EXPLORATION OF PROBLEMS OF THE FARMERS IN T-AMAN CULTIVATION DUE TO FLOOD

BY

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This is to certify that the thesis entitled **"Exploration of Problems of the Farmers in T-aman Cultivation due to Flood"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension and Information System**, embodies the result of a piece of bona fide research work carried out by **Muhammad Abdullah-Al-Mahmud**, Registration No. **04-01491** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

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The Author

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS OF SYMBOLS AND TERMS

Abbreviation	Full Word
et al.	And others (at elli)
BRR1	Bangladesh Rice Research Institute
B.C.	Before Christ
BBS	Bangladesh Bereau of Statistics
CV	Coefficient of Variation
d.f.	Degrees of Freedom
DAE	Department of Agricultural Extension
GDP	Gross Domestic Product
GO	Government Organization
etc.	Etcetera
e.g.	Example
ha	Hectare
Tk.	Taka
i.e.	That is
Km	Kilometer
Kg	Kilogram
LGED	Local Government Engineering Department
LGRD	Local Government and Rural Development
viz.	Namely
NGO	Non-Government Organization
%	Percent
PFI	Problem Faced Index
r	Pearson's Product Moment Correlation Co-efficient

ABSTRACT

The main focus of the present study was to determine the problems faced by the farmers in T-aman cultivation due to flood and to explore the relationships between the problems faced by the farmers and their selected characteristics. The study was conducted at Patadaha and Gojaria villages as a flood affected area of Adarvita Union of Madargonj Upazilla under Jamalpur District. Data were collected from 125 flood affected T-aman farmers who were randomly selected as the sample of the study by using random sampling method from an update list of 1254 T-aman farmers that was prepared with the help of Sub-Assistant Agricultural Officers of the study area. The researcher himself collected data through personal contact with a well structured pretested interview schedule during the period from 08 to 31 March, 2011. The study revealed that highest proportion (63.2 percent) of the respondents had medium problem in T-aman cultivation due to flood, while 20.8 percent and 16 percent of the respondents had low and high problems respectively. Pearson's Product Moment Correlation co-efficient (r) was computed to explore the relationships between the problems faced by the farmers in T-aman cultivation due to flood and their ten selected characteristics. The correlation analysis indicated that educational level, extension media contact, training exposure, innovativeness, decision making ability and farmers' knowledge on T-aman cultivation in flooding condition had significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. Experience in T-aman cultivation, T-aman cultivation area, annual expenditure and commercialization had non-significant relationships with the problems in T-aman cultivation due to flood. A Problem Faced Index (PFI) for the 15 selected problems in T-aman cultivation due to flood was developed to measure the severity among the problems of which possible range was "0" to 300. The Problem Faced Index indicated that the farmers faced highest problem in "fully damaged field requires re-transplantation". This was followed by "poor yield in the flood affected fields" and "high price of seeds and seedlings after flood". However, the less serious problems were identified as "high price of labor, fertilizers and pesticides after the affect of flood", "unavailability of labor after flood" and "shortage of fertilizers and pesticides in after flood condition". Individually they were positioned in the rank order as 13th, 14th and 15th respectively.

CHAPTER 1

INTRODUCTION

1.1 General Background

The floodplains of Bangladesh are one of the regions where the rice plant was first domesticated around 5th millennium B.C. Rice is the staple food for the 158 million Bangladeshis who obtain more than 70% of their total calorie (BBS, 2010). Two-thirds of Bangladeshi populations are engaged in livelihood activities related to rice and accounting for about 72 percent of agricultural land use (20.16 percent of GDP) BBS, (2010). In spite of doubling rice production in the country since the introduction of modern varieties in the early seventies, Bangladesh has experienced a continued annual shortage of nearly 1.5 million tons of food grains (Karim, 2007). This shortage of food production will continue to increase even if the present level of population growth is maintained. In other words, rice production has to be increased by at least 60 percent to maintain the present level of rice requirements by the year 2020 (Bhuiyan & Karim, 1999). So food security is the great concern of Bangladesh now.

In Bangladesh the rice-growing environment has been classified into three major ecosystems based on physiographic and land types. These ecosystems are a) irrigated, b) rainfed, and c) floating or deepwater. The rainfed ecosystem has been further classified as rainfed lowland and rainfed upland. Thus, all rice varieties cultivated in the country are grouped into five distinct ecotypes such as (a) Boro, (b) Transplanted Aus (T-Aus), (c) Transplanted Aman (T-Aman), (d) Upland Aus (direct-seeded Aus), and (e) Deepwater rice (Floating rice). Boro rice is grown completely under the irrigated ecosystem during the dry period (November to July) while T-Aman (during July to December), T-Aus (during April to August) and Upland rice (during March to July) are grown under the rainfed ecosystem. Of the total 13.8 million hectares of cultivable land in the country (UNDP/FAO, 2004), 10.27 million ha (74.4 percent) are devoted to rice cultivation covering the above four ecosystems (BBS, 2003 & 2007; Hamid 2001). Besides these, special types of ecosystems like tidal wetland covering about 425 thousand hectares and

about 3.05 million hectares of coastal saline soils are also included into the 10.27 million hectares of rice land. Among these cropping, T-aman rice covers about 50.92% of the rice areas of Bangladesh (BBS, 2005) of which modern T-aman varieties covers 60% (BBS, 2005). The rest 42.71% and 6.37% of the land is occupied by Boro and Aus respectively.

Transplanted Aman is grown throughout Bangladesh and broadcast Aman is grown mostly in the south and southeastern part of the country. BR3 (Biplob), BR11 (Mukta), BR22 (Kiron), BR23 (Dishari), BR25 (Nayapajam), BRRI dhan31, BRRI dhan32, BRRI dhan44 are some popular and modern T-aman varieties of Bangladesh.

Bangladesh is among the top ten of most flood affected Asian countries due to its unique geographical location, hydrological regime and topography. The Ganges, the Brahmaputra and the Meghna are the three major river systems and the combined basin area about 80% of Bangladesh. The river systems drain the run-off generated from one of the heaviest rainfall areas in the world. The annual flow volume of the rivers is 1,200 billion cubic meters, and 80 percent of the flow passes during the Monsoon season (June to September) (WFP, 2009).

The country is extremely flat with only a few hills in the southeast and the northeast parts of the country. Generally, ground slopes of the country extend from the north to the south and the elevation ranges from 1-60 meters above Mean Sea Level (MSL). Due to the unique topography, river system and rainfall pattern, floods occur in Bangladesh almost every year and devastate everything on a 5 to 10 year interval. The rivers both big and small gradually became incapable of draining the huge quantity of silt-laden run-off passing through them and the unique coastline, conical in shape, causes a higher sea level during monsoon period. That's why every year almost one-third of Bangladesh is flooded.

The river basin areas are inundated two or more times yearly which cause a great damage of seasonal agricultural crops, especially T-aman (Alam *et al.* 2000).

The country has experienced a lot by so many catastrophic floods in 1954, 1955, 1956, 1974, 1984, 1987, 1988, 1998, 2000, 2004, 2005 and 2007. Some statistical data of loss due to flood in Bangladesh is presented in table 1.1.

Table 1.1 Coverage of inundation, production and economic loss due to flood (1954 - 2008)

Years	Flood area (Sq. km)	Percent of total area	Production loss million ton	Economic loss million TK.
1954	36,920	25	-	1500
1968	3700	25	-	1200
1974	52,720	35	-	2000
1988	77,700	52	2.505	4000
1998	100,000	68	3.347	6684
2004	93,600	63	3.056	6153
2005	89,680	61	2.970	5738
2007	92,890	63	3.020	6115
2008	108,870	73	3.660	7235

Source: DAE, 2009

The main riverine areas of Bangladesh are; the Jamuna, the Ganges, the Padma, the Upper Meghna and the Lower Meghna rivers. There are other areas of riverine, along the Old Brahmaputra and the Tista rivers. Jamalpur district is situated on the east bank of the Jamuna river. The river side upazilas i.e., Madarganj, Sharishabari, Melandaha, Islampur and Dewanganj are highly flood prone. These areas constitute many branches from the Jamuna river which are losing their depth day by day. As a result, heavy rainfall or simply increase in water flow of the Jamuna causes flood over this vast river basin area. And flood causes various problems of the farmers in their agricultural production about every year.

A problem is an obstacle, impediment, difficulty or challenge, or any situation that invites resolution; the resolution of which is recognized as a solution or contribution toward a known purpose or goal. Every theoretical problem asks for

an answer or solution. A situation is only a problem if the problem-owner wants to do something about it.

Problem exploration of the farmers may vary from one farmer to another by the influence of various factors. An individual is greatly influenced by his different characteristics. It is, therefore, likely that the problems of the farmers might be influenced by their personal, economic, social and psychological characteristics. An understanding of the agricultural problem confrontation of the farmers and its relationship with their various characteristics will be greatly helpful for planning and execution of programs. But little efforts have been made to undertake systematic investigation in this respect. These facts indicate the need for conducting a research study on exploration of problems faced by the farmers.

1.2 Statement of the Problem

Agriculture is always vulnerable to unfavorable weather events and climate conditions. Despite technological advances i.e.; improved crop varieties, modern cultivation techniques, equipments, fertilizers, pesticides and irrigation systems, weather and climate are important factors, which play a significant role to agricultural productivity. So it is well known that flood is a natural calamity and an annual affair in our country on agricultural aspects. Our country suffers a lot from flood every year. About 60% land of Bangladesh is flood-prone while 25% areas in Bangladesh are inundated by monsoon flood water between June and October every year (Siddique *et al.*, 2000). But the regrettable matter is that, the most important T-aman cultivation is going on during this season. Obviously, the farmers of river basin areas where aman rice is transplanted are the victims of this sort of flood effects. And more or less every year flood damages one or more times the standing T-aman, where farmers have to struggle a lot to earn the least yield from their fields.

The farmers as well as the victims of flood effects loss their stocks of food grains, seeds and other agricultural inputs and implements. They become economically helpless. Sometimes flood causes famine in case of fully damaged T-aman cultivation. Therefore, many problems arise due of floods in T-aman cultivation.

The above consequences are regular casuals in the Jamuna river basin areas. Considering the above facts in view, it is necessary to undertake a research study entitled "**Exploration of Problems of the Farmers in T-aman Cultivation due to Flood**".

In light of above discussion and the background information, the present study has been undertaken with the following research questions:

1. What are the problems of the farmers in T-aman cultivation due to flood?
2. What are the farmers' characteristics that are related to the problems in T-aman cultivation due to flood?
3. Are there any relationships between the problems of the farmers faced in T-aman cultivation due to flood and their selected characteristics?

1.3 Specific Objectives of the Study

The following specific objectives were formulated for giving proper direction to the study:

1. To assess the extent of problems faced by the farmers in T-aman cultivation due to flood
2. To determine and describe the following selected characteristics of the T-aman farmers:
   - (i) Experience in T-aman cultivation
   - (ii) Education Level
   - (iii) T-aman cultivation area
   - (iv) Extension media contact
   - (v) Training exposure
   - (vi) Annual expenditure
   - (vii) Commercialization
   - (viii) Innovativeness
   - (ix) Decision making ability
   - (x) Farmers' knowledge on T-aman Cultivation in flooding condition
3. To explore the relationship between the problems faced by the farmers in T-aman cultivation due to flood and their selected characteristics
4. To compare the severity among the problems faced by the farmers in T-aman cultivation

1.4 Justification and Scope of the Study:

The main focus of the study was to explore and sort out the problems faced by the farmers in T-aman cultivation due to flood. The present study was dealing with the farmers who are facing problems every year in the most flood prone area of Madargonj Upazila under Jamalpur District. Their cropping intensity is very low i.e., Boro and T-aman are their only main crops which they cultivate in a year. And regrettably, they are facing a lot of problems in T-aman cultivation due to flood more or less every year. So, this study was a modest attempt to find out the exact problems of the farmers in T-aman cultivation due to flood. The findings from the study may be helpful for the Government policy makers and non-Government organizations to redesign and formulate the extension programs and technologies to reduce the problems of the farmers faced in T-aman cultivation under the flooding condition.

1.5 Statement of Hypothesis

As defined by Goode and Hatt, (1952), "a hypothesis is a proposition, which can be put to a test to determine its validity. It may seem contrary to, or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test". In studying differences between variables, research hypotheses are formulated which state anticipated differences between the variables. However, for statistical test it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no significant difference between the variables. If a null hypothesis is rejected on the basis of a statistical test, it is assumed that there is a difference between the concerned variables. The following null hypothesis was formulated to examine the relationships between the selected characteristics of the farmers and their extent of flood affected problems, "There is no relationship between the problems of the farmers in T-aman cultivation due to flood and each of their selected characteristics".

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 (Goode and Hatt, 1952). The researcher had the following assumptions in mind while undertaking this study:

1) The respondents included in the sample were capable of providing proper answer to the question in the interview schedule.
2) The researcher who acted as interviewer was adjusted to social and environmental condition of the study area. Hence, the data collected by him and the respondents were free from bias.
3) The responses furnished by the respondents were reliable. They expressed the truth about their conviction and opinions.
4) Views and opinions furnished by farmers included in the sample were representative views and opinions of the whole population of the study.
5) The finding of the study will have general application to other parts of the country with similar socio-economic, cultural and agro-ecological conditions of the study area.
6) The respondents were more or less conscious about the problems in T-aman cultivation due to flood.

1.7 Limitations of the Study

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

1. The study was confined mainly to farmers' problem in T-aman cultivation due to flood.
2. The study was confined in only two flood affected villages of Adarvita union under Madargonj upazila of Jamalpur district.
3. The characteristics of T-aman farmers are many and varied but only ten characteristics were selected for investigation in this study.
4. Population of the study includes only the T-aman cultivators of the farm families.
5. Facts and figures were collected by the investigator applied to the present situation in the selected area.

6. For information about the study, the researcher was dependent on the data furnished by the selected respondent during data collection.

1.8 Definition of Key Term

Certain terms have been used in this research which are defined and interpreted as follows for clarity of understanding:

Exploration: A careful systematic search of anything.

Problem: A state of difficulty that needs to be resolved. A matter or situation regarded as unwelcome or harmful and needing to be dealt with and overcome.

Flood: A great flowing or overflowing of water, especially over land not usually submerged. In other words, flood is defined as rise of water of a natural stream above a level associated with the beginning of damage.

Farmers/cultivators: The persons who were involved in farming activities are called farmers. They participated in different farm and community level activities like crops, livestock, fisheries, other farming activities etc.

Variable: A general indication in statistical research of characteristic that occurs in a number of individuals, objects, groups etc. and that can take on various values, for example the age of an individual.

Assumption: An assumption is "The supposition that an apparent fact or principle is true in the light of the available evidence" (Goode and Hatt, 1952).

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

Null hypothesis: The hypothesis which we pick for statistical test is null hypothesis (Ho). In this study the null hypothesis is stated that there is no relationship between the concerned variables.

Experience in T-aman Cultivation: It referred to how many years a farmer has been cultivating T-aman rice.

Educational Level: 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 T-aman cultivator has passed from a formal educational institution.

T-aman cultivation area: The term related to the hectare of land of a farmer on which he carried his T-aman cultivation, the area being estimated in terms of full or partial benefit to the farmer.

Extension media contact: Extension media contact referred to the channel through which various information are diffused among the farmers who become informed about different aspects of agricultural activities.

Training Exposure: It referred to the total number of days that a respondent received training in his entire life from different organizations under different training programs.

Annual Expenditure: It referred to the total annual expenses of all the family members of a farmer by agricultural and other non-agricultural purposes i.e.; health, education, cloth, food, housing, festival, electricity, fuel etc.

Commercialization: Commercialization of an individual referred to the ratio of value of crops sold and value of crops raised. It was expressed in percentage.

Decision Making Ability: Decision making ability of a respondent referred to the extent of ability to make decision with four different aspects viz. 'Able to make decision by own', 'Able to make decision with the family members', 'Able to make decision with the neighbors and local leaders', and 'Able to make decision with the highly educated or extension personnel'.

Innovativeness: Innovativeness is the degree to which an individual is relatively earlier in adopting innovations, new ideas, practices and things than the other members of a social system (Rogers, 1995). This was comprehended by the quickness of accepting innovations by an individual in relation to others and was measured on the basis of time dimension.

Knowledge on T-aman Cultivation in Flooding Condition: It is the extent of basic understanding of the farmers in different aspects of T-aman cultivation like soil, seed, fertilizer, insects and diseases, high yielding variety etc in the flooding season. It includes the basic understanding of the use of different inputs and practices for T-aman cultivation in the flooding condition.

CHAPTER 2

REVIEW OF LITERATURE

This chapter deals with the review of past research works that relates to this investigation directly or indirectly. Despite of frantic search, the researcher found only a few literatures related to this study. The researcher came across with some expert opinions and has tried his best to collect needful information through searching relevant studies, journals, periodicals, bulletins, leaflets, internet etc. These enhanced the researcher's knowledge for better and clear understanding of the present study. This chapter has been presented in four sections as follows:

2.1 Concept of the Problem

Goode (1945) defined problem as "a significant perplexing and challenging situation, real and artificial, the solution of which requires reflective thinking."

According to Hatt (1964), a problem is the difference between "what ought to be" and "what exists". This may be written as an equation:

Problem = "ought" minus "is"

There are two possible solutions: (i) change the ought or (ii) change the "is". If there is no need for change, i.e.; if "ought" equals to "is", there is no problem (Kashem, 1977).

Problem faced, therefore, refers to the extent to which an individual faces difficult situations about which something needs to be done.

2.2 Problem confrontation of the farmers in different agricultural aspects

Akanda (1993) conducted a research to find out problem confrontation of the farmers in cultivating Mukta (BR11) rice in transplanted aman season. The problem confrontation of the farmers was measured in three aspects of Mukta rice cultivation viz. (a) using quality seed (b) using recommended fertilizers (c) taking plant protection measures. The findings revealed that, (a) in using quality seed majority of the farmers (72.38 percent) had medium problem confrontation compared to 22.86 percent having low problem confrontation and only 4 percent

high problem confrontation, (b) in using recommended fertilizers the highest portion (88.57 percent) of the farmers belong to medium problem confrontation category, compared to 29.52 percent having low and only one percent high problem confrontation and (c) in taking plant protection measures the highest portion of the farmers (80.95 percent) had high problem confrontation, while 16.19 percent had medium and only 2.66 percent low problem confrontation.

Marothia (1983) conducted a research to find out the constraints in the adoption of paddy technologies in two villages in Raipur Block, Madhaya Pradesh, India. The findings revealed that the majority of farmers still adopt a partial package of recommendations, mainly due to the high cost of inputs, financial limitations and risk of crop failure. Inadequate supportive input-facilities were found to be responsible for the slow adoption a paddy technology.

Salam (2003) in his study identified constraints in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: (i) low production due to limited use of fertilizer (ii) lack of organic matter in soil, (iii) lack of Govt. support for environmentally friendly farming practices, (iv) lack of capital and natural resources for integrated farming practices, (v) lack of knowledge on integrated farm management and (vi) unavailability of pest resistant varieties of crops.

Chander and Singh (2003) in their study identified four aspects of constraints in adoption of IMP practices viz. technological constraints, economical constraints, services, supply and marketing constraints and transfer of technology constraints. They also opined that economical constraints faced by the farmers at "most serious" level.

Uddin (2004) in his study identified five aspect of constraints in commercial cultivation of vegetables viz. seed constraints, disease and insect infestation constraints, field management constraints, marketing of vegetable constraints and extension work constraints. Among these aspects of constraints he revealed disease and pest infestation constraints severely faced by the farmers.

Arya and Shah (1984) conducted a study in the mid-Himalayan region of Uttar Pradesh of India to find out the existing and potential level of food production and the main constraints on the adoption of new technology for rainfed agriculture. The main findings were (i) small and skewedly distributed holdings; (ii) fragmented and scattered holdings; (iii) shortage of labour; (iv) lack of availability of inputs and funds; (v) lack of education, extension and training especially for women.

Faroque (1997) found that female rural youth in Bhaluka (Mymensingh) lacked cash for buying seeds, seedling and fisheries and deprived of necessary knowledge in improved vegetable cultivation. He further added that the majority of female rural youth faced very high (74%) problems.

Ismail (2001) conducted a study on farm youth of haor area of Mohangonj upazila. Study revealed that there were six top problems in rank order were (1) no arrangement of loan for the farm youth for fishery cultivation, (ii) lack of government programmes in agriculture for the farm youth, (iii) absence of loan giving agencies for establishing agricultural farm, (iv) general people face problem for fishery due to government leasing of Jalmohal, lack of government programmes for establishing poultry farm, (vi) lack of agricultural loan for the farm youth.

Pramanik (2001) made an extensive, study on the twenty-four problems of farm youth in Mymensingh villages relating to different problems in crop cultivation. Out of twenty-four problems tile top four problems in rank order were: (i) local NGO take high rate of interest against a loan, (ii) lack of agricultural machinery and tools, (iii) lack of cash and (iv) financial inability to, arrange improved seeds, fertilizers and irrigation.

Agnew *et al.* (2002) found that the adoption of Harvesting Based Practice (HBP) (specifically, lower pour rite and lower extractor fan speed balanced against harvest time) can provide an extra $100/ha to the industry. Several barriers to adoption of HBP have slowed progress. These include low sugar prices, wet

weather, orange rust disease, system of harvester payment, insufficient cane quality feedback mechanisms and physical, time and safety upon harvesting.

Halim (2003) conducted a study on constraints faced by the farmers in adopting crop diversification. The top five constraints identified of this study according to their rank order were (i) lack of storage facilities for products and seeds. (ii) high price of inputs, (iii) non-availability of credit for other crops, (iv) lack of sufficient training programme in different aspects of crop diversification and (v) most of the lands are in low lying areas and not suitable for CDP crops.

Shehrawant and Sharma (1994) found that the Indian rural youths were suffering serious economic problems and difficulty in obtaining loans from banks and other agencies. They further added that the youth faced uncertainty about the access of field corps, less price of produced crops.

Kumar *et al.* (1995) showed that the economics of improved management practices, extent of adoption of seven improved management activities by crop, and investigates major constraints to adoption. The sample consisted of 25 farmers from all adopted village for technology transfer and 25 farmers from non-adopted villages. Adoption of improved management practices, though cost intensive, provided higher yield and income levels than traditional farming practices. The level of adoption of improved management practices was higher in the adopted village than the non-adopted village. High input prices and low market prices for output were the major constraints experienced by farmers in both adopted and non-adopted villages.

Rahman (1995) in his study, identified farmers' faced problems in cotton cultivation. Non-availability of quality seed in time, unfavourable and high cost of fertilizer and insecticides, lack of operating capital, not getting fair weight and reasonable price according to grade, affects of cattle in cotton field, lack of technical knowledge, lack of storage facility, stealing from field at maturity stage, and late buying of raw cotton by Cotton Development Board wait identified as major problems of cotton farmers in Mymensingh district.

Raha *et al.* (1986) identified some common problems of cotton cultivation as perceived by the farmers in Bangladesh. Those were: lack of suitable land, lack of irrigation facilities, shortage of labour, shortage of cash money, lack of technical knowledge, lower price of cotton, and non-availability of seed, insecticides and fertilizers. production technology were all irregular and insufficient electricity supply, small size of holding for green manuring, intercrops not convenient due to weeds, high cost of farm fuel, scare irrigation facilities, absence of location specific recommendations for earthing up, lack of drought resistant varieties and lack of technical knowledge about plant protection and chemical fertilizers.

Ramachandran and Sripal (1990) identified different constraints in adoption of dry land technology for rainfed cotton in Kainaraj district, Tamilnadu, India. They found that farmers' faced constraints were insufficient rainfall, susceptibility of pest and diseases, lack of experience, presence of modern plants, chemicals not available in time, lack of knowledge, insufficient livestock, risk due to failure of monsoon, high cost etc.

Freeman and Breth (1994) conducted a study on issues in African Rural Development Study showed several constraints in farming practices such as intensified land use, fallow periods decline and crop cultivation spreads into marginal or ecologically fragile lands. In the absence of appropriate resource management technologies, these practices inevitably lead, to degradation of the resource base with important implications for soil productivity, household food security and rural poverty.

Gumisiriza *et al.* (1994) showed several constraints, (traditional fanning practices, unavailability or lack of improved cultivars, information and technology transfer, rusts and foliar disease ineffective communication between research stations and research priorities in Uganda).

2.3 Review of past studies on the relationship between the selected characteristics of the T-aman farmers and their problems exploration

2.3.1 Experience in T-aman cultivation and problem exploration

The researcher could not find any literature involving relationship between experience in T-aman cultivation and problem confrontation of the farmers.

2.3.2 Educational level and problem exploration

Akanda (1993) in his study found that education of the farmers had significant negative relationships with problem confrontation of the farmers in cultivating Mukta (BR11) rice in three aspects i.e.; (a) using quality seed (b) using recommended fertilizers (c) taking plant protection measures.

Hasan (2005) in his study found that there was no relationship between education of the farmers and their problem confrontation in crop production activities.

Hoque (2001) found a significant negative relationship between education and problem confrontation of the FFS farmers in practicing IPM.

Haque (1995) in his study on problem confrontation of the farmers of Mohila Bittaheen Samabaya Samittee working under the Bangladesh Rural Development Board found a significant negative relationship between education of members and their problem confrontation. Similar findings were obtained by Mansur (1989). Rahman (1995), Rahman (1996), Faroque (1997), Pramanik (2001).

2.3.3 T-aman cultivation area and problem exploration

Hasan (2005) in his study found that there was no relationship between farm size of the farmers and their problem confrontation in crop production activities.

Uddin (2004) found that farm size of the farmers was negatively related with their constraints. Alam (2003) found similar result in his study.

Hoque (2001) revealed that significant positive relationship between farm size and problem confrontation of the FFS farmers in practicing IPM.

2.3.4 Extension media contact and problem exploration

Akanda (1993) in his study found that extension media contact of the farmers had significant negative relationships with problem confrontation of the farmers in cultivating Mukta (BR11) rice in three aspects namely, (a) using quality seed (b) using recommended fertilizers (c) taking plant protection measures.

Akanda (2005) reported that there was significant positive relationship between communication exposure and technological gap in cultivating transplanted modern aman rice.

Hasan (2005) in his study found that there was no relationship between Extension contact of the farmers and their problem confrontation in crop production activities.

Rahman (1995) in his study conducted that extension contact of the farmer had significant negative relationship with their problem confrontation in cotton cultivation. Similar findings were obtained by Rahman (1996), Faroque (1997), Pramanik (2001), Hossain (2002), Bhuiyan (2002), Ahmed (2002), Salam (2003) and Halim (2003) their respective studies.

The study of Ismail (2001) revealed that there was no significant relationship between farm youths' extension contact and their agricultural problem confrontation. Similar findings were obtained by Raha (1989) and Hoque (2001) in their respective studies.

2.3.5 Training Exposure and problem exploration

The researcher could not find any literature involving relationship between training exposure and problem confrontation of the farmers. But the findings of the study of Akanda (2005) can be cited here. The findings revealed that training experience of the farmers had significant negative relationship with technological gap in transplanted modern rice cultivation at farmers' level.

2.3. Annual expenditure and problem exploration

The researcher could not find any literature involving relationship between farming & living expenditure and problem confrontation of the farmers. But a study conducted by Akanda (2005) to find out the relationship between farming expenditure of the farmers and technological gap in three dimensions viz. knowledge gap, skill gap and practice gap in transplanted modern rice cultivation at farmers' level. The findings indicated that there was no significant relationship between farming experience and each of the three dimensions viz. knowledge gap, skill gap and practice gap of technological gap in transplanted modern rice cultivation at farmers' level.

2.3.7 Commercialization and problem exploration

The researcher could not find any literature involving relationship between commercialization and problem confrontation of the farmers.

2.3.8 Innovativeness and problem exploration

Akanda (1993) reported that innovativeness of the farmers had significant negative relationship with problem confrontation of the farmers cultivating Mukta (BR11) rice in each of the three aspects namely, (a) using quality seed (b) using recommended fertilizers (c) taking plant protection measures.

Rahman (1995) in his study found that innovativeness of the farmers had no significant relationship with their problem confrontation in cotton cultivation. Similar findings were obtained by Rashid (1999) in their respective studies.

Salam (2003) in his study found that innovativeness of the farmers had significant negative relationship with their problem confrontation in adopting environmentally friendly farming practices.

Mansur (1989) showed that innovativeness of the farmers had a significant negative relationship with their problem confrontation in feeds and feeding cattle. Similar findings were obtained by Ali (1978), Saha (1983), Sarker (1983), Ismail

(2001), Pramanik (2001), Hossain (2002) and Halim (2003) in their respective studies.

2.3.9 Decision making ability and problem exploration

The researcher could not find any literature involving relationship between decision making ability and problem confrontation of the farmers.

2.3.10 Agricultural knowledge and problem exploration

Akanda (1993) reported that agricultural knowledge of the farmers had significant negative relationship with problem confrontation of the farmers cultivating Mukta (BR11) rice in each of the three aspects namely, (a) using quality seed (b) using recommended fertilizers (c) taking plant protection measures.

Raha (1989) in a study on poultry problem confrontation reported that the relationship between poultry knowledge and poultry problem confrontation was negative. He reported from his study that farmer's knowledge in irrigation of modern boro rice had no significant relationship with their irrigation problem confrontation. Anwar (1994), Karim (1996), Rashid (1999), Ismail (2001), Salam (2003), and Rashid (2003) found similar findings in their respective studies.

Mansur (1989) found in his study that there was a substantial significant negative relationship between knowledge in feeds and feeding cattles of the farmer and their problem confrontation in feeds and feeding. Similar findings were obtained by Sarker (1983), Rahman (1996), Hoque (2001), Hossain (2002) and Ahmed (2002) in their respective studies.

The study of Ali (1999) revealed that knowledge of the rural youth had significant positive relationship with their anticipated problem confrontation in self employment by undertaking selected income generating activities.

2.4 Conceptual Framework of the study

In scientific research, selection and measurement of variables constitute an important task. The hypothesis of a research while constructed properly consist at least two important elements i.e.: a dependent variable and an independent variable. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. Variables together are the causes and the phenomenon is effect and thus, there is cause effect relationship everywhere in the universe.

The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while making structural arrangements for the dependent and independent variables. This study is concerned with the farmers' problem faced in T-aman cultivation because of flood. Thus, exploration of problems of the farmers was the dependent variable and 10 selected characteristics of the farmers were considered as the independent variables. Problems of the farmers in T-aman cultivation due to flood of an individual may be affected through interacting forces of many independent variables. It is not possible to deal with all independent variables in a single study. It was therefore, necessary to limit the independent variables, which include: experience in T-aman cultivation, educational level, T-aman cultivation area, extension media contact, training exposure, annual expenditure, commercialization, innovativeness, decision making ability and farmers' knowledge on T-aman cultivation in flooding condition.

Again, in order to have a clear understanding of the nature of farmers' problem, the dependent variable was considered from the view of several numbers of dimensions of problems. These dimensions included: (1) fully damaged field requires re-transplantation, (2) gap filling is required in case of partly damaged field, (3) extra weeding is required in severe weed infested fields which are affected by flood, (4) extra crop protection measures are required as flood affected fields are highly infected by pests and diseases, (5) removal of damaged residues

and management of the field over which flood water sweeps are more complicated, (6) shortage of seeds and seedlings in case of after flood condition, (7) unavailability of labor after flood, (8) shortage of fertilizers and pesticides, (9) lack of quality seedlings for second time transplanting and gap filling, (10) unavailability of late improved and flood tolerant or resistant varieties of T-aman, (11) high price of seeds and seedlings after flood, (12) high price of labor, fertilizers and pesticides, (13) lease rate is very high of the upland seedbed available in nearer territory, (14) credit unavailability to cope with flood situation and Complexity in receiving credit and (15) poor yield in the flood affected field.

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

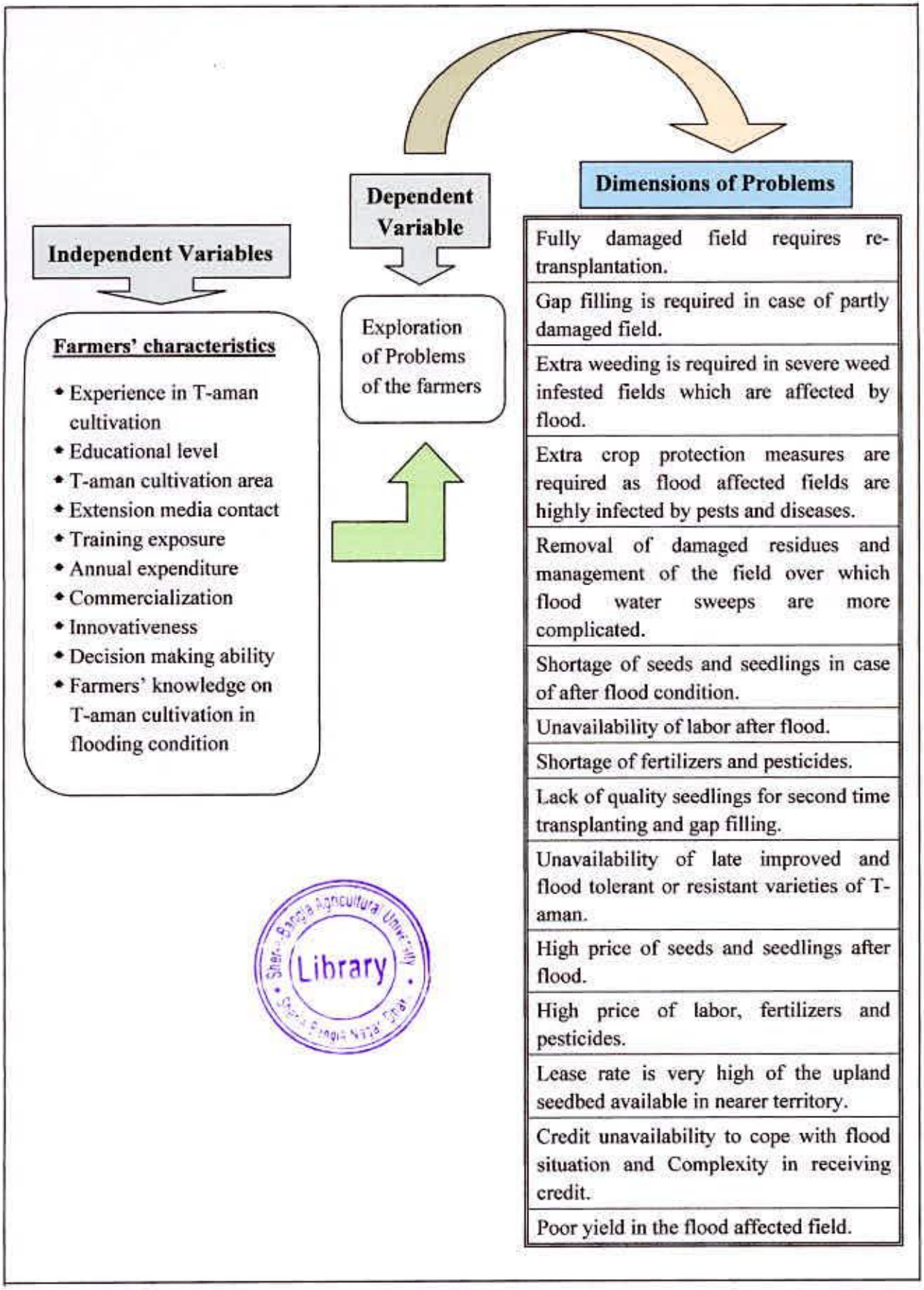


Figure 2.1 Conceptual framework of the study

CHAPTER 3

METHODOLOGY

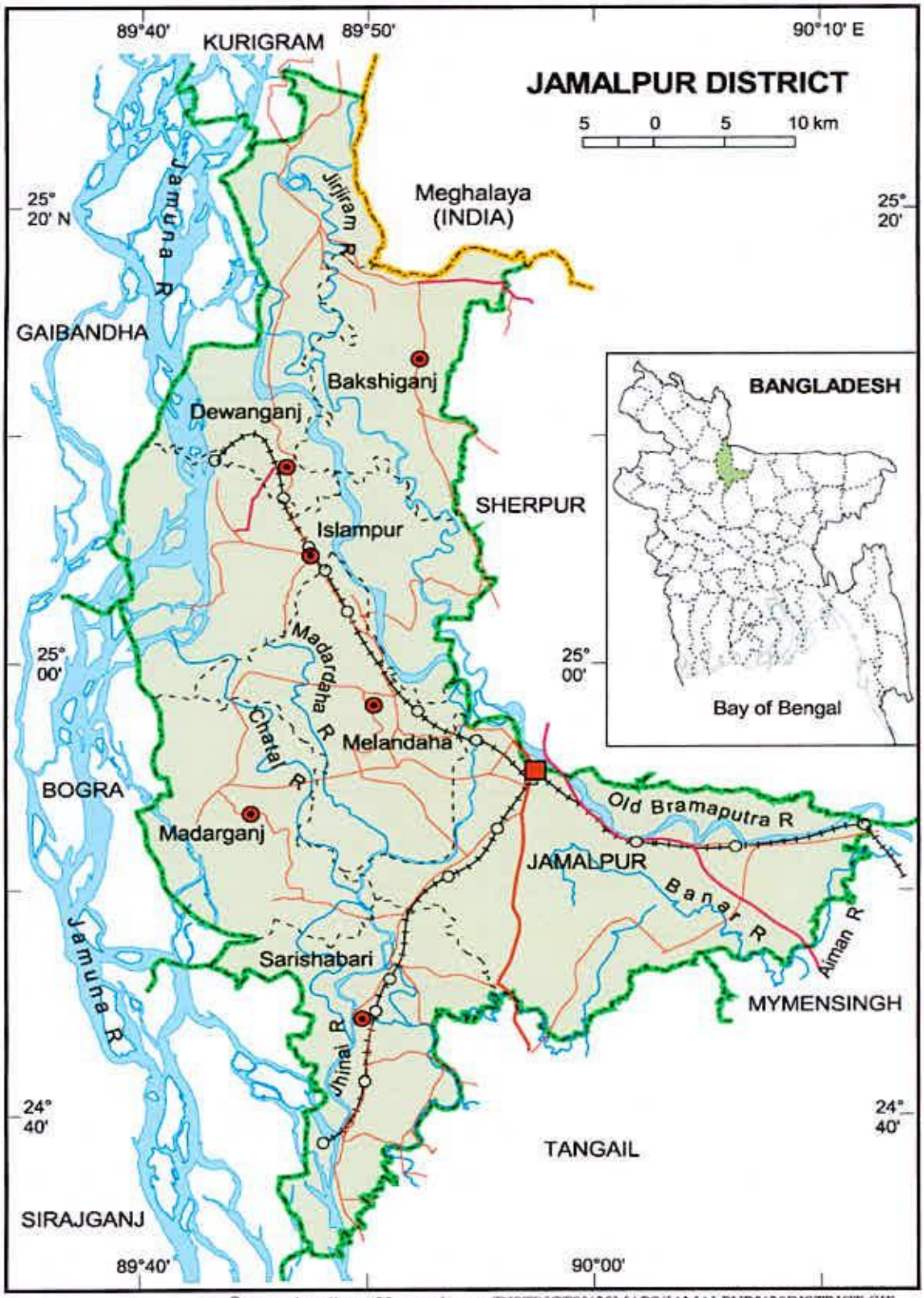
Methodology would be enabling the researcher to collect valid information. It is impossible to conduct research work smoothly without proper methodology and it is very difficult to address the objectives with a scientific manner. It requires a very careful consideration on the part of the researcher to collect valid and reliable data and to analyze the same for meaningful conclusion. A sequential description of the methodologies followed in conducting this research work has been presented in this chapter.

3.1 Locale of the Study

The study was conducted in the Adarvita Union of Madargonj Upazilla under Jamalpur District. This union is situated 25 km south-west from Jamalpur District head quarter. Patadaha and Gojaria villages under Adarvita union of Madargonj Upazilla were selected randomly as the locale of the study. The villages are situated near the river of Jamuna. Every year flood occurs in these villages and causes human sufferings and damages crops. No previous study was conducted in this area on farmers' problems in T-aman cultivation due to flood. To bring the area in the light of nation's concern it was selected as the locale of the study. Maps of Jamalpur District and Madargonj Upazilla showing the study areas are presented in Figures 3.1 and 3.2 respectevily.

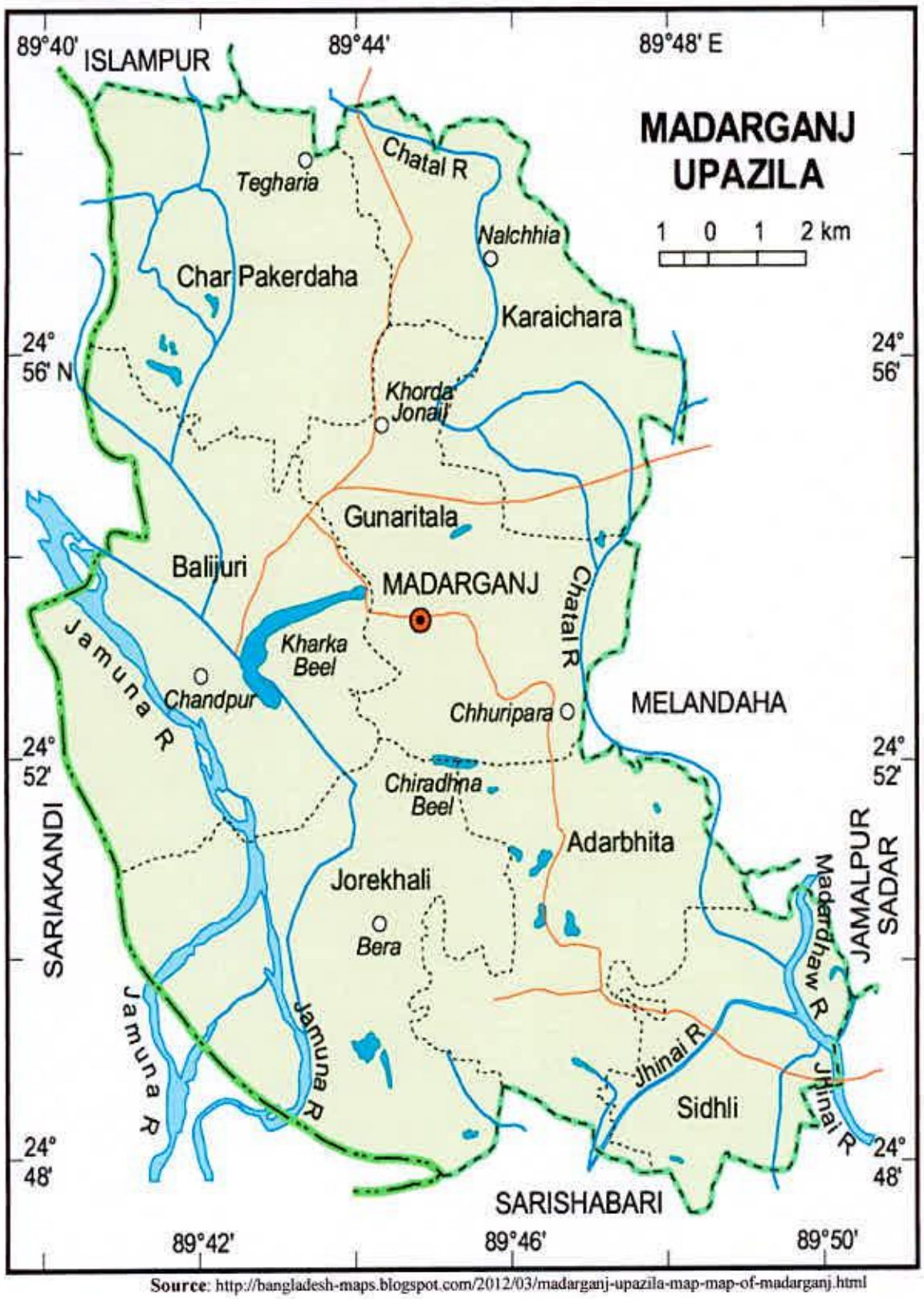
3.2 Population and Sample

T-aman farmers of Patadaha and Gojaria villages under Adarvita union constituted the population of the study. An update list of 1254 T-aman cultivators from the selected villages was prepared with the help of Sub-Assistant Agricultural Officers of the study areas. Ten (10) percent of the populations were proportionately and randomly selected as the sample of the study by using random sampling method. Thus, 125 T-aman cultivators constituted the sample of the study. A reserve list of 13 T-aman cultivators was also prepared by the same method so that the respondents of this list could be used for interview if the



Source: http://zesun35geo.webs.com/DISTRICTS%20MAPS/JAMALPUR%20DISTRICT.GIF

Figure 3.1 Map of Jamalpur District showing Madargonj Upazilla



Source: http://bangladesh-maps.blogspot.com/2012/03/madarganj-upazila-map-map-of-madarganj.html

Figure 3.2 Map of Madargonj Upazilla Showing the Study Area Adarvita Union

respondents included in the original sample were not available at the time of data collection. The distribution of the population sample and number of T-aman cultivators in the reserve list are given in Table 3.1.

Table 3.1 Distribution of the sample population and number of T-aman farmers in the reserve list

Name of the of village	No. of T-aman farmers	No. of T-aman farmers included in the sample	No. of T-aman farmers in the reserve list
Patadaha	711	71	7
Gojaria	543	54	6
Total	1254	125	13

3.3 The Research Instrument

A well structured interview schedule was developed based on objectives of the study for collecting information. An interview schedule was constructed containing direct and simple questions in open form and close form keeping in view the dependent and independent variables. Appropriate scales were developed to measure both independent and dependent variables.

The interview schedule was pre-tested with ten T-aman cultivators in actual situation before finalized it for collection of data. Necessary corrections, additions, alternations, rearrangements and adjustments were made in the interview schedule based on pretest experience. The interview schedule was then multiplied by printing in its final form. A copy of the interview schedule is presented into Appendix-A.

3.4 Measurement of Variables

The variable is a characteristic, which can assume varying, or different values in successive individual cases. A research work usually contains at least two important variables viz. independent and dependent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes

or varies the independent variable (Townsend, 1953). 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. At last he had selected 10 independent variables and one dependent variable. The independent variables were: experience in T-aman cultivation, educational level, T-aman cultivation area, extension media contact, training exposure, annual expenditure, commercialization, innovativeness, decision making ability and farmers' knowledge on T-aman cultivation in flooding condition. The dependent variable of this study was exploration of problems of the farmers. The methods and procedures in measuring these variables are presented below:

3.4.1 Measurement of Independent Variables

The 10 characteristics of the respondents T-aman cultivators mentioned above constitute the independent variables of this study. The following procedures were followed for measuring the independent variables.

3.4.1.1 Experience in T-aman cultivation

Experience in T-aman cultivation of a respondent was measured by the period of time from the time he/she started to cultivate T-aman rice to the time of interview and it was measured in terms of completed years on the basis of their response. A score of one (1) was assigned for each year of cultivation. Question(s) regarding this variable appear in the item no. 1 in interview schedule as presented in Appendix-A.

3.4.1.2 Educational level

Level of education was measured in terms of grades (class) passed by respondent T-aman cultivator. If a respondent received education from the school, their education was assessed in terms of year of successful schooling, i.e. one (1) score was given for one year of schooling. For example, if a respondent passed the final examination of class V, his/her education score was taken as 5. If the respondent had education outside school and the level of education was equivalent to that of

class V of the school than his education score was taken as 5. Each illiterate person was given a score of zero. The respondent who did not know how to read or write but able to sign his/her name only was given a score of "0.5". Question(s) regarding this variable appear in the item no. 2 in interview schedule as presented in Appendix-A.

3.4.1.3 T-aman cultivation area

T-aman cultivation area of a respondent referred to the total area of land on which he/she cultivate T-aman rice in the last Aman season and the area being estimated in terms of full or partial benefit to his/her family. It was expressed in hectares for each respondent. The data were first recorded in terms of local unit i.e; *bigha, katha or pakhi* and then were converted to hectare. Question(s) regarding this variable appear in the item no. 3 in interview schedule as presented in Appendix-A.

3.4.1.4 Extension media contact

The researcher selected three broad extension media contact namely, personal media contact, group media contact and mass media contact comprising of fourteen media in total. The researcher selected the following media of information for studying extension media contact of the respondent farmers:

Personal media contact: Local leaders, neighbors, input dealers (fertilizer, pesticide, and seed), NGO workers, Sub-Assistant Agriculture Officer, Upazila level Agricultural Officers.

Group media contact: Group discussion, method demonstration and result demonstration.

Mass media: Listening agriculture related programs in radio, watching agriculture related programs in television, reading daily newspapers, farm publications (e.g. Leaflet, poster, bulletin, etc.) and visiting agricultural fairs.

So, extension media contact score was measured by adding personal media contact score, Group media contact score and Mass media contact score.

The extension media contact of the respondent farmers was measured on the basis of their opinions regarding the extent of use/visit the selected media in receiving information on problems in T-aman cultivation due to flood during the immediate past year. Hence, the use of each of the fourteen extension media contact was first ascertained by computing their using score. A four point scale was used to compute the extension media contact. Logical frequencies were considered for each alternative response for each item. Then the extension media contact score of a respondent for the fourteen extension media contact were added together to ascertain his/her total score in extension media contact. In this regard weight was assigned to each of the four types of responses provided by the respondent farmers in the following manner:

Responses	Weight
Frequently	3
Occasionally	2
Rarely	1
Not at all	0

Thus, the extension media contact score of a respondent could range from '0' to 42 where '0' indicate no extension media contact and 42 indicate highest extension media contact. Question(s) regarding this variable appear in the item no. 4 in interview schedule as presented in Appendix-A.

3.4.1.5 Training exposure

Training exposure score of a respondent farmer was obtained by the number of days that a respondent had received training in his or her entire life. A score of one (1) was assigned for each day of training attended. It was indicated by the total number of days of training received by a respondent under different training programs. Question(s) regarding this variable appear in the item no. 5 in interview schedule as presented in Appendix-A.

3.4.1.6 Annual expenditure

Annual expenditure referred to the total expenditure of the total members of a farm family and agricultural production. One score was given for each thousand taka of expenditure. Question(s) regarding this variable appear in the item no. 6 in interview schedule as presented in Appendix-A.

3.4.1.7 Commercialization

Commercialization score of a T-aman farmer was determined on the basis of value of crops sold out of the total value of crops raised. The following formula was followed in computing the commercialization score of a farmer as developed by Karim and Mahboob (1974) and used by Ali (2008):

$$\text{Commercialization score} = \frac{\text{Value of sold crops}}{\text{Total value of raised crops}} \times 100$$

Question(s) regarding this variable appear in the item no. 7 in interview schedule as presented in Appendix-A.

3.4.1.8 Innovativeness

Innovativeness is the degree to which an individual adopts an innovation relatively earlier than other members in a social system (Rogers, 1983). Here, innovativeness of a respondent was measured on the basis of the adoption of ten agricultural technologies by the respondents. A five point scale was used to compute the extension media contact. The score was assigned on the basis of time dimension which means actual number of years through which a respondent used the technology continuously. The scoring was done in the following manner:

Adoption period	**Assigned score**
Never used	0
Used after 4 years	1
Used within 2 to 3 years	2
Used within 1 to 2 years	3
Used within 1 years	4

Thus, the innovativeness score of a respondent was obtained by adding his/her scores for all the ten items and it could range from '0' to 40 where '0' indicated no innovativeness and 40 indicated highest innovativeness. Question(s) regarding this variable appear in the item no. 8 in interview schedule as presented in Appendix-A.

3.4.1.9 Decision making ability

Decision making ability of a respondent was measured by using a four point rating scale developed by Ali (2008) with slight modification. Each respondent was asked to indicate the extent of his/her decision making ability in each of the five selected items by checking any one of the responses viz. 'Able to make decision by own', 'Able to make decision with the family members', 'Able to make decision with the neighbors and local leaders', and 'Able to make decision with the highly educated or extension personnel'. The weights were assigned to the responses as 4, 3, 2 and 1 for decision making by own, with the family members, with the neighbors and local leaders, with the highly educated or extension personnel respectively. Finally, decision making ability score of a respondent was computed by summing up his all the scores for his/her responses to all the items. Thus, decision making ability scores of the respondents could range from 5 to 20, where 5 indicated very low decision making ability and 20 indicated very high decision making ability. Question(s) regarding this variable appear in the item no. 9 in interview schedule as presented in Appendix-A.

3.4.1.10 Farmers' knowledge on T-aman cultivation in flooding conditions

Knowledge on T-aman cultivation in flooding conditions referred to the knowledge gained by the farmers in T-aman cultivation in the flood season. Twelve questions on different aspects of flooding conditions related to season, causes, cropping pattern, merits, demerits and twelve more questions on different aspects of T-aman cultivation related to varieties, soil, fertilizer, insect, pest, disease and cultural practices were asked to the T-aman cultivators to ascertain their knowledge score. The score was assigned as 2 for full correct answer and zero (0) for incorrect or no answer for each question. Partial score was assigned

for partial correct answer. Thus, the knowledge scores of the respondents could range from '0' to 48 where zero (0) indicated very low and 48 indicated highest knowledge on T-aman cultivation in flooding condition. Question(s) regarding this variable appear in the item no. 10 in interview schedule as presented in Appendix-A.

3.4.2 Measurement of Dependent Variable

Exploration of problems of the farmers in T-aman cultivation due to flood was the dependent variable of this study. The procedure for measuring the dependent variable was as follows:

The researcher categorized the problems of the T-aman farmers in flooding conditions in three different aspects i.e; field management problem, inputs availability problem and economic problem. Each section comprises five problem statements related to T-aman cultivation in flooding season. A four point rating scale was used to determine the extent of problems. Each of the statements was open ended. The assigned score was as follows:

Extent of the problem	Assigned score
Severe problem	3
Moderate problem	2
Little problem	1
Not at all	0

The problem score of a farmer was computed by adding all scores obtaining by him/her on 15 items. The total score of a farmer could range from 0 to 45, while 0 indicated no problem and 45 indicated highest problem in T-aman cultivation due to flood.

Problem Faced Index (PFI):

For clearer understanding of problems of farmers, index for each item along with rank order was computed by using the following formula:

Problem Faced Index (PFI) = $P_n \times 0 + P_l \times 1 + P_m \times 2 + P_s \times 3$

Where,

P_n = Percentage of farmers faced no problem in T-aman cultivation due to flood

P_l = Percentage of farmers having little problem in T-aman cultivation due to flood

P_m= Percentage of farmers having moderate problem in T-aman cultivation due to flood

P_s = Percentage of farmers having serious problem in T-aman cultivation due to flood

Problem Faced Index (PFI) for any one of the selected dimensions could range from "0" to 300, where "0" indicated no problem faced and 300 indicated highest problem faced.

3.5 Hypothesis of the Study

In the present study the following null hypotheses were formulated:

"There are no relationships between the problems faced by the farmers in T-aman cultivation due to flood and each of their 10 selected characteristics".

3.6 Data Collection Procedure

The researcher himself collected data with the help of an interview schedule from the sample respondents through face to face interview during the pre-scheduled leisure period of respondent at his/her house or field. The researcher established desired rapport with the respondents so that they did not feel any hesitation at the time of interview. Whenever any respondent faced difficulty in understanding questions, more attention was taken to explain the same with a view to enabling the cultivators to answer properly. No serious problem was faced by the investigator during data collection but obtained cooperation from the respondents. Data collection was started in 08 March, 2011 and completed in 31 March, 2011.

3.7 Data processing

For data processing the following steps were followed:

3.7.2 Compilation and coding of data

After completion of field survey all the interview schedule were compiled, tabulated and analyzed according to the objectives of the study. In this process all the responses in the interview schedule were given numerical coded values. The responses to the question in the interview schedule were transferred to a master sheet to facilitate tabulation. Tabulation was done on the basis of categories developed by the investigator himself.

3.7.2 Categorization of respondents

For describing the various independent and dependent variables the respondents were classified into various categories. In developing categories the researcher was guided by the nature of data and general consideration prevailing on the social system. The procedures have been discussed while describing the variable in the sub-sequent sections of next chapter.

3.8 Statistical Analysis of Data

Data collected from the respondents were complied, coded, tabulated and analyzed in accordance with the objectives of the study. Various statistical measures such as frequency counts, percentage distribution, average, and standard deviation were used in describing data. SPSS (version 11.5) computer program were used for analyzing the data. The categories and tables were used in describing data. The categories and tables were also used in presenting data for better understanding.

For determining the association of the selected characteristics of the T-aman farmers with their problems in T-aman cultivation due to flood, Pearson's Product Moment Correlation was used. Five percent (0.05) level of probability was used as the basis for rejecting any null hypothesis. In order to find out the relationship between the selected dependent and independent variables correlation co-efficient (r) was done.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter deals with the findings that were recorded in accordance with the objective of the study with the help of an interview schedule with interpretation. The chapter contains four (4) sections. The first section of this chapter deals with the characteristics of the farmers. The second section deals with their problems in T-aman cultivation at the time of flood. The third section deals with the relationship between selected characteristics of the farmers with their problems faced in T-aman cultivation due to flood. The last section deals with the comparative severity among the problems faced by the farmers in T-aman cultivation due to flood.

4.1 Characteristics of the farmers

Actually, there are various interrelated and constituent attributes that are characterized on individual and form an integral part of farmers' livelihood. However, the 10 selected characteristics of the farmers such as experience in T-aman cultivation, educational level, T-aman cultivation area, extension media contact, training exposure, annual expenditure, commercialization, innovativeness, decision making ability and farmers' knowledge on T-aman cultivation in flooding condition that greatly influences the problems in T-aman cultivation at the time of flood are presented below:

4.1.1 Experience in T-aman cultivation

The experience of T-aman cultivators ranged from 7 to 48 score against the possible range of zero (0) to unknown score with a mean and standard deviation of 21.47 and 8.93 respectively. Considering the observed scores of experience in T-aman cultivation, the farmers were classified into three categories namely 'low', 'medium' and 'high' experienced. The distribution in accordance of their experience, the respondent T-aman cultivators are presented in Table 4.1.

Table 4.1 Distribution of the T-aman farmers according to their experience in T-aman cultivation

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low experienced (below 15 years)	21	16.8	21.47	8.93
Medium experienced (15-30 years)	91	72.8		
High experienced (above 30 years)	13	10.4		
Total	125	100		

Table 4.1 indicates that the medium experienced T-aman cultivators comprise the highest proportion (72.8 percent) followed by low experienced category (16.8 percent) and the lowest proportion were made by the high experienced category (10.4 percent). Data also indicates that the low and medium experienced T-aman cultivators constitute about 89.6 percent of the respondents.

Those farmers who possess agriculture occupation for a long duration he gains a lot of experience. Experience leads the farmers how to face and mitigate problems in different aspects. The lower and medium experienced farmers were generally tended to take risk oriented decisions. Now-a-days farmers take alternative occupations as a result they lost their agricultural knowledge and experiences. Thus, extension agencies should provide rehabilitation through offering practical training to them.

4.1.2 Educational level

The level of educational scores of the respondent farmers ranged from 0 to 15 score with a mean and standard deviation of 4.15 and 3.53, respectively. Based on their educational scores, the farmers were classified into five categories such as 'illiterate' (0), 'can sign only' (0.5), 'primary education' (1 to 5), 'secondary education' (6 to 10) and 'above secondary education' (above 10). The distribution of the farmers according to their level of education has been presented in Table 4.2.

Table 4.2 Distribution of the T-aman farmers according to their educational level

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Illiterate (0)	13	10.4	4.15	3.53
Can sign only (0.5)	24	19.2		
Primary education (1-5)	53	42.4		
Secondary education (6-10)	28	22.4		
Above secondary education (above 10)	7	5.6		
Total	125	100		

Table 4.2 shows that farmers under 'primary education category constitute the highest proportion (42.4 percent) compared to 22.4 percent secondary level category, 19.2 percent can sign only and 10.4 percent illiterate level category. On the other hand the lowest 5.6 percent belongs to above secondary level category. Education broadens the horizon of outlook of farmers and expands their capability to analyze any situation related to production.

Education is the process of developing the mind of an individual and it increases his power of observation, analysis, integration, understanding, decision-making and adjustment to new situations. It helps individual to become rational, conscious and to get useful information to solve their every day working problem. Educated farmers may get useful information through reading leaflets, booklets, books, newspapers and other printed materials (Islam 2004). Education broadens the power of understanding and develops the ability of analyzing facts and situation to take rational decision. The findings of this study, however, indicate that 10.4 percent of the farmers had no schooling and 19.2 percent of the farmers can sign only, who are supposed to face a great difficulty in adjusting with the unfavorable condition regarding in T-aman cultivation at the time of flood. Such consideration indicates the need for improving literacy level among the farmers for adjusting the adverse condition in flooding season.

4.1.3 T-aman cultivation area

The T-aman cultivation area of the respondents' farmer family ranged from 0.21 hectare to 2.03 hectare with a mean and standard deviation of 0.84 and 0.44 respectively. Based on their T-aman cultivation area, the respondents were classified into three categories viz., small T-aman cultivation area (below 0.80 ha), medium T-aman cultivation area (0.81 to 1.50 ha) and large T-aman cultivation area (above 1.50 ha). The distribution of the farmers according to their T-aman cultivation area has been presented in Table 4.3.

Table 4.3 Distribution of the farmers according to their T-aman cultivation area

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Small T-aman cultivation area (below 0.80 ha)	64	51.2	0.84	0.44
Medium T-aman cultivation area (0.81 to 1.50 ha)	44	35.2		
Large T-aman cultivation area (above 1.50 ha)	17	13.6		
Total	125	100		

Table 4.3 indicates that the small farm holder constitutes the highest proportion (51.2 percent) followed by 35.2 percent with medium farm holder and the lowest 13.6 percent were large farm holder in case of T-aman cultivation. The findings of the study reveal that majority (86.4 percent) of the farmers have small to medium sized T-aman cultivation area. Therefore, it could be said that the choice of T-aman cultivation regarding the farming practices in the study area was expected to be considerably influenced by the small and medium farmers.

4.1.4 Extension media contact

The extension media contact of the respondents' farmers ranged from 8 to 25 score against the possible range of zero (0) to 42 score with a mean and standard deviation of 16.36 and 4.05 respectively. Based on their extension media contact

score, the respondents were classified into three categories. These categories were low, medium and high extension media contact. The distribution of the respondents according to their extension media contact has been presented in Table 4.4.

Table 4.4 Distribution of the farmers according to their extension media contact

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low contact (below 16)	49	39.2	16.36	4.05
Medium contact (16-24)	71	56.8		
High contact (above 24)	5	4.0		
Total	125	100		

Table 4.4 indicates that the farmers have medium extension media contact category constitute the highest proportion (56.8 percent) followed by low contact (39.2 percent) and high contact category (4 percent). Table 4.4 showed that the maximum percentage (96 percent) is the category of the group of low to medium extension media contact group. It could be concluded that information crisis phenomenon exists in the study area. It was due to lower rate of literacy level, backward infrastructural communication facilities and lower level of socio-economic status of majority of the respondents. Rokanuzzaman (2004) also found similar kind of results in his study. So, concerned extension agencies (both GOs and NGOs) should give more attention to appropriate media sources to increase media contact to the T-aman cultivating farmers for reducing various problems in the study area.

4.1.5 Training exposure

Training exposure of the respondent's farmers ranged from 0 to 8 score with a mean and standard deviation of 2.16 and 1.99 respectively. Based on their training exposure score, the respondents were classified into three categories. These categories were low and medium training exposure. The distribution of the respondents according to their training exposure has been presented in Table 4.5.

Table 4.5 Distribution of the farmers according to their training exposure

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low training exposure (below 5)	109	87.2	2.16	1.99
Medium training exposure (≥5)	16	12.8		
Total	125	100		

Data in Table 4.5 indicates that 87.2 percent of the respondents were in low training exposure group and while remaining 12.8 percent had medium training exposure only. Training helps the farmers to acquire deep knowledge and improve skills about the respected aspects. Trained farmers can cope and handle smoothly the adverse situation in crop cultivation. The findings of this study, however, indicate that 87.2 percent of the farmers had low training exposure and 12.8 percent of the farmers had medium training exposure, who is supposed to face a great difficulty in adjusting with the unfavorable condition regarding in T-aman cultivation at the time of flood.

4.1.6 Annual expenditure

Annual expenditure of the respondent farmers was expressed in Taka and unit score of one (1) was used for each Tk. 1000. The respondents' annual expenditure were ranged from 61 to 186 score against with a mean and standard deviation of 104.56 and 26.68 respectively. On the basis of the annual expenditure the respondents were classified into three categories namely 'low expenditure' (below 90), 'medium expenditure' (90-150) and 'high expenditure' (above 150). The distribution of the respondents according to their annual expenditure has been presented in Table 4.6.

Table 4.6 Distribution of the farmers according to their annual expenditure

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low expenditure (below 90)	35	28	104.56	26.68
Medium expenditure (90-150)	80	64		
High expenditure (above 150)	10	8		
Total	125	100		

Data presented in Table 4.5 indicate that the highest proportion (64 percent) of the respondents had low annual expenditure while 28 percent and 8 percent had medium and high expenditure respectively. So the study findings show that all most all (92 percent) of the respondents in the study area had low to medium annual expenditure. Annual expenditure is associated with the purchasing power of an individual. Farmers who have low purchasing ability (i.e.; low and medium annual expenditure group) face more economic problems in agricultural crop cultivation. Especially in T-aman cultivation when flood damages their fields partly or fully.

4.1.7 Commercialization

Commercialization of the farmers was found to range from 26 to 76 score against the possible range of zero (0) to 100 score with a mean and standard deviation of 51.33 and 12.45 respectively. On the basis of commercialization the respondents were classified into three categories as 'low commercialization' (below 40), 'medium commercialization' (40-65) and 'high commercialization' (above 65). The distribution of the respondents according to their commercialization has been presented in Table 4.7.

Table 4.7 Distribution of the farmers according to their commercialization

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low commercialization (below 40)	27	21.6	51.33	12.45
Medium commercialization (40-65)	78	62.4		
High commercialization (above 65)	20	16.0		
Total	125	100		

Data presented in Table 4.7 indicate that the highest proportion (62.4 percent) of the respondents belonged to medium commercialization group compared to 21.6 and 16 percent low and high commercialization group respectively. Problems in cultivation could reduce commercialization of the farmers. Because problems cause low production, that is low scope to sale of products.

4.1.8 Innovativeness

The maximum innovativeness score of the respondents was 21 and the minimum was 7 score against the possible range of zero (0) to 40. However, the average was 13.93 and the standard deviation was 3.50. Based on their innovativeness scores, the respondents were classified into three categories: "low innovativeness" (below 10), "medium innovativeness" (10-18) and "high innovativeness" (above 18). The distribution of the respondents according to their innovativeness is shown in Table 4.8.

Table 4.8 Distribution of the farmers according to their innovativeness

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low innovativeness (below 10)	20	16	13.93	3.50
Medium innovativeness (10-18)	95	76		
High innovativeness (above 18)	10	8		
Total	125	100		

Data contained in table 4.8 indicate that the highest proportion (95 percent) of the T-aman cultivators had medium innovativeness as compared to 16 percent low innovativeness and only 8 percent in high innovativeness. Data also revealed that

majority (92 percent) of the respondent growers of the study area had low to medium level of innovativeness. These findings indicate that major proportion of the respondents in the study area was not adopted new idea or technology strongly. As there has been absence of farmer extension program for a long time, it is quite natural that farmer lives with traditional farming knowledge and skill. The innovativeness of farmers develops quality as they are exposed to new technology. So low and sloth diffusion of innovation keep them under-developed individuals.

4.1.9 Decision making ability

Decision making ability of the farmers was found to range from 7 to 19 score against the possible range of 5 to 20 score with a mean and standard deviation of 12.80 and 2.89 respectively. On the basis of decision making ability the respondents were classified into three categories as 'low decision making ability' (below 10), 'medium decision making ability' (10-16) and 'high decision making ability' (above 16). The distribution of the respondents according to their decision making ability has been presented in Table 4.9.

Table 4.9 Distribution of the farmers according to their decision making ability

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low decision making ability (below 10)	18	14.4	12.80	2.89
Medium decision making ability (10-16)	96	76.8		
High decision making ability (above 16)	11	8.8		
Total	125	100		

Data contained in table 4.8 indicate that majority (76.8 percent) of the respondents had medium decision making ability, while 14.4 and 8.8 percent had low and high decision making ability respectively. An individual's decision making ability is a crucial criterion to face the problem. It leads the farmer how and which way he/she handle the faced problem. The data revealed that an overwhelming majority (91.2 percent) of the respondent farmers had low to medium decision making ability.

4.1.10 Farmers' knowledge on T-aman cultivation in flooding condition

Farmers' knowledge on T-aman cultivation in flooding condition score of the respondents was found to range from 14 to 38 against a possible range from zero (0) to 48. The average score was 25.58 with a standard deviation of 4.94. Based on the score of farmers' knowledge on T-aman cultivation in flooding condition the respondents were classified into three categories as 'low knowledge' (below 10), 'medium knowledge' (10-16) and 'high knowledge' (above 16). The distribution of the respondents according to their knowledge on T-aman cultivation in flooding condition has been presented in Table 4.10.

Table 4.10 Distribution of the farmers according to their knowledge on T-aman cultivation in flooding condition

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low knowledge level (below 24)	40	32	25.58	4.94
Medium knowledge level (24-34)	81	64.8		
High knowledge level (above 34)	4	3.2		
Total	125	100		

Findings shown in table 4.10 indicate that the highest proportion (64.8 percent) of the respondents had medium knowledge on related aspects in flooding condition while 40 percent and 3.2 percent of the respondents had low and high knowledge respectively. Knowledge is to be considered as vision of an explanation in any aspect of the situation regarding T-aman cultivation in flooding condition. It is act or state of understanding; clear perception of fact or truth, that helps an individual to foresee the consequence he may have to face in future. It makes individuals to become rational and conscious about related field.

The study area of Patadaha and Gojaria villages are situated in flood prone area and every year farmers of these villages fight against flood to cultivate their T-aman rice, which is one of their two main cultivating annual crops. As a result most of the respondents had some knowledge about T-aman cultivation and

flooding condition. On the other hand most of the respondents of the area are not so educated and trained. So they do not have in depth knowledge and techniques to solve the problems arise due to flood in their T-aman cultivation.

4.2 Problems faced by the farmers in T-aman cultivation due to flood

Problems faced by the farmers in T-aman cultivation due to flood were found to range from 18 to 38 against a possible range from zero (0) to 45. The average score was 27.08 with a standard deviation of 5.80. Based on the score of problems faced in T-aman cultivation, the farmers were classified into three categories as 'low problem' (below 10), 'medium problem' (10-16) and 'high problem' (above 16). The distribution of the respondents according to their problems faced in T-aman cultivation due to flood has been presented in Table 4.11.

Table 4.11 Distribution of the farmers according to their problems faced in T-aman cultivation due to flood

Categories (Scores)	Respondents		Mean	Standard deviation
	Number	Percent		
Low problem (below 22)	26	20.8	27.08	5.80
Medium problem (22-34)	79	63.2		
High problem (above 34)	20	16.0		
Total	125	100		

Findings shown in table 4.11 indicate that the highest proportion (63.2 percent) of the respondents had medium problem in T-aman cultivation in the flooding condition, while 20.8 percent and 16 percent of the respondents had low and high problem respectively.

Exploration of problems of the farmers' in T-aman cultivation due to flood was the main focus of this study. In this study, problems faced by the farmers in T-aman cultivation due to flood represented in fifteen selected aspects. The study revealed that flooding was a big problem of the T-aman farmers. Each year they start to transplant aman seedlings with a new hope. But unfortunately, flood damages the standing crops in their fields and sometimes it repeated when the

farmers re-transplant their fields. Then they become helpless because of no seeds or seedlings, no money, no job to earn even no alternative crop they can cultivate. On the other hand partially damaged fields create more problems. They require gap filling, extra weeding, extra crop protection measures and finally lower yield has obtained after a long struggle. As, a large number of farmers of that region are suffering these problems consecutively and they have only two main crops- Boro and T-aman, so lower or no yield in T-aman often fell them in destitute situation. Therefore, it could be concluded that the LGED, LGRD, DAE & other GOs and NGOs should take proper steps immediately to minimize the problems of the farmers in T-aman cultivation due to flood for their successful T-aman cultivation.

4.3 Relationship between the problems faced by the farmers in T-aman cultivation due to flood with their selected characteristics

Pearson's Product Moment Correlation Co-efficient (r) was computed in order to find out the extent of relationship between problems faced in T-aman cultivation due to flood by the farmers and their selected characteristics. To reject or accept any null hypotheses at 0.05 level of probability was used. Results of correlation have been shown in Table 4.12. Correlation co-efficient among all the variables may be seen in the correlation matrix in Appendix-B.

Table 4.12 Pearson's product moment co-efficient of correlation showing relationship between problems faced in T-aman cultivation due to flood by the farmers and their selected characteristics

N =125

Dependent variable	Independent variables	Value of co-efficient of correlation (r)	Tabulated value at 123 df	
			0.05 level	0.01 level
Problems faced by the farmers in T-aman cultivation due to flood	Experience in T-aman cultivation	-0.166^{NS}	0.174	0.229
	Educational level	-0.226*		
	T-aman cultivation area	0.081^{NS}		
	Extension media contact	-0.430**		
	Training exposure	-0.201*		
	Annual expenditure	-0.120^{NS}		
	Commercialization	-0.048^{NS}		
	Innovativeness	-0.381**		
	Decision making ability	-0.260**		
	Farmers' knowledge on T-aman cultivation in flooding condition	-0.493**		

**Significant at the 0.01 level
*Significant at the 0.05 level
^{NS} Not significant

4.3.1 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their experience in T-aman cultivation

Relationship between experience in T-aman cultivation and problems of the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between experience in T-aman cultivation and problems of the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.166. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.166) was found to be smaller than the tabulated value (r = 0.174) with 123 degrees of freedom at 0.05 level of probability.*
c. *The null hypothesis could not be rejected.*
d. *The relationship between the concerned variables was statistically non significant at 0.05 level of probability.*

Based on the above findings it was concluded that experience in T-aman cultivation of the famers had non-significant negative relationships with the problems of the farmers in T-aman cultivation due to flood. But, with the increase in experience in T-aman cultivation of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.2 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their educational level

Relationship between educational level and problems of the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between educational level and problems of the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.226. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.226) was found to be greater than the tabulated value (r = 0.174) with 123 degrees of freedom at 0.05 level of probability.*
c. *The null hypothesis was rejected.*
d. *The relationship between the concerned variables was statistically significant at 0.05 level of probability.*

Based on the above findings it was concluded that educational level of the famers had significant negative relationships with the problems of the farmers in T-aman cultivation due to flood. This represents that educational level of the respondent farmers was an important factor in facing problems in T-aman cultivation due to flood. And with the increase in educational level of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.3 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their T-aman cultivation area

Relationship between in T-aman cultivation area and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between T-aman cultivation area and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.081. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a positive trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (0.081) was found to be smaller than the tabulated value (r = 0.174) with 123 degrees of freedom at 0.05 level of probability.*
c. *The null hypothesis could not be rejected.*
d. *The relationship between the concerned variables was statistically non significant at 0.05 level of probability.*

Based on the above findings it was concluded that T-aman cultivation area of the famers had non-significant positive relationships with the problems faced by the farmers in T-aman cultivation due to flood and the strength of relationship between the variables was very low. This represents that with the increase in T-aman cultivation area of the respondents, problems in T-aman cultivation due to flood was also increased.

4.3.4 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their extension media contact

Relationship between extension media contact and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between extension media contact and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.430. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.430) was found to be greater than the tabulated value (r = 0.229) with 123 degrees of freedom at 0.01 level of probability.*
c. *The null hypothesis was rejected.*
d. *The relationship between the concerned variables was statistically highly significant at 0.01 level of probability.*

Based on the above findings it was concluded that extension media contact of the famers had highly significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. This represents that extension media contact of the respondent farmers was an important factor in facing problems in T-aman cultivation due to flood. And with the increase in extension media contact of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.5 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their training exposure

Relationship between training exposure and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between training exposure and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.201. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.201) was found to be greater than the tabulated value (r = 0.174) with 123 degrees of freedom at 0.05 level of probability.*
c. *The null hypothesis was rejected.*
d. *The relationship between the concerned variables was statistically significant at 0.05 level of probability.*

Based on the above findings it was concluded that training exposure of the famers had significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. This represents that training exposure of the respondent farmers was an important factor in facing problems in T-aman cultivation due to flood. And with the increase in training exposure of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.6 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their annual expenditure

Relationship between annual expenditure and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between annual expenditure and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.120. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.120) was found to be smaller than the tabulated value (r = 0.174) with 123 degrees of freedom at 0.05 level of probability.*
c. *The null hypothesis could not be rejected.*
d. *The relationship between the concerned variables was statistically non significant at 0.05 level of probability.*

Based on the above findings it was concluded that annual expenditure of the famers had non-significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. But, with the increase in annual expenditure of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.7 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their commercialization

Relationship between commercialization and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between commercialization and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.048. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.048) was found to be smaller than the tabulated value (r = 0.174) with 123 degrees of freedom at 0.05 level of probability.*
c. *The null hypothesis could not be rejected.*
d. *The relationship between the concerned variables was statistically non significant at 0.05 level of probability.*

Based on the above findings it was concluded that commercialization of the famers had non-significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. But, with the increase in commercialization of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.8 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their innovativeness

Relationship between innovativeness and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between innovativeness and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.381. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.381) was found to be greater than the tabulated value (r = 0.229) with 123 degrees of freedom at 0.01 level of probability.*
c. *The null hypothesis was rejected.*
d. *The relationship between the concerned variables was statistically highly significant at 0.01 level of probability.*

Based on the above findings it was concluded that innovativeness of the famers had highly significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. This represents that innovativeness of the respondent farmers was an important factor in facing problems in T-aman cultivation due to flood. And with the increase in innovativeness of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.9 Relationships between problems faced by the farmers in T-aman cultivation due to flood and their decision making ability

Relationship between decision making ability and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between decision making ability and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.260. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.260) was found to be greater than the tabulated value (r = 0.229) with 123 degrees of freedom at 0.01 level of probability.*
c. *The null hypothesis was rejected.*
d. *The relationship between the concerned variables was statistically highly significant at 0.01 level of probability.*

Based on the above findings it was concluded that decision making ability of the famers had highly significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. This represents that decision making ability of the respondent farmers was an important factor in facing problems in T-aman cultivation due to flood. And with the increase in decision making ability of the respondents, problems in T-aman cultivation due to flood was decreased.

4.3.10 Relationships between problems faced by the farmers in T-aman cultivation due to flood and farmers' knowledge on T-aman cultivation in flooding condition

Relationship between farmers' knowledge on T-aman cultivation in flooding condition and problems faced by the farmers in T-aman cultivation due to flood was determined by Pearson's product moment correlation coefficient.

The coefficient of correlation between farmers' knowledge on T-aman cultivation in flooding condition and problems faced by the farmers in T-aman cultivation due to flood is presented in Table 4.12. The coefficient of correlation between the concerned variables was found -0.493. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration.

a. *The relationship showed a negative trend between the concerned variables.*
b. *The observed value between the concerned variables "r" (-0.493) was found to be greater than the tabulated value (r = 0.229) with 123 degrees of freedom at 0.01 level of probability.*
c. *The null hypothesis was rejected.*
d. *The relationship between the concerned variables was statistically highly significant at 0.01 level of probability.*

Based on the above findings it was concluded that farmers' knowledge on T-aman cultivation in flooding condition had highly significant negative relationships with the problems faced by the farmers in T-aman cultivation due to flood. This represents that knowledge on T-aman cultivation in flooding condition of the respondent farmers was an important factor in facing problems in T-aman cultivation due to flood. And with the increase in knowledge on T-aman cultivation in flooding condition of the respondents, problems in T-aman cultivation due to flood was decreased.

4.4 Comparative severity among the problems faced by the farmers in T-aman cultivation due to flood.

The farmers faced more or less problems in T-aman cultivation due to flood. A problem faced index (PFI) was calculated for each of the fifteen problems in T-aman cultivation due to flood. The rank order of the problems was made on the basis of the descending order of the PFI. Comparative view of the 15 selected problems has been shown in table 4.13 on the basis of their Problem Faced Index (PFI).

Table 4.13 Rank order of 15 selected items of problems faced in T-aman cultivation due to flood according to descending order of PFI

Sl. No.	Problems	Percentage (%) of the respondents				Problem Faced Index (PFI)	Rank Order (RO)
		Faced no problem (P_n)	Faced little problem (P_l)	Faced moderate problem (P_m)	Faced serious problem (P_s)		
01.	Fully damaged field requires re-transplantation	0	0	0	100	300	1
02.	Poor yield in the flood affected field	0	0	2.4	97.6	297.6	2
03.	High price of seeds and seedlings after flood	0	0	13.6	86.4	286.4	3
04.	Shortage of seeds and seedlings in case of after flood condition	0	0.8	22.4	76.8	276	4
05.	Extra crop protection measures are required as flood affected fields are highly infected by pests and diseases	0	1.6	25.6	72.8	271.2	5
06.	Lack of quality seedlings for second time transplanting and gap filling	0	2.4	39.2	58.4	256	6
07.	Extra weeding is required in severe weed infested fields which are affected by flood	0	5.6	46.4	48	242.4	7
08.	Gap filling is required in case of partly damaged field	0	8.8	52	39.2	230.4	8
09.	Lease rate is very high of the upland seedbed available in nearer territory	0	15.2	56	28.8	213.6	9
10.	Credit unavailability to cope with flood situation and Complexity in receiving credit	1.6	13.6	61.6	23.2	206.4	10
11.	Unavailability of late improved and flood tolerant or resistant varieties of T-aman	2.4	13.6	67.2	16.8	198.4	11
12.	Removal of damaged residues and management of the field over which flood water sweeps are more complicated	4	23.2	64.8	8	176.8	12
13.	High price of labor, fertilizers and pesticides after the affect of flood	7.2	24.8	68	0	160.8	13
14.	Unavailability of labor after flood	8.8	30.4	60.8	0	152	14
15.	Shortage of fertilizers and pesticides in after flood condition	28	36.8	35.2	0	107.2	15

Problem Faced index (PFI) of the farmers on 15 items in problems in T-aman cultivation due to flood ranged from 107.2 to 300 against a possible range of 0 to 300. The PFI in the Table 4.13 indicates that the farmers faced highest problem in "fully damaged field requires re-transplantation" (PFI = 300). This was followed by "poor yield in the flood affected field" (PFI = 297.6), "high price of seeds and seedlings after flood" (PFI = 286.4). Individually they were positioned in the rank order as 1st, 2nd and 3rd respectively.

It is to be noted here that, all the flood related problems affect the T-aman cultivation of the farmers. Some may be most serious and some may be less. However, in this study as less serious problems were identified as "high price of labor, fertilizers and pesticides after the affect of flood", "unavailability of labor after flood" and "shortage of fertilizers and pesticides in after flood condition". Individually they were positioned in the rank order as 13th, 14th and 15th respectively.

Rank order has done to compare the severity among the problems faced by the farmers in T-aman cultivation due to flood. And it has drawn the real scenario which reflected the farmers' heartfelt feelings. When their standing crops are destroyed fully or partially due to flood it creates a very grievous situation. Sometimes they got such low yield which does not cover their cost of production. In this study, fifteen (15) dimensions of problem which had been selected are more or less exact problems of the study area. All the problems are not equally severe. So, the farmers' answers had drawn a result of which problem they are facing severely and which one is less. In general view, it could be told that the study findings in the rank order are practical.

The maximum farmers of the study area cultivate Boro and T-aman rice from which they consume their family food for six months each and the excess sale to earn for household expenditures. So, when flood effect creates a lot of problems in the T-aman cultivation, the consequence of sufferings is long.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The study was conducted in Patadaha and Gojaria villages of Adarvita union of Madargonj Upazila under Jamalpur district.

The researcher himself collected data through personal contact during 08 to 31 March, 2011. It mentioned earlier that ten (10) selected characteristics of the farmers constituted while problems faced by the farmers in T-aman cultivation due to flood was the dependent variable of the study. This chapter deals with the summary of findings, conclusions and recommendations of this study.

5.1 Summary of Findings

5.1.1 Characteristics of the farmers

Findings in respect of the ten selected characteristics of the T-aman farmers are summarized below:

Experience in T-aman cultivation

The experience of T-aman cultivators ranged from 7 to 48 with a mean of 21.47. Medium experienced T-aman cultivators comprise the highest proportion (72.8 percent) followed by low experienced category (16.8 percent) and the lowest proportion were made by the high experienced category (10.4 percent).

Educational level

The level of educational scores of the respondent farmers ranged from 0 to 15 with a mean of 4.15. Farmers under 'primary education category constitute the highest proportion (42.4 percent) compared to 22.4 percent secondary level category, 19.2 percent can sign only and 10.4 percent illiterate level category. On the other hand the lowest 5.6 percent above secondary level category.

T-aman cultivation area

The T-aman cultivation area of the respondent's farmer ranged from 0.21 hectare to 2.03 hectare with a mean of 0.84. The small farm holder constitutes the highest proportion (51.2 percent) followed by 35.2 percent with medium farm holder and the lowest 13.6 percent were large farm holder in case of T-aman cultivation area.

Extension media contact

The extension media contact of the respondent's farmers ranged from 8 to 25 with a mean of 16.36. The farmers have medium extension media contact category constitute the highest proportion (56.8 percent) followed by low contact (39.2 percent) and high contact category (4 percent). So the maximum percentage (96 percent) is the category of the group of low to medium extension media contact group.

Training exposure

Training exposure of the respondent's farmers ranged from 0 to 8 with a mean of 2.16. The highest 87.2 percent of the respondents were in low training exposure group and while remaining 12.8 percent had medium training exposure only.

Annual expenditure

The respondents' annual expenditure was ranged from 61 to 186 with a mean of 104.56. The highest proportion (64 percent) of the respondents had low annual expenditure while 28 percent and 8 percent had medium and high annual expenditure respectively. So, all most majority (92 percent) of the respondents in the study area had low to medium annual expenditure.

Commercialization

Commercialization of the farmers was found to range from 26 to 76 score with a mean of 51.33. The highest proportion (62.4 percent) of the respondents belonged to medium commercialization group compared to 21.6 and 16 percent low and high commercialization group respectively.

Innovativeness

The maximum innovativeness score of the respondents was 21 and the minimum was 7 with a mean of 13.93. The highest proportion (95 percent) of the T-aman cultivators had medium innovativeness as compared to 16 percent low innovativeness and only 8 percent in high innovativeness.

Decision making ability

Decision making ability of the farmers was found to range from 7 to 19 score with a mean of 12.80. Majority (76.8 percent) of the respondents had medium decision making ability, while 14.4 and 8.8 percent had low and high decision making ability respectively.

Farmers' knowledge on T-aman cultivation in flooding condition

Farmers' knowledge on T-aman cultivation in flooding condition score of the respondents was found to range from 14 to 38 and the average score was 25.58. The highest proportion (64.8 percent) of the respondents had medium knowledge on related aspects in flooding condition while 40 percent and 3.2 percent of the respondents had low and high knowledge respectively.

5.1.2 Exploration of Problems Faced by the Farmers

The score of the respondents in case of problems faced in T-aman cultivation due to flood was found to range from 18 to 38 and the average score was 27.08. The highest proportion (63.2 percent) of the respondents had medium problem in T-aman cultivation in the flooding condition, while 20.8 percent and 16 percent of the respondents had low and high problem respectively.

5.1.3 Relationship between the problems faced by the farmers in T-aman cultivation due to flood with their selected characteristics

Educational level, extension media contact, training exposure, innovativeness, decision making ability and farmers' knowledge on T-aman cultivation in flooding condition had significant negative relationships with the problems in T-aman cultivation due to flood. Experience in T-aman cultivation, annual expenditure and commercialization had non-significant negative relationships

with the problems in T-aman cultivation due to flood. On the other hand, T-aman cultivation area had non-significant positive relationships with the problems in T-aman cultivation due to flood.

5.1.4 Comparative severity among the problems faced by the farmers in T-aman cultivation due to flood

Problem Faced index (PFI) of farmers' on 15 items in problems in T-aman cultivation due to flood ranged from 107.2 to 300 against a possible range of 0 to 300. According to the severity the problems were as, (1^{st}) fully damaged field requires re-transplantation, (2^{nd}) poor yield in the flood affected field, (3^{rd}) high price of seeds and seedlings after flood, (4^{th}) Shortage of seeds and seedlings in case of after flood condition and (5^{th}) Extra crop protection measures are required as flood affected fields are highly infected by pests and diseases.

Then, 'High price of labor, fertilizers and pesticides after the affect of flood', 'Unavailability of labor after flood' and 'Shortage of fertilizers and pesticides in after flood condition' were positioned in the rank order as 13^{th}, 14^{th} and 15^{th} respectively.

5.2 Conclusions

Conclusions drawn on the basis of the findings of this study and their logical interpretation in the light of the other relevant factors are furnished below:

1. It was found that the farmers faced various problems in T-aman cultivation due to flood. Majority of the farmers (79.2 percent) under the study area faced medium and high problems in T-aman cultivation because of flood effects. These farmers may face a lot of problems in T-aman cultivation until or unless necessary steps are taken regarding this issue.

2. 29.6 percent of the farmers were either illiterate or could sign only. And 42.4 percent of the farmers had completed primary education. There existed a negatively significant relationship between farmers' educational level and their problem faced in T-aman cultivation due to flood. Which revealed that, low

educated farmers faced high problem or with the decreasing in educational level of the farmers tend to increase their problems faced in T-aman cultivation due to flood. Therefore, it may be concluded that an appreciable proportion of the farmers will continue to face problems in T-aman cultivation due to flood, if suitable steps are not taken to remove illiteracy from the farmers.

3. An over-whelming majority (96 percent) of the farmers had low to medium extension media contact, while there was a strong negative significant relationship between farmers' extension media contact and their problems in T-aman cultivation due to flood. Which indicated that, with the decreasing in extension media contact of the farmers tends to increase their problems in T-aman cultivation due to flood. Thus, it may be concluded that high extension media contact would be helpful for minimizing the problems of the farmers in T-aman cultivation due to flood.

4. The whole portion (100 percent) of the farmers had low to medium training exposure, while there was a negatively significant relationship between farmers' training exposure and their problem confrontation. Which resulted that, with the decreasing in training exposure of the farmers tends to increase their problems in T-aman cultivation due to flood. It may therefore, be concluded that steps to conduct various training programs for the farmers will lead to minimize their problems in T-aman cultivation due to flood.

5. Ninety two percent of the farmers possessed low to medium innovativeness, while there was a strong negative significant relationship between innovativeness of the farmers and their problems faced in T-aman cultivation due to flood. Which revealed that, low innovative farmers faced high problem or with the decreasing in innovativeness of the farmers tends to increase their problems faced in T-aman cultivation due to flood. Therefore, innovativeness of the farmers should be increased and it would be helpful for minimizing their problem confrontation.

6. An over-whelming majority (91.2 percent) of the farmers had low to medium decision making ability, while there was a strong negative significant relationship between decision making ability of the farmers and their problems because of flood. Which revealed that, low able to decision making farmers faced high problem or with the decreasing in decision making ability of the farmers tends to increase their problems faced in T-aman cultivation due to flood. Therefore, it may be concluded that majority of the farmers will continue to face problems, if suitable steps are not taken to strengthen decision making ability among the farmers.

7. A great majority (96.8 percent) of the farmers had low to medium knowledge on T-aman cultivation in flooding condition, while there existed a very strong negative significant relationship between farmers' knowledge on T-aman cultivation in flooding condition and their problems in T-aman cultivation due to flood. It meant that, low knowledgeable farmers in case of T-aman cultivation in flooding condition faced high problem or with the decreasing in knowledge level of the farmers tends to increase their problems faced in T-aman cultivation due to flood. The above facts lead to the conclusion that proper and expert knowledge of the farmers will be very conducive for diminishing problems in their T-aman cultivation.

5.3 Recommendations for policy implications

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

1. Education is the backbone for all development activities. The study reveals that majority (72 percent) of the farmers were illiterate or had primary level of education. This low level of education might make them unable to manage the complex problems T-aman cultivation due to flood effects. Hence, adult education and training participation may help them in this regard. So it is necessary to increase their education level through ensuring access to informal educational facilities and other motivational programs.

2. Extension media contact helps the farmers to become more conscious, dynamic and increase their knowledge in different aspects of agriculture. So extension contact is necessary for reducing problem confrontation. But it was found that majority of the farmers had low to medium contact to information media. Therefore, proper policies like parallel exposure and use of different information sources should be formulated to provide more facilities to the farmers to increase their perception to decline their problems in T-aman cultivation due to flood.

3. Maximum proportion of the farmers in the study area was training less or has very low training exposure. This is might due to the area is backward in position which causes communication gap and create problems to conduct various training programs during the flooding condition. Therefore, different GOs and NGOs should formulate strategy to increase their technical support and conduct various instructional training programs to increase awareness and the coping ability of the farmers against flood.

4. Innovativeness is a good characteristic of the farmers which lead the farmers to adopt innovations. But the findings revealed that ninety two percent of the farmers possessed low to medium innovativeness. To increase innovative power there should be arranged tour by the farmers for visiting agricultural research stations, agricultural farms, agricultural universities and other agriculture related organizations. It will help to acquire knowledge, skill and attitude that will be benevolent to the farmers to cope problems more effectively in flooding condition.

5. Farmers with good agricultural knowledge want to use improved agricultural practices for their agricultural production and use different techniques to reduce their production related problems. So, the concern authority like extension services should facilitate them the effective measures of flood control. It is, therefore, recommended that extension work for educating and training the farmers will be supportive to solve their problems.

6. There are no flood tolerant or resistant high yielding varieties of T-aman rice which could solve the farmers' problem in flooding condition. So, it is recommended to the respective research institutes to develop such T-aman varieties which could reduce the farmers' problems.

7. Farmers become helpless when their cultivated fields are fully or partially damaged by the flood attack. They fell in scarcity of seeds, seedlings and money. Therefore, it is recommended that when the farmers would be fell in such problematic situations, the Department of Agricultural Extension (DAE), Bangladesh Agricultural Development Corporation (BADC), NGOs and any other organizations or agencies should be given careful considerations for; (a) supplying required inputs to the farmers at subsidized rate. (b) making available the required inputs locally and sell to the farmers on loan which may be paid in installments and (c) arranging short term loan systems for the farmers in easy terms and conditions with a low interest rate with a continuous supervision.

8. Findings of the study indicate that the overall problems were either severe or moderate for 79.2 percent of the farmers. As T-aman is their second main crop after Boro rice and more or less every year flood causes a great problem in T-aman cultivation of that area, a perfect flood protection infrastructures for that region should be built by the government of Bangladesh to control flood and for drainage the flood water. This could be in following ways:
   a) The existing rivers and canals depth should increase by digging to control the water flow.
   b) High roads and dams should build to protect the paddy fields from flood water.
   c) Sluice gates and culverts should build at proper site to facilitate the drainage system.

5.3.1 Recommendation for further study

This study investigated problems of the farmers in T-aman cultivation due to flood. As a small and limited research has been conducted in the present study cannot provide much information related to this aspect. Further studies should be undertaken to covering more information in the relevant matters. So the following suggestions were put forward for further research:

1. The present study was conducted only in two villages of Adarvita union of Madargonj upazila under Jamalpur district. Findings of the study need further verification through similar research in other parts of the country.

2. It is difficult to explore all the problems in T-aman cultivation of flood affected farmers. Measurement of problems of the farmers is not free from questions. More reliable measurement of concerned variables is necessary for further study.

3. The study investigated the relationship of ten characteristics of the flood affected farmers with their problems in T-aman cultivation. So it is recommended that further study would be conducted with other dependent and independent variables.

4. In the present study experience in T-aman cultivation, T-aman cultivation area annual expenditure and commercialization had no significant relationship with the problems of the T-aman flood affected farmers. In this connection further research is necessary.

5. The study investigated only 15 dimensions of problems of the farmers in T-aman cultivation due to flood. It is necessary to examine the relationship of the characteristics of the farmers with their problem faced in other aspect of agricultural problem confrontation, such as use of high yielding variety, intercultural operations, net return etc.

6. In addition to agricultural problem confrontation the farmers of study area also faced other problems due to flood effects viz., social, economic, housing, sanitation, nutrition etc. These entire problems affect the performance of the farmers. There is a need for undertaking research on the various problems faced by the farmers which affect the performance of the farmers.

7. Research should be undertaken on the effectiveness of agricultural extension services and other related organizations in helping people to solve their agricultural problems.

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APPENDIX-A

English Version of the Interview Schedule

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University, Dhaka-1207

An Interview Schedule on

"Exploration of Problems of the Farmers in T-Aman Cultivation due to Flood"

Sl. No.....

Name of the respondent : .....

Village : ..... Union: .....

Upazila : ..... District: .....

(Please answer the following questions. Your answers will be kept confidential.)

1. Experience in T-aman Cultivation

How many years have you been cultivating T-aman rice? (.....) years

2. Educational Level

Please mention your educational level.

a) Cannot read and write (.....)
b) Can sign only (.....)
c) I have passed class (.....)

3. T-aman cultivation area

Please mention your T-aman cultivation area (.....) ha.

4. Extension media contact

Please indicate your extent of contact with the following communication media.

	Sl. No.	Media	Frequency of communication			
			Frequently	Occasionally	Rarely	Not at all
Personal Media	01.	Local leaders	>6 times/ month ( )	3-6 times/ month ( )	1-3 times/ month ( )	( )
	02.	Neighbors	>8 times/ month ( )	5-8 times/ month ( )	1-4 times/ month ( )	( )
	03.	Input dealers (fertilizer, pesticide, seed)	>4 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	( )
	04.	NGO workers	>4 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	( )
	05.	Sub-Assistant Agriculture Officer	>4 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	( )
	06.	Upazila level Agricultural Officers	>6 times/ year ( )	4-6 times/ year ( )	1-3 times/ year ( )	( )
Group Media	07.	Group discussion	2 times/ month ( )	1 time/ 2 months ( )	1 time/ 6 months ( )	( )
	08.	Method demonstration	>2 times in life ( )	2 times in life ( )	Once in the life ( )	( )
	09.	Result demonstration	>2 times in life ( )	2 times in life ( )	Once in the life ( )	( )
Mass Media	10.	Listening agriculture related programs in radio	>11 days/ month ( )	6-10 days/ month ( )	1-5 days/ month ( )	( )
	11.	Watching agriculture related programs in television	>11 days/ month ( )	6-10 days/ month ( )	1-5 days/ month ( )	( )
	12.	Reading daily newspapers	>11 days/ month ( )	6-10 days/ month ( )	1-5 days/ month ( )	( )
	13.	Farm publications (e.g. Leaflet, poster, bulletin, etc.)	>6 days/ month ( )	4-6 days/ month ( )	1-3 days/ month ( )	( )
	14.	Visiting agricultural fairs	1 time/ 2 years ( )	1 time/ 4 years ( )	1 time/ 5 years ( )	( )

5. Training Exposure

Please give information about trainings you have attended.

Sl. No.	Title of Training	Offering organization	Duration of Training(days)
01.			
02.			
03.			
04.			
05.			
Total			

6. Annual expenditure

Please mention your yearly expenditure on the following items

Sl. No.	Items	Monthly cost (Tk.)	Annual cost (Tk.)
01.	**Food:**		
02.	Cloth		
03.	Education		
04.	Health		
05.	Housing		
06.	Agricultural farming		
07.	Electricity/kerosene bill		
08.	Fuel cost		
09.	Telephone/mobile cost		
10.	Others (if any)		
Total			

7. Commercialization

Please mention the following information.

	Name of crops	Total yield (Kg)	Unit price (Tk./Kg)	Value of total yield (Tk.)	Quantity of sold crop (Kg)	Value of sold crop (Tk.)
Agronomic Crops	Aus rice					
	Aman rice					
	Boro rice					
	Wheat					
	Jute					
	Sweet potato					
	Pulses					
	Oilseeds					
Vegetables	Potato					
	Papaya					
	Tomato					
	Brinjal					
	Bottle gourd					
	Sweet gourd					
	Cucumber					
	Bean					
	Red amaranth					
	Amaranth					
	Spinach					
	Radish					
	Bitter gourd					
	Kakrol					
	Ladies finger					
	Dhundol					
	Jhinga					
	Carrot					
	Cauliflower					
	Cabbage					
Spices	Chili					
	Onion					
	Garlic					
	Turmeric					
	Zinger					
	Coriander					
Fruits	Mango					
	Litchi					
	Banana					
	Pineapple					
	Other fruits					
Others	Timber					
	Bamboo					
Total						

8. Innovativeness

If you use the following technologies, please indicate duration of its use from first hearing.

Sl. No.	Name of the technologies	Extent of use				Never used
		Used within 1year	Used within 1 to 2 years	Used within 2 to 3 years	Used after 4 years	
01.	Use of hybrid varieties of T-aman					
02.	Use of granular urea					
03.	Use of Boron fertilizer					
04.	Use of Zinc fertilizer					
05.	Use of bio-fertilizer					
06.	Use of green manure					
07.	Use of balanced fertilizer					
08.	Use of IPM to control pests and diseases					
09.	Use of power tiller or power tractor					
10.	Use of indigenous technology to preserve rice seed (air tight earthen pot, gunny bags, polythene or others)					

9. Decision making ability

Please indicate the extent of your decision making ability.

Sl. No.	Items of decision making	Extent of decision making			
		Able to make decision by own	Able to make decision with the family members	Able to make decision with the neighbors and local leaders	Able to make decision with the highly educated or extension personnel
01.	Adoption of new agricultural technologies				
02.	Purchasing of agricultural inputs				
03.	Selling of own produced agricultural products				
04.	Mitigation of family problems				
05.	In case of taking risk oriented decisions				

10. Farmers' knowledge on T-aman cultivation in flooding conditions

Please answer the following questions.

	Sl. No.	Questions	Assigned scores	Obtained marks
flooding condition	01.	What is the flooding season of Bangladesh?	2	
	02.	What are the main causes of flood in Bangladesh?	2	
	03.	What is the suitable time of transplanting of T-aman to reduce loss due to flood?	2	
	04.	What type of crop you cultivate in low land to reduce loss due to flood?	2	
	05.	What kind of crop can you cultivate at a minimum cost immediately after drainage of flood water?	2	
	06.	What type of cropping pattern do you follow to avoid the risk of flood?	2	
	07.	How do you manage seed after flood?	2	
	08.	Why crop diseases occur after flood?	2	
	09.	Why weed infestation is more after flood?	2	
	10.	What are the possible income generating activities exist during flooding time without crop cultivation?	2	
	11.	Mention two merits of flood?	2	
	12.	Mention two demerits of flood?	2	
T-aman Cultivation	13.	Name four high yielding varieties of T-aman?	2	
	14.	Name two local varieties of T-aman?	2	
	15.	What type of soil is suitable for T-aman cultivation?	2	
	16.	What are the qualities of good T-aman seed?	2	
	17.	Name one disease and one major insect of T-aman.	2	
	18.	Name two harmful weeds of T-aman.	2	
	19.	Mention two fungicides which are available in your local market.	2	
	20.	Why crop rotation is essential?	2	
	21.	Mention the benefits of gap filling.	2	
	22.	What types of irrigation are needed in T-aman cultivation?	2	
	23.	Mention two urea deficiency symptoms of rice.	2	
	24.	Mention the fertilizer doses in T-aman cultivation (Urea, TSP, and MP)?	2	
	Total		48	

11. Exploration of problems of the farmers

Please mention the extent of the following problems faced by you at the time of flood in T-aman cultivation.

	Sl. No.	Problems	Extent of problem			
			Severe	Moderate	Little	Not at all
Field management	01.	Fully damaged field requires re-transplantation				
	02.	Gap filling is required in case of partly damaged field				
	03.	Extra weeding is required in severe weed infested fields which are affected by flood				
	04.	Extra crop protection measures are required as flood affected fields are highly infected by pests and diseases				
	05.	Removal of damaged residues and management of the field over which flood water sweeps are more complicated				
Availability of inputs	06.	Shortage of seeds and seedlings in case of after flood condition				
	07.	Unavailability of labor after flood.				
	08.	Shortage of fertilizers and pesticides in after flood condition				
	09.	Lack of quality seedlings for second time transplanting and gap filling				
	10.	Unavailability of late improved and flood tolerant or resistant varieties of T-aman				
Economic	11.	High price of seeds and seedlings after flood				
	12.	High price of labor, fertilizers and pesticides after the affect of flood				
	13.	Lease rate is very high of the upland seedbed available in nearer territory				
	14.	Credit unavailability to cope with flood situation and Complexity in receiving credit				
	15.	Poor yield in the flood affected field				

Thank you for your kind co-operation.

(Signature of the interviewer)

Appendix-B. Correlation Matrix

Characters	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Y
X_1	1.00										
X_2	-0.075	1.00									
X_3	-0.095	0.472**	1.00								
X_4	-0.318**	0.323**	0.440**	1.00							
X_5	-0.270**	0.358**	0.388**	0.434**	1.00						
X_6	-0.081	0.461**	0.811**	0.481**	0.467**	1.00					
X_7	-0.234**	0.389**	0.558**	0.412**	0.475**	0.440**	1.00				
X_8	-0.050	0.323**	0.317**	0.361**	0.227*	0.375**	0.403**	1.00			
X_9	-0.102	0.323**	0.023	0.285**	0.292**	0.083	0.160	0.222*	1.00		
X_{10}	0.087	0.414**	0.204*	0.440**	0.379**	0.217*	0.288**	0.477**	0.254**	1.00	
Y	-0.166	-0.226*	0.081	-0.430**	-0.201*	-0.120	-0.048	-0.381**	-0.260**	-0.493**	1.00

X_1: Experience in T-aman cultivation
X_2: Educational level
X_3: T-aman cultivation area
X_4: Extension media contact
X_5: Training exposure
X_6: Annual expenditure
X_7: Commercialization
X_8: Innovativeness
X_9: Decision making ability
X_{10}: Farmers' knowledge on T-aman cultivation in flooding condition
Y: Exploration of problems of the farmers