showed a negative trend.

iii. The null hypothesis could not be accepted.

Based on the above findings, it was concluded that problem faced in saline tolerant rice cultivation of the farmers had significant negative relationship with their adoption of saline tolerant rice varieties. This means that adoption of saline tolerant rice varieties was found more among those farmers who faced more problem in saline tolerant rice cultivation than the farmers with lessproblem faced in saline tolerant rice cultivation.

4.6 Inter co-relationship among the farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties

This section deals with exploring the interco-relationships among the farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties. Pearson's Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between two variables. Five percent (0.05) level of probability was used as the basis for acceptance or rejecting the null hypothesis at 111(113-2) degrees of freedom. The results of inter co-relation of coefficient (r) shown in Table 4.15.

Table 4.15: Co-efficient of correlation among the farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties

(n = 113)

	Farmers' knowledge on saline tolerant rice varieties	**Farmers' attitude towards saline tolerant rice varieties**	**Farmers' adoption of the saline tolerant rice varieties**
Farmers' knowledge on saline tolerant rice varieties	-		
Farmers'attitude towards saline tolerant rice varieties	0.375**	-	
Farmers'adoption of the saline tolerant rice varieties	0.305**	0.243**	-

** Significant at 0.01 level (1 percent)

4.6.1 Relationship between knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice varieties

The relationship between knowledge on saline tolerant rice varieties and their attitude towards saline tolerant rice varieties was examined by testing the following null hypothesis:

“There is no relationship between knowledge on saline tolerant rice varietiesand their attitudetowards saline tolerant rice varieties.”

Computed value of the co-efficient of correlation between knowledge on saline tolerant rice varieties and their attitude towards saline tolerant rice varieties was found to be ‘r’ = 0.375(**)as shown in Table 4.15. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation.

i. The relationship showed a positive trend.
ii. The computed value of 'r' (0.375) was greater than the tabulated value (0.242) with 111 degrees of freedom at 0.01 level of probability.
iii. Hence the concerned null hypothesis could be rejected.
iv. The correlation co-efficient between the two concerned variables was significant at 0.01 level of probability.

Based on the above findings, the researcher concluded that knowledge on rice cultivation of the farmers had significant effect with their attitude towards saline tolerant rice varieties. This indicated that farmer's knowledge on saline tolerant rice varieties increases the attitude towards saline tolerant rice varieties cultivation.

4.6.2 Relationship between knowledge on saline tolerant rice varieties and adoption of saline tolerant rice varieties

The relationship between knowledge on saline tolerant rice varieties and their adoption of saline tolerant rice varieties was examined by testing the following null hypothesis:

“There is no relationship between knowledge on saline tolerant rice varieties and their adoption of saline tolerant rice varieties.”

Computed value of the co-efficient of correlation between knowledge on rice farmers and their adoption saline tolerant rice varieties was found to be 'r' = 0.304(**)as shown in Table 4.15. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation.

i. The relationship showed a positive trend.
ii. A strong relationship was found between the two variables.
iii. The computed value of 'r' (0.304) was found to be greater than the table value (r = 0.242) with 111 degrees of freedom at 0.01 level of probability.
iv. The concerned null hypothesis could be rejected.

The researcher concluded that the knowledge on saline tolerant rice varieties had a positive significant relationship with their adoption of saline tolerant rice varieties.

4.6.3 Relationship between farmer's attitude and adoption of saline tolerant rice varieties

The relationship between attitude of rice farmers and their adoption of saline tolerant rice varieties was examined to the following null hypothesis:

"There is no relationship between attitude of rice farmers and their adoption of saline tolerant rice varieties".

Computed value of the co-efficient of correlation between attitude of rice farmers and their adoption of saline tolerant rice varieties was found to be 'r' = (0.243**) as shown in Table 4.15. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation.

i. The relationship showed a positive trend.
ii. A high relationship was found between the concerned variables.
iii. The computed value of 'r' (0.243) was found to be smaller than the table value (r = 0.242) with 111 degrees of freedom at 0.01 level of probability.
iv. Hence, the concerned null hypothesis could be rejected.

The researcher thus concluded that the attitude of rice farmers had positive significant relationship with their adoption of saline tolerant rice varieties. It could influence directly to adopt new technologies. Hence, extension workers who are strongly contributed to be created need awareness, consciousness and activeness of them to adopt saline tolerant rice varieties.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

5.1.1 Selected characteristics of the rice cultivators

Age: The middle-aged rice cultivators comprised the highest proportion (63.7 percent) and the lowest proportion by the old aged (8.8 percent).

Level of education: Secondary education constituted the highest proportion (46.0 percent) and the lowest 14.2 percent in primary education.

Family size: The highest proportion (71.7 percent) followed by the large size family (18.6percent). Only 9.7 percent farmers had small family size.

Rice cultivation experience: The majority (55.8 percent) of the cultivator fell in high rice cultivation experience, whereas 44.2 percent in medium rice cultivation experience.

Annual family income: Rice cultivators having medium annual income constitute the highest proportion (79.6 percent), while the lowest proportion (0.9 percent) in high annual family income.

Training experience: The highest proportion (38.1 percent) of the rice cultivators had no training experience and the lowest proportion (7.1 percent) had high training experience.

Agricultural extension media contact: The highest proportion (64.6 percent) of the farmers had medium agricultural extension contact as compared to 17.7 percent of them having low agricultural extension contact and 17.7 percent fell in high extension media contact.

Problem faced in saline tolerant rice cultivation: The 54.9 percent of the farmers had medium problem, 26.5 percent had low problem and 18.6 percent had high in problem faced in saline tolerant rice cultivation.

5.1.2 Knowledge on saline tolerant rice varieties

The 54.9 percent of the farmers had medium knowledge, 20.4 percent had low knowledge and 24.8 percent had high Knowledge on saline tolerant rice varieties.

5.1.3 Attitude towards saline tolerant rice cultivation

The 61.9 percent of the farmers had favorable attitude towards saline tolerant rice cultivation while 26.5 percent of them had unfavorable attitude and 11.5 percent of them had neutral attitude towards saline tolerant rice cultivation.

5.1.4 Adoption of saline tolerant rice varieties

The highest 45.1 percent rice cultivators belong to the group of full adoption and the lowest percentage 6.2 percent in medium adoption followed by high adoption (48.7 percent) by the rice cultivators in adoption of saline tolerant rice varieties.

5.1.5 Relationship between each of the selected characteristics of the farmers and their knowledge on saline tolerant rice varieties

i. Level of education and training experience of farmers had significant positive relationship with their knowledge on saline tolerant rice varieties.

ii. Age, family size, rice cultivation experience, annual family income, agricultural extension media contact, problem faced in saline tolerant rice cultivation characteristics of farmers had non-significant relationship with their knowledge on saline tolerant rice varieties.

5.1.6 Relationship between each of the selected characteristics of the farmers and their attitude towards saline tolerant rice cultivation

i. Level of education, agricultural extension media contact of farmers had significant positive relationship with their attitude towards saline tolerant rice cultivation. Problem faced in saline tolerant rice cultivation of farmers had significant negative relationship with their attitude towards saline tolerant rice cultivation.

ii. Age, family size, rice cultivation experience, annual family income of farmers had non-significant relationship with their attitude towards saline tolerant rice cultivation.

5.1.7 Relationship between each the selected characteristics of the farmers and their adoption of saline tolerant rice varieties

i. Agricultural extension media contact of farmers had significant positive relationship with their adoption of saline tolerant rice varieties. Problem faced in saline tolerant rice cultivation of farmers had significant negative relationship with their adoption of saline tolerant rice varieties.

ii. Age, level of education, family size, rice cultivation experience, annual family income, training experience of farmers had non-significant relationship with their adoption of saline tolerant rice varieties.

5.1.8 Relationship among the farmer's knowledge, attitude and adoption regarding saline tolerant rice varieties

Farmer's knowledge, attitude and adoption had significant positive relationship with each other regarding saline tolerant rice varieties cultivation.

5.2 Conclusions

Conclusion is the final decision or judgment, which is placed through contention at the end or termination of a research work. Conclusion should be so constructive that its words and contentions must drew the attention of the concerned individuals/organizations. The findings and relevant facts of research work prompted the researcher to draw following conclusions.

i. The findings revealed that maximum 54.9 percent of the farmers had medium knowledge on saline tolerant rice varieties. However, to meet the ever-growing demand of food, there is a need to further enhance and continue the rate and extent of knowledge on saline tolerant rice varieties among the farmers. It may be concluded that the composite knowledge on saline tolerant rice varieties in important factor for sustainable food production and needs further advancement at the study area.

ii. Attitude of the farmers is not up to mark. A proportion of 61.9 percent of the farmers had favorable attitude towards saline tolerant rice varieties cultivation. It may be concluded that the cultivation of saline tolerant rice varieties will not be possible to improve to a significant extent unless the concerned authorities take proper steps to improve farmers' attitude towards saline tolerant rice varieties cultivation.

iii. The findings revealed that maximum 48.7 percent of the farmers had high adoption of saline tolerant rice varieties. However, to meet the ever-growing demand of food, there is a need to further enhance and continue the rate and extent of adoption of saline tolerant rice varieties among the farmers. It may be concluded that the composite adoption of saline tolerant rice varieties in important factor for sustainable food production and needs further advancement at the study area.

iv. Level of education of the farmers showed the significant positive relationship with knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation. This means that high literacy and educational level among the farmers might have influenced knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation. Conclusion could be drowned that these farmers could be more ameliorated in all aspects of socio-economic life if government takes more educational project to make it more educated.

v. Training experience of the farmers showed the significant positive relationship with knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice varieties cultivation. This means that high training experience among the farmers might have influenced at knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation. Consequently, they became motivated to salt tolerant rice cultivation. The above facts lead to conclude that necessary arrangements should be made to increase the training experience of farmers which would ultimately increase the knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation.

vi. Agricultural extension media contact of the farmers showed the significant positive relationship with attitude towards saline tolerant rice cultivation and adoption of saline tolerant rice varieties. Through agricultural extension media contact an individual farmer became facilitating of the information on the various aspect of selected rice cultivation. Consequently, they became motivated to adoption of selected rice cultivation. The above facts lead to conclude that necessary arrangements should be made to increase the agricultural extension media contact of farmers which would ultimately increase the attitude towards saline tolerant rice varieties cultivation and adoption of saline tolerant rice varieties.

vii. Problem faced in saline tolerant rice cultivation by the farmers showed the significant negative relationship with attitude towards saline tolerant rice cultivation and adoption of saline tolerant rice varieties. The above facts lead to conclude that necessary arrangements should be made to decrease the Problem faced in saline tolerant rice cultivation by the farmers which would ultimately increase the attitude towards saline tolerant rice varieties cultivation and adoption of saline tolerant rice varieties.

5.3 Recommendations

5.3.1 Recommendations for policy implications

On the basis of observation and conclusions drawn from the findings of the study following recommendations are made:

i. An increased rate and extent of farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties are vitally important for increasing the yield of rice cultivation. This rate and extent of farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties should be increased. It is, therefore, recommended that an effective steps (such as training, seed supply, pesticide supply etc) should be taken by the Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for strengthening the farmers' qualities in favor of adoption of Saline tolerant rice varieties to a higher degree.

ii. Level of education of the farmers had a significant relationship with knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation. It indicates the importance of education of saline tolerant rice varieties cultivators for rapid increase of knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation. It may be recommended that arrangements should be made for enhancing the education level of the saline tolerant rice cultivators by the concerned authorities through the establishment of night school, adult education and possible extension method.

iii. Training experience of the farmers showed the significant positive relationship with knowledge on saline tolerant rice varieties and attitude towards saline tolerant rice cultivation. So, concerned extension organizations and other sponsor services must settle training and arrange discussion as well as some meetings so that farmers can change their decision to adopt the saline tolerant rice varieties to a higher degree.

iv. It is recommended that support services and extension organizations should be conscientious of to facilitate farmer's agricultural extension media contact. So, concerned extension organizations and other sponsor services must motivate the farmers so that farmers can improve their nature of agricultural extension media contact.

v. Farmers having mostly medium to high, problem faced in saline tolerant rice cultivation. It should be selected on priority basis for any motivational training by Department of Agricultural Extension (DAE) and Non-Government Organizations (NGOs) for mitigating problem faced in saline tolerant rice cultivation by the farmers so that it could gain sustainable rice cultivation.

5.3.2 Recommendations for further study

On the basis of scope and limitations of the present study and observation made by the researcher, the following recommendations are made for future study.

i. The present study was conducted in Chadpur, Kamorpur and Dorista of Dhaliur union of Satkhira Sadar upazila. It is recommended that similar studies should be conducted in other areas of Bangladesh.

ii. This study investigated the relationship of eight characteristics of the farmers with their knowledge, attitude and adoption regarding saline tolerant rice varieties as casual variables. Therefore, it is recommended that further study should be conducted with other characteristics of the farmers with their knowledge, attitude and adoption regarding saline tolerant rice varieties.

iii. The present study was concern only with the extent of knowledge, attitude and adoption regarding saline tolerant rice varieties. It is therefore suggested that further studies should be included more reliable measurement of concerned variable.

iv. The study was based on the farmers' knowledge, attitude and adoption regarding saline tolerant rice varieties. Further studies may be conducted in respect of knowledge, attitude and adoption of other crop cultivation technologies.

v. The relationships of eight important characteristics of the farmers with their knowledge, attitude and adoption regarding saline tolerant rice varieties have been investigated in this study viz. age, level of education, family size, rice cultivation experience, annual family income, training experience, agricultural extension media contact, problem faced in saline tolerant rice cultivation. But besides these eight characteristics of the farmers, there might be other factors which influence the knowledge, attitude and adoption regarding saline tolerant rice varieties. Therefore, further research should be conducted to explore the relationship of other characteristics of farmers with their knowledge, attitude and adoption regarding saline tolerant rice varieties.

vi. Adoption is the measurement of implementation by the farmers as well as important indicator of agricultural development. It is a continuous process due to change of social system, technologies, human behavior, cropping patterns, etc. So, it is suggested that there should be continuous adoption research in various aspects for agricultural development in Bangladesh.

REFERENCES

Abolagba, G.M. 2006. Adoption of Agricultural Technology by the Indians of Guatemala. A Summary Rural Sociology Report-62.Department of Sociology and Anthropology, Iowa University, Ames, Iowa.

Adesina, A. and Zinnah, M. 1992. Adoption, diffusion, and economic impacts of modern mangrove rice varieties in western Africa: Further results from Guinea and Sierra Leone. Towards a New Paradigm for Farming System Research/Extension, 443-466.

Afrad, M.S.I. 2002. Farmers' Attitude towards Vegetable Cultivation in Dumki Upazila of Patuakhali District. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Aguila-Obra, A. R., & Padilla-Meléndez, A. 2006. Organizational factors affecting Internet technology adoption. *Internet Res.,* **16**(1), 94-110.

Ahmed, K.U. 2006. Phul Phal O Shak Shabji (In Bangla). 2nd Edition, Alhaj Kamaluddin Ahmed, Banglow No. 2, Farm Gate, Dhaka, Bangladesh. P.470.

Akpabio, I. A., and Inyang, E. B. 2007.Major constraints affecting aquaculture development in AkwaIbom State, Nigeria.*African Journal of Aquatic Science*, **32**(1), 45-50.

Akter, L. 2007. Adoption of Improved Tomato Varieties by the Farmers in a Selected Area of Bangladesh. M.S. (Ag.Ext.Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Ali, M.S. 2012. Establishment of Digital Archive on Agricultural Theses and Journal of Bangladesh.www.daatj.net

Ali, M. 1999. Attitude of Block Supervisor towards the Activities of Non-Government Organization. M.S. (Ag.Ext.Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Ali, M. 2002. Attitude of Block Supervisor towards the Activities of Non-Government Organization. M.S. (Ag.Ext.Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Allport, G.W. 1935. Attitudes, Appeared In C.M. Murchison (Ed), Handbook Of Social Psychology. Clark University Press, Woreester, Mass, U.S.A. 810.

Amin, M. R. 2015. Adoption of Modern Technologies by the Rice Cultivators in the Selected Areas of Jhalokathi District, M.S. Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh.

Anderson, J. R. and Feder, G. 2007.Agricultural extension. Handbook of agricultural economics, **3**: 2343-2378.

Anwar, A.B.M.N.1994. Study on Involving Rural Youth Activities In Three Selected Villages of Mymensing District. Ph.D. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, BAU, Mymensingh.

Aurangozeb, M.K. 2002. Adoption of Integrated Homestead Farming Technologies by the Rural Women in RDRS. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Azilah, M.E. 2007. Adoption of Cassava Technology for Sustainable Livelihoods: A Thesis Presented in Partial Fulfilment of the Requirements for the Degree of Master of Applied Science in Rural Development at Massey University, New Zealand. Massey University, Palmerston North

Bantel, K.A. and Jackson, S.E. 1989. Top management and innovations in banking: Does the demography of the top team make a difference. *Strategic Management Journal*, **10**(2), 107-124.

Barr, N. and Cary, J. 1992. Greening a brown land: the Australian search for sustainable land use: MacMillan Education Australia Pty Ltd.

BARI, M.A. 2000. Attitude of Farmers towards Hybrid Rice ALOK 6201. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Bezuayehu, T., Gezahegn, A., Yigezu, A., Jabbar, M. A. and Paulos, D. 2002. Nature and Causes of Land Degradation in the Oromiya Region: A review of social economics and Policy Research Working Paper No. 36. International Livestock Research Institute (ILRI). Nairobi, Kenya. pp: 82.

Bhuiyan, M.H. 2012. Generation and diffusion of agricultural innovation Gurpukur Research Institute, Dhaka, Bangladesh.

Bogdan, R.C. and Biklen, S.K. 2006. Qualitative Research for Education: An Introduction to Theory and Methods (5th Ed.). *Boston: Allyn& Bacon*.

Bray, E.A., Bailey-Serres, J. and Weretilnyk, E. 2000. Responses to abiotic stresses. In Biochemistry and Moleculer Biology of Plants (eds B. B. Buchnau, W. Gruissem and R. L. Jones). pp. 1158-1203.

BRRI (Bangladesh Rice Research Institute). 2011. Adhunik Dhaner Chash (in bengali). Bangladesh Rice Research Institute, Joydebpur, Gazipur. pp.5.

Cary, J., Webb, T. and Barr. N. 2002. Understanding Landholders' Capacity to Change to Sustainable Practices: Insights about Practice Adoption and Social Capacity for Change. Canberra: Bureau of Rural Sciences.

Caswell, M., Fuglie, K. O., Ingram, C., Jans, S., and Kascak, C. 2001. Adoption of agricultural production practices: lessons learned from the US Department of Agriculture area studies project. Agricultural Economics Reports.Central Bank of Solomon Islands (CBS), (2009).Annual Report, Honiara, Solomon Islands.

Cernea, M. M., and Meinzen-Dick, R. S. 1995. Design for water user associations: organisational characteristics. *Water Resources Journal*, 23-30.

Chahine, K., Sourour, A., Youssef, T. and Hajer, S. 2013. Salinity effect on plant growth at the seedling stage of duramwheet (TriticumduramDesf.)*J. Plant Breed. Crop sci*.**5** (2):20-25.

Chau, P. Y. K. and Tam, K. Y. 1997. Factors affecting the adoption of open systems: an exploratory study. *Mis Quarterly*, 1-24.

Chowdhury, A.H. 2003. Farmers Attitude towards Crop Diversification. M.S. (Ag.Ext.Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Chowdhury, et al. 2012.Adoption of BRRI dhan 47 in the Coastal areas of Bangladesh. *Agril. J.***7** (5):286-291.

D'Emden, F. H., Liewellyn, R. S. And Burton, M.P. 2008.Factors Influencing Adoption of Conservation Tillage in Australian Cropping Regions.The Australian Journal of Agricultural and Resource Economics.DOI: 10.1111/J.1467-8489.2008.00409.

Daberkow, S. G. and McBride, W. D. 2003. Farm and operator characteristics affecting the awareness and adoption of precision agriculture technologies in the US.*Precision Agriculture*, **4**(2), 163-177.

Daku, L. 2002. Assessing farm-level and aggregate economic impacts of Albanian olive integrated pest management programs: An ex-ante analysis. Ph. D. dissertation, Virginia Tech, Blacksburg. Pp: 274.

Damanpour, F. and Schneider, M. 2009. Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers. *J. of Public Administration Res. and Theory*, **19**(3), 495.

Deressa, T. T., Hassan, R. M., Ringler, C., Alemu, T. and Yesuf, M. 2009. Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Env. Change*, **19**(2), 248-255.

Doorman, F. 1991.A framework for the rapid appraisal of factors that influence the adoption and impact of new agricultural technology.*Human Organization*, **50**(3), 235-244.

Doss, C. R. and Morris, M. L. 2000. How does gender affect the adoption of agricultural innovations? *Agric. Economics*, **25**(1), 27-39.

Drever, J. (Ed). 1968. Dictionary of Psychology, English Language Book Society and Penguin Books Ltd., Great Britain.

Duvel, G. H. 1991. Towards a model for the promotion of complex innovation through programmed extension. South Africa J. of Agric. Ext. **20**: 70-86.

Erenstein, O. and Farooq, U. 2009. Factors affecting the adoption of zero tillage wheat in the rice wheat systems of India and Pakistan. *Outlook on Agric.*, **38**(4), 367-373.

Feder, G. and Umali, D. L. 1993. The adoption of agricultural innovations: A review. *Technol. forecasting and social change*, **43**(3-4), 215-239.

Feder, G., Just, R. E. and Zilbverman, D. 1985. Adoption of Agricultural innovation in developing countries: A Survey Journal of Economic Development and Cultural change, **33**: 255-298.

Fliegel, F. C. 1993. Diffusion research in rural sociology: the record and prospects for the future: Greenwood Press.

Floyd, C., Harding, A.H., Paudel, K.C., Rasali, D.P., Subedi, K. and Subedi, P.P 2003. Household adoption and the associated impact of multiple agric. technologies in the western hills of Nepal.*Agric. Sys.***76** (2), 715-738.

Gabre-Madhin, E. Z. and Haggblade, S. 2003. Successes in African agriculture: results of an expert survey: Markets and Structural Studies Division, International Food Policy Research Institute.

Gibson, J. 1994. Rice import substitution and employment in Papua New Guinea.*Pacific Economic Bulletin*, **9**(1), 46-52.

Green, B.G. 1954. Attitude Measurement in Gardener. In: Lindzey (Ed.). Handbook of Social Psychology. Addison Wesley.

Habib, M. 2000. Attitude of Block Supervisors towards the Use of Agrochemicals. M.S. Thesis, Department of Agricultural Extension Education, BAU, Mymensingh.

Hassan, M. 2004.Adoption of Improved Practice in Pineapple Cultivation by the Farmers of Madhupur Upazila in Tangail District. M.S. (Ag.Ext.Ed.) Thesis.

Hassan, M.F. 2004. Knowledge and Attitude of RDRS Programme Participants towards Partnership Extension Approach. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Herbig, P. A. and Miller, J. C. 1991.The Effect of Culture upon Innovativeness.*J. of Int. Consumer Marketing*, **3**(3), 7-53.

Hoque, M.M. 1993. Adoption of Improved Practices in Sugarcane Cultivation by the Sugarcane Growers of Sreepur Upazilla under Gazipur District. M.S. (Ag. Ext. Ed.) Thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Hossain, K. 2006. Adoption of selected High Yielding Variety of Rice by the Farmers of Rajpat union under Kasiani upazila in Gopalgonj District. M.S. (Ag.Ext.Ed). Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Hossain, M.M. 2003. Farmers' Knowledge and Adoption of modern boro rice Cultivation Practices. M.S. (Ag.Ext.Ed.) Thesis, Department of Agricultural Extension Education.Bangladesh Agricultural University.

Howell, J. M. and Higgins, C. A. 1990. Leadership behaviors, influence tactics, and career experiences of champions of technological innovation. *The Leadership Quarterly*, **1**(4), 249-264.

Hussen, M.A. 2001. Farmers' Knowledge and Adoption of modem sugercane Cultivation Practices. M.S. (Ag.Ext.Ed.) Thesis, Department of agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

IRRI (International Rice Research Institute). 2010. What is rice? Retrieved from: http://www.irri.org/about rice/ rice facts/

Islam, A. 2002. Proshika Farmers' Knowledge and Adoption of Ecological Agricultural Practices. M.S. (Ag.Ext.Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Islam, A. 2008. Farmers' Knowledge System and Dissemination of Mungbean Cultivation in the South-western Region of Bangladesh. MS Thesis. Department of Agricultural Extension and Rural Development, Bangabandhu Sheikh Mujibur Rahman Agricultural University.Gazipur.

Islam, M.M. and Kashem, M.A. 1997. Attitude of Farmers towards the Use. Agro-Chemicals Bangladesh Journal of Training Development. 10 (1 & 2) 23-28.

Islam, M.S. 2002. Adoption of Modem Agricultural Technologies by the Farmers of Sandwip. MS, (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Karim, M.L., M.A. Kashem and A.S.M.Z. Karim. 1997. Relationships of Selected Characteristics of Kakrol Growers with Their Problem Confrontation. Bangladesh Journal of Training and Development.10 (1&2):49-54.

Kasenge, V. 1998.Socio-economic factors influencing the level of Soil Management Practices on Fragile Land.

Kashem, M.A. 2004. Measurement of Adoption. In: Fundamentals of Extension Education.P.64-67.BAU, Mymensingh.

Kashem, M.A. 1987. Small Farmers' Constraints to the Adoption of Modern Rice Technology. The Bangladesh Development Studies, 15 (40): 18-30.

Khan, M.A.H. 1993.Adoption of Insecticides and Related Issuces in the Villages of Pachon Union, Madaripur district. M. S. (Ag. Ext. Ed.) Thesis.Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Khan, M.A.S. 2004.Farmers' Participation in Farm and Community Level Activities in Sailokupa Upazila under Jhenaidah District. M.S. (Ag. Ext. Ed.) Thesis, Dept. of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Khan, M.J. 1996. The Effectiveness of A Farmers' Primer on Growing Rice in Knowledge Change of The Farmers in Shakhipur Thana. M. S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensigh.

Khan, M.S.I. 2005.Farmers' Knowledge of Maize Cultivation InTilli Union. M. Gurpukur Research Institute, Dhaka, Bangladesh.

Knowler, D. and Bradshaw, B. 2007. Farmers' adoption of conservation agriculture: A review and synthesis of recent research. *Food Policy*, **32**(1), 25-48.

Kumari, N. 1988. An Experiment Study on Communication Effectiveness of Selected Mix Media for Health Education, Thesis Abstract. Haryana Agricultural University. Hissar, India.

Lawrence, G., Richards, C. A. and Cheshire, L. 2004. The environmental enigma: Why do producers professing stewardship continue to practice poor natural resource management? *J. of Env. Policy and Planning*, **6**(3), 251-270.

Leathers, H. D. and Smale, M. 1991.A Bayesian approach to explaining sequential adoption of components of a technological package. American J. of Agric. Eco., **73**(3), 734-742.

Levi, Y. and Litwin, H. 1986. Community and cooperatives in participatory development: Gower, Aldershot, Hants, England; Brookfield, Vt., USA.

Levigneron, A., Lopez, F. and Vasut, G. 1995. Less plants faces au stress salinity. *Cahiers d'Agricultures***4**:263-273.

Macgrath, J.E. 1966. Social Psychology. New York: Halt, Rinehart And Winston.

Miajy, M.A. 2005. Adoption of hybrid Varieties of Maize by the Farmers in Two Selected Unions under Gaibandha Sadar Upazilla. MS. (Ag.Exi.EeL) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Mingers, J. 2001. Combining IS Research Methods: Towards a Pluralist Methodology. *Info. Sys. Res.***12**(3): 240-259.

Monalesa, N. 2014. Farmers' Knowledge and Attitude towards Summer Tomato Cultivation, M.S. Thesis, Department of Agricultural Extension and Information System, SAU, Dhaka.

Morgan, B., G.E. Holmes and C.E. Bundy.1929. Methods in Adult Education. Danville: the Interstate Printers and Publishers, Inc.

Moser, C. M., and Barrett, C. B. 2003. The disappointing adoption dynamics of a yield increasing, low external-input technology: the case of SRI in Madagascar. *Agric. Sys.*, **76**(3), 1085-1100.

Muttaleb, M.A., M.N. Islam. and M.A .Hussain. 1998. Adoption of Selected Plant Protection Practices in Potato Cultivation. Bangladesh Journal of Extension Education. 9(2):2027-30.

Msuya C. P. 2005. Factors that affect adoption of hybrid maize in MwangaDistrict.Implications for Continuing Education.J.of Continuing Edu.and Ext., **2**(1): 1-42.

Mwaseba, D. L., Kaarhus, R., Johnsen, F. H., Mvena, Z. S. K. and Mattee, A. Z. 2006. Beyond Adoption Rejection of Agricultural Innovations: Empirical evidence from smallholder rice farmers in Kilombero, Morogoro, Tanzania, pp: 268.

Noor, M.S. 1995. Farmers' Attitude towards the Cultivation of High Yielding Varieties Of Potato. M.S. (Ag. Ext. Ed) Thesis, Department of Agricultural Extension Education, ISPA, Gazipur.

Nurzzaman, M. 2000. Knowledge Attitude and Practice of FFS and Non-FFS Farmers in Respect of IPM. ***M.S. (Ag. Ext.Ed.) Thesis,*** Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Ogunlana, E. A. 2004. The technology adoption behavior of women farmers: The case of alley farming in Nigeria. *Renewable Agric. and Food Sys.*, **19**(01), 57-65.

Onyx, J. and Leonard, R. J. 2010.Complex systems leadership in emergent community projects.*Community Development J.*

Pannell, D. J., Marshall, G. R., Barr, N., Curtis, A., Vanclay, F. and Wilkinson, R. 2006. Understanding and promoting adoption of conservation practices by rural landholders. *Australian J. of Exp. Agric.*, **46**(11), 1407-1424.

Parveen, S. 1995. Awareness of Farm Women on Environmental Degradation Due to the Use of Some Selected Modem Agricultural Technologies. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension and Teacher's Training, Bangladesh Agricultural University, Mymensingh.

Paul, S.K. 2000. Attitude of Farmers towards the Use of Urea Super Granule on Rice Cultivation. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Raha, A.K.1989. Deep Tubewell Irrigation Problems of the Farmers in the Cultivation of Boro Paddy in Two Selected Blocks of Muktagacha Upazilla under Mymensing District. M.Sc. (Ag.Ext.Ed) Thesis, Department of Agricultural Extension & Teachers' Training, BAU, Mymensingh.

Rahman, A. and Mainuddin, K. 2013.Salinity-induced loss and damage to farming households in coastal Bangladesh.*Int. J. Global Warming* **5**(4).

Rahman, M.A. 2015. Farmers' Knowledge and Attitude regarding cultivation of salt tolerant variety (BRRI dhan47) of rice. M.S. (Ag. Ext. Ed). Thesis, Department of Agricultural Extension and Information System, SAU, Dhaka.

Rahman, M.M. 1993. An Investigation into the Characteristics of the Farmers Related to Adoption of Improved Farm Practices in Boro Rice Cultivation. M. Sc. (Ag. Ext. Ed.) Thesis. Department of Agricultural Extension Education, IPSA, Gazipur

Rahman, M.S. 2001. Knowledge, Attitude and Adoption of the Farmers' Regarding Alok-6201 Hybrid Rice in Sadar Upazila of Mymensingh District. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Rahman, M.S. 2004. Extent and Level of Knowledge of Farmers on HYV Boro Rice Cultivation Practices. M.S. (Ag. Ext. Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Rashid, S.M.M. 2014. Empowering Farmers through e-Agriculture. M.S. (Ag. Ext. & Info.Sys.)Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka.

Ray, G.L. 1991. Extension Communication and Management. Calcutta: Naya Prokash.

Reza, M.S. 2007. Adoption of Modern Maize Cultivation Technologies by the Farmers. M.S. (Ag. Ext. Ed.) Thesis, Department of Education, Bangladesh Agricultural University, Mymensingh.

Rogers, E. 2003. Diffusion of Innovations. Fifth Edition, Free Press, New York. pp: 221.

Rogers, E.M. 1983. Diffusion of Innovation. (3rd Ed.), Macmillan Publisher, NewYork.11pp,453pp.(http//enwikipedia.org/wiki/Technology_adoption_life cycle) site visited on 14/08/2016.

Rogers, E.M. 1995. Diffusion of Innovations. (4th Ed.), Free Press, New York.

Rogers, E.M. and Leuthold, F.O. 1962. Demonstration and Diffusion of Fertilizer Practices. Research Bulletin No. 908, Ohio Agricultural Experiment Station, Wood star, Ohio.

Rosero-Bixby, L. and Casterline, J. B. 1993. Modelling diffusion effects in fertility transition.*Population Studies*, **47**(1), 147-167.

Ross, M. G. and Lappin, B. W. 1967. Community organization: Theory, principles, and practice: Harper & Row.

Roy, K.K. 2006. Farmers' Knowledge on Boro Rice Cultivation in Some Selected Areas of Dinajpur District. M. S. (Ag. Ext. Ed). Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural Universtiy, Mymensingh.

Sadat, M.A. 2002. Farmers Attitude towards Proshika: A Comparative Study between Proshika Beneficiaries and Non Beneficiaries. M.S. (Ag.Ext.Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Saha, M. 2001.Farmers' Knowledge on Improved Practices of Pineapple Cultivation. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Saltiel, J., Bauder, J. W. and Palakovich, S. 1994. Adoption of Sustainable Agricultural Practices: Diffusion, Farm Structure, and Profitability1. Rural sociology, 59(2), 333-349.

Sana, M.C. 2003. Farmers' Knowledge of Shrimp Cultivation in AshasuniUpazilaUnderSatkhira District. M.S. (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Sardar, M.H.U. 2002. Adoption of EPM Practices by the Farmers under PETRA Project of RDRS. MS. (Ag. Ext .Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Sarker, M.R A. 2002. Farmers' knowledge and Attitude towards BRRI Dhan 29 Variety of Rice. M. S. (Ag. Ext. Ed). Thesis, Department of Agricultural Extension and Education,SAU,Dhaka.

Scott, S.G. and Bruce, R.A. 1994. Determinants of innovative behavior: A path model of individual innovation in the workplace. *The Academy of Management J.*, **37**(3), 580-607.

Sherif, M. and C.W. Sherif. 1956. An Outline of Social Psychology. Harper and Brothers, New York. 489. Adopted From Encyclopedia of Educational Research. Third Edition.Vol. 1.

Shehrawat, P.S. 2002. An Empirical Analysis of Diversification in Farming Using Statistical Tools. Research Paper Presented at 16th Australian Statistical Conference, National Convention Centre Canberra, Australia.

Siddique, A.B. 2002. Attitude of the Farmers towards Winter Vegetable Production in a selected area of Goforgaon Upazila under Mymensingh district. M.S. (Ag.Ext.Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Singh, R.N. 1982. Changes in Farmers' Knowledge about and Attitude towards Some Selected Aspects of Agricultural Technology with the Coming of Irrigation Water in Traditionally Dry Farming of Haryana. Haryana Agricultural University, Thesis Abstract, 9 (3): 222-224.

Singh, B. and Kunzroo, O.N. 1985. Attitude of Farmers towards Goat and Sheep Farming. Indian Journal of Extension Education. XXI (1 And 2): 83-85.

Sommers**,** D.G. and Napier, T.L. 1993. Comparison of Amish and Non-Amish Farmers: A Diffusion/Farm Structure Perspective1. *Rural Sociology*, **58**(1), 130-145.

Spence, W.R. 1994. Innovation: The communication of change in ideas, practices and products: Thomson Learning.

Staal, S., Baltenweck, I., Waithaka, M., DeWolff, T. and Njoroge, L. 2002. Location and uptake: integrated household and GIS analysis of technology adoption and land use, with application to smallholder dairy farms in Kenya. *Agric. Eco.,* **27**(3), 295-315.

Stanley, J., Clouston, B. and Baker, R. 2000. Understanding land manager constraints to the adoption of changed practices or technological innovations: Literature review. Case Studies in Increasing the Adoption of Sustainable Resource Management Practices. Land and Water Resources Research and Development Corporation (LWRRDC), Canberra, ACT.

Straub, D.W. 1994. The Effect of Culture on ITS Diffusion: E-Mail and FAX in Japan and the US. *Info.Sys.Res*. **5**(1), 23.

Sunding, D. and Zilberman, D. 2001. The agricultural innovation process: research and technology adoption in a changing agricultural sector. *Handbook of agricultural economics*, **1**, 207-261.

Sulakshana, D. 1988. An Explanatory Study of the Constraints in the Promotion of Income Generating Projects For Rural Women in Haryana. Thesis Abstract. XVI (2) 100.

Suryanarayanan S. 2010. Innovation and food security in Bangladesh, http://www.wordssecuritynetwork.com/showArticle3.cfm?article id=18473.

Thurstone, L.L. 1928. The Measurement of Opinion.*J. of Social Psychol.***22**: 415-430.

Twati, J. M. and Tripoli, L. 2008. The influence of societal culture on the adoption of information systems: The case of Libya. *Communications of the IIMA*, **8**(1), 1-12.

Van den Ban, A. and Hawkins, H. 1996.Agricultural extension. London, Cambridge.

Van den Ban, A.W. and Hawkins, H. S. 1988.Agricultural Extension. John Wiley and Sons, London, UK.pp: 328.

Warren, H.C. (Ed). 1934. Dictionary of Psychology. Boston: Houghton Mifflin.

Verma, H.K. And Kumar, K. 1991. Correlates of Farmers' Attitude towards Buffalo Management Practices. Indian Journal of Extension Education, 27 (1 And 2): 97-100.

Wejnert, B. 2002. Integrating models of diffusion of innovations: a conceptual framework.*Annual Review of Sociology*, **28**, 297-326

West, M. A. and Anderson, N. R. 1996. Innovation in top management teams.*J.of Applied Psychology*, **81**(6), 680.

World Bank 2011. Bangladesh: Climate Change & Sustainable Development. Report No. 21103BD, Dhaka.

Zeller, M., Diagne, A., Mataya, C., Consumption, I.F.P.R.I.F. and Division, N. 1998. Market access by smallholder farmers in Malawi: Implications for technology adoption, agricultural productivity and crop income. *Agric. Eco.*, **19** (1-2), 219-222

APPENDIX-I

ENGLISH VERSION OF THE INTERVIEW SCHEDULE

Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University
Dhaka-1207

An Interview Schedule for the Study Entitled

FARMERS KNOWLEDGE, ATTITUDE AND ADOPTION REGARDING SALINE TOLERANT RICE VARIETIES

Name of the respondent: …… Serial No: ……

Union: …….

Village: …….…….….

(Please provide following information. Your information will be kept confidential and will be used for research purpose only)

1. Age

How old are you? _____years.

2. Level of education

Please mention your level of education.

a) I can't read and write ☐

b) I can sign only ☐

c) I have passed…….class.

3. Family size

How many members live in your family together? _____.

4. Rice cultivation experience

Mention your experience inrice cultivation ……. year/years.

5. Annual family income

Please mention the amount of annual income from the following sources:

	Source of income			Income in '000' Tk.
A.	Agricultural sources			
	1)	Rice		
	2)	Other crops		
	3)	Livestock		
	4)	Poultry		
	5)	Fisheries		
B.	Non-Agricultural sources			
		i)	Business	
		ii)	Service	
		iii)	Labor	
		iv)	Remittance	
		v)	Others (please specify)……..	
Total				

6. Training Experience:

Have you received any training on rice cultivation? Yes --------- No ----------

If yes, please give the following information:

Sl. No.	Subject of training	Duration of training (Days)
1		
2		
3		
4		
Total		

7. Agricultural Extension media contact

Please state the extent of your contact with the following communication media

Sl. No.	Categories of farmers	Extent of participation			
		Regularly (3)	Occasionally (2)	Rarely (1)	Never (0)
1	Model farmers (per month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 time ( )
2	Agricultural input dealer(s) (per month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 time ( )
3	NGO worker(s) (per month)	>6 times ( )	4-5 times ( )	1-3 times ( )	0 time ( )
4	Sub-Assistant Agriculture Officer (SAAO) (per month)	>6 times ( )	4-5 times ( )	1-3 times ( )	0 time ( )
5	Agricultural Extension Officer (AEO) (per 3 month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 time ( )
6	Listening agricultural program in Radio (per week)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 time ( )
7	Watching agricultural program on TV (per week)	>4 times ( )	3 times ( )	1-2 times ( )	0 time ( )
8	Reading printed media e.g. agricultural newspaper poster, leaflet (per 3 month)	>6 times ( )	3-4 times ( )	1-2 times ( )	0 time ( )
9	Participation in group discussion (per year)	>6 times ( )	4-5 times ( )	1-3 times ( )	0 time ( )
10	Participation in demonstration meeting (per year)	>3 times ( )	2 times ( )	1 time ( )	0 time ( )
Total					

8. Problem faced in saline tolerant rice cultivation

Please state the extent of the following problems faced in saline tolerant rice cultivation

Sl. No.	Problem	Extent of problems			
		Severe (3)	Moderate (2)	Low (l)	Not at all (0)
1	Lack of quality seeds				
2	High production cost				
3	Lack of technical support/ management information				
4	Lack of storage facilities				
5	Weed infestation				
6	Insect attack				
7	Disease attack				
8	Low market price				
9	Lack of proper marketing facilities				
10	Poor transport facilities				
Total					

9. Saline tolerant rice cultivation knowledge

Please answer the following questions

Sl. No.	Questions	Full marks	Mark obtained
1	Name two saline tolerant rice varieties.	2	
2	Which is the suitable time for sowing seed in the seedbed?	2	
3	When are the saline rice seedlings transplanted in the main field?	2	
4	What is the distance between two rows?	2	
5	Mention the suitable time of the year for saline tolerant rice cultivation.	2	
6	Mention the harmful weeds in saline tolerant rice field.	2	
7	Name two harmful insects of saline tolerant rice.	2	
8	What is the suitable time for saline tolerant rice harvesting?	2	
9	Mention the fertilizer which are used in saline tolerant rice cultivation.	2	
10	How many days require to complete their life cycle?	2	
Total			

10. Attitude towards saline tolerant rice cultivation

Please mention your degree of agreement with the following statements

Sl. No.	Statements	Extent of agreement/disagreement				
		SA (4)	A(3)	NO (2)	D(1)	SD (0)
1 (+)	Seeds of saline tolerant rice are available in coastal region.					
2 (-)	High cost is involved in saline tolerant rice cultivation.					
3 (+)	Less insect attack in saline tolerant rice cultivation.					
4 (-)	In small area, saline tolerant rice can be cultivated.					
5 (+)	Saline tolerant rice has high demand in food industries.					
6 (-)	Saline tolerant rice cultivation is complex.					
7 (+)	Most of the pest can be controlled by appropriate cultivation.					
8 (-)	It is difficult to maintain quality of saline tolerant rice seeds.					
9 (+)	Less infestation of diseases occurs in saline tolerant rice cultivation.					
10 (-)	Saline tolerant rice cultivation requires higher investment.					

N.B: SA= Strongly Agreed; A=Agreed; NO= No Opinion D=Disagreed; SD= StronglyDisagreed;

11. Adoption of saline tolerant rice varieties

Mention the extent of your adoption of saline tolerant rice varieties

Varieties	2016		2015		2014	
	Potential Areas(D)	Effective Areas(D)	Potential Areas(D)	Effective Areas(D)	Potential Areas(D)	Effective Areas(D)
1						
2						
3						
4						
Total						

D=Decimal

Thanks for your kind co-operation.

Dated: (Signature of interviewer

APPENDIX-II

Correlation matrix of the relationship between the selected characteristics of the farmers and their knowledge on saline tolerant rice varieties

Correlations Matrix

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	Y_1	Y_2	Y_3
X_1	-										
X_2	.451**	-									
X_3	.242**	.082**	-								
X_4	.772**	.295**	.288**	-							
X_5	.125	.009	-.033	.195*	-						
X_6	-.108	.171	.025	-.021	-.048	-					
X_7	-.182	.334**	-.014	-.100	.069	-.021	-				
X_8	.193*	-.205*	-.016	.221*	.314**	-.003	.271**	-			
Y_1	.052	.358**	.021	.080	-.024	.214*	.159	-.171	-		
Y_2	-.073	.295**	-.110	-.029	-.100	.181	.334**	.414**	.375**	-	
Y_3	.014	.138	.084	.093	-.020	-.057	.229*	.416**	.304**	.243**	-

NS:Non-Significant
*Correlation is significant at 0.05 levels (2-tailed)
**Correlation is significant at 0.01 levels (2-tailed)
X_1: Age
X_2: Level of education
X_3: Family size
X_4: Rice cultivation experience
X_5: Annual family income
X_6: Training Experience
X_7: Agricultural Extension media contact
X_8: Problem faced in saline tolerant rice cultivation
Y_1: Saline tolerant rice cultivation knowledge
Y_2:Attitude towards saline tolerant rice cultivation
Y_3:Adoption of saline tolerant rice varieties