ADOPTION OF MIXED CROPPING IN RABI SEASON BY THE FARMERS OF MADARIPUR SADAR UPAZILA

BY

H. M. SHAHIDUL ISLAM

DEPARTMENT OF AGRICULTURAL EXTENSION AND INFORMATION SYSTEM

SHER-E-BANGLA AGRICULTURAL UNIVERSITY
SHER-E-BANGLA NAGAR, DHAKA -1207

December, 2007

ADOPTION OF MIXED CROPPING IN RABI SEASON BY THE FARMERS OF MADARIPUR SADAR UPAZILA

BY

H. M. SHAHIDUL ISLAM

Registration No. 00459

A Thesis

Submitted to the Faculty of Agriculture,

Sher-e-Bangla Agricultural University, Dhaka,

in partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE
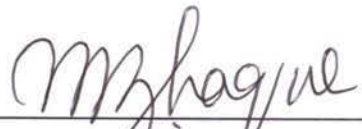
IN

AGRICULTURAL EXTENSION AND INFORMATION SYSTEM

SEMESTER: JULY-DECEMBER, 2007

Approved by:

_____

(Asso. Prof. Md. Sekender Ali)

Supervisor

_____

(Professor M.Zahidul Haque)

Co-Supervisor

_____

(Professor M.Zahidul Haque)

Chairman

Examination Committee

CERTIFICATE

This is to certify that the thesis entitled "ADOPTION OF MIXED CROPPING IN RABI SEASON BY THE FARMERS OF MADARIPUR SADAR UPAZILA" submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM**, embodies the result of a piece of bona fide research work carried out by H. M. SHAHIDUL ISLAM, Registration No. 00459 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

Place: Dhaka, Bangladesh

(Associate Prof. Md. Sekender Ali)

Supervisor

Dedicated to
My
Mother and Father

ACKNOWLEDGEMENT

i

LIST OF CONTENTS

CONTENTS

CHAPTER V
SUMMARY, CONCLUSIONS AND
RECOMMENDATIONS   54-59

CHAPTER VI
REFERENCES   60
APPENDIX   63

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ADOPTION OF MIXEDCROPPING IN RABI SEASON BY THE FARMERS OF MADARIPUR SADAR UPAZILA

ABSTRACT

The main purpose of the study was to determine the extent of mixed cropping in rabi season by the farmers of Madaripur sadar upazila and to explore the relationships between the selected characteristics of the respondents and their extent of adoption of mixed cropping in Rabi season. The study was conducted in four unions covering eight villages of Madaripur sadar upazila .Data were collected from randomly selected 100 farmers by using a pre-tested interview schedule during the period from November 15 to December 15, 2007. From the study it was found that the highest proportion (51 percent) of the farmers had low adoption of mixed cropping compared to 40 and 9 percent having medium and high adoption of mixed cropping respectively. Pearson Product Moment Correlation(s) test was used to ascertain the relationships between the concerned dependent and independent variables of the study. Findings revealed that number of family labor, cropping intensity, annual family income, credit received, training exposure and knowledge on mixed cropping had significant positive relationship with the adoption of mixed cropping while age, level of education, land possession, extension contact, and organization participation had no significant relationship with the adoption of mixed cropping. On the basis of descending order of Problem Faced Index (PFI) the farmers confronted the problems were "lack of extension service", "lack of inputs in time", "lack of technical knowledge", "unfavorable climate", "difficult to practice mixed cropping", "high pest attack", and "less crop production by adopting mixed cropping"

Chapter 1

Introduction

CHAPTER I

INTRODUCTION

1.1 General Background

Mixed cropping is the judicious utilization of time and space to increase the total crop output per unit area. The process of growing and harvesting a short duration crop before canopy development and growth phase of the main crop is very much helpful for farmers to avert risk of crop failure. It is a very good practice to increase total crop yield balancing the nutritional requirements, higher monetary return, greater resource utilization and to fulfill the diversified needs of the farmers.

Mixed cropping in Rabi season is highly profitable. Generally pulse crops and oil seeds are the major crops grown as mixed cropping in Rabi season. Mixed cropping increases substantial yield compared to single cropping. In Bangladesh, mixed cropping is very much essential for the farmers to increase their total income.

In Bangladesh, mixed cropping for pulse and oil seeds are very important for small and medium farmers for the income and for the country as a whole. Many farmers are now practicing mixed cropping. Bangladesh has been successfully increasing the rice production over the past few years, but this has often caused a reduction in the production of other minor crops. Modern rice varieties grown with irrigation permit rice cultivation throughout the year and this remain the major driving force behind rapid growth in rice production. The Government of Bangladesh in quest for achieving self-sufficiency in food-grain had pursued policies for over a decade that promotes expansion of cultivation of cereal crops. Other important such as roots and tubers, pulses, oilseeds and vegetables received little or no attention and as a result the

production level of these crops had remained stagnant or declined. This has aggravated malnutrition and resulted in unbalanced diet of the most Bangladeshi people. This has prompted the Ministry of Agriculture of the Government of Bangladesh to attach priority to the policy of mixed cropping during the Third and Fourth Five Year Plan with a view to increasing the production of non-cereal crops (Anonymous, 1985 and Anonymous, 1990). A comprehensive project styled mixed cropping programmed with Canadian and Dutch assistance was launched during 1990 considering the most important and realistic action programmed for implementation of this policy. The broad objectives of this programme are to increase the production of tuber, oilseed and pulse crops and to promote consumption of these crops to raise the nutritional status as a more balanced diet for the people.

The mixed cropping programme was an integrated development programme which was a joint effort of the Government of Bangladesh, the Canadian International Development Agency (CIDA) and the Directorate General for International Co-operation (DGI) of the Royal Netherlands Government. Four implementing agencies – the Department of Agricultural Extension (DAE), the Bangladesh Agricultural Research Institute (BARI), the Bangladesh Agriculture Development Corporation (BADC) and the Department of Agricultural Marketing (DAM) and one co-ordinating agency - the Project Implementation Unit (PIU) was involved in the implementation of Crop Diversification Programme (CDP).

CDP project area was concentrated in the north-west, central-west and central parts of the country. Its targeted area were confined in 125 Upazilas under 31 districts (Anonymous, 1993), comprising about one-sixth of the available land of Bangladesh. The most farmers in the project area owned less than one hectare of land. Those (target Upazilas) included 28,000 villages and 29 million people. CDP mandates were as follows:

- to increase the area of cultivated land for the target crops through the use of fallow land, minor irrigation and inter-cropping technique;
- to increase yields of the target crops by developing new varieties and improving crop husbandry; and
- to increase consumption of CDP crops through promotional campaign and market development programmed.

The CDP was marking to increase the production of selected 13 crops. The present researcher thought that more crops should be included in mixed cropping programs. No previous research was conducted to find out the extent of adoption of mixed cropping. On the above consideration the researcher felt necessity to conduct the research entitled "Adoption of Mixed Cropping in Rabi Season by the Farmers of Madaripur Sadar Upazila".

1.2 Statement of the Problem

Among all other agricultural practices only mixed cropping has been taken as present research topic. Farmers have opportunity to increase the participation level in production of tubers, oilseeds and pulses crops in mixed cropping. This participation will help to decrease the malnutrition of the country. Some farmers have realized these benefits and responded very positively to adopt this practice. They were very much keen to get along with the practice of mixed cropping. Some farmers in contrast, showed totally reverse attitudes. This study is, therefore, designed to making an in-depth analysis of the extent of mixed cropping by the farmers.

No research has been conducted to examine the extent of farmers' adoption of mixed cropping activities. The present study was an attempt to provide more information on this subject. This research also examined the relationship between selected personal and socio-economic characteristics of farmers and their extent of adoption of mixed cropping.

3

The present study, therefore, aims to provide information regarding the following questions:

(1) What was the extent of adoption of mixed cropping by the farmers?

(2) What were the personal and socio-economic characteristics of the farmers of the study area?

(3) What personal and socio-economic characteristics of the farmers in the study area were related with the extent of adoption of mixed cropping by the farmers? and

(4) What were the problems being faced by the farmers in adopting mixed cropping?

1.3 Objective of the Study

The specific objectives of the study:

1. To determine and describe some selected personal and socio-economic characteristics of the farmers, the selected characteristics were:

    a) age

    b) level of education

    c) number of family labor

    d) land possession

    e) cropping intensity

    f) annual family income

    g) credit received

    h) extension contact

    i) organizational participation

    j) training exposure

    k) knowledge on mixed cropping

2. To determine the extent of adoption of mixed cropping by the farmers

3. To determine the relationship between the selected personal and socio-economic characteristics of the farmers and their extent of adoption of mixed cropping

4. To determine the problems faced by the farmers in adoption mixed cropping.

4

1.4 Limitations of the Study

The study was undertaken to understand the extent of adoption of mixed cropping by the farmers. The respondents were selected randomly from the study area. To make the study meaningful, the following limitations were taken into consideration:

1. Among 476 Upazila of Bangladesh only Madaripur Sadar Upazila under Madaripur district has been selected as study area.
2. The study was confined in four unions of Madaripur Sadar upazila.
3. Personal and socio-economic characteristics of the respondents were many but only 11 have been selected for investigation in this study.
4. In attempting to accomplish the objectives listed above, the researcher depended on information furnished by the respondents.

1.5 Assumptions

The following assumptions were kept in mind by the researcher while undertaking the study:

1. The respondents selected for this study were competent enough to provide proper responses to the questions included in the interview schedule.
2. The views and opinions furnished by the respondents were the representative views and opinion of all the farmers of that area.
3. The researcher was well adjusted to the social and cultural environment of the study area. So, the data collected from the respondents were free from bias.
4. The responses furnished by the respondents were reliable. They expressed the truth about their convictions and opinions.

1.6 Statement of Hypothesis

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 (Goode and Hatt, 1952)". In order to examine the relationship between

variables, research hypotheses were formulated which stated anticipated relationship (positive or negative) between the concerned variables. However, for statistical test, it was necessary to formulate null hypothesis. A null hypothesis states that there was no relationship between variables. If a null hypothesis was rejected on the basis of empirical test, it was then concluded that there was a relationship between the concerned variables. The following null hypotheses were formulated to explore the relationships of the variables:

"There was no significant relationship between the adoption of mixed cropping by the farmers and any of their selected characteristics"

1.7 Definition of the Terms

For clarity of understanding, certain terms used throughout the study are defined as follows:

Mixed cropping

Mixed cropping means two or more crops cultivate on a same piece of land at the same time.

Age

Age of the respondent was defined as the period of time in years from his birth to the time of interview. It was obtained by asking direct question.

Level of education

Education was the production of desirable change in human behavior, that is, change in knowledge, change in skill and change in attitude of an individual through reading, writing and observation of activities. In this study the level of education was measured on the basis of grades passed by an individual in formal school.

Number of family labor

Number of family labor of a respondent was defined as the total number of working members living with the family. It includes respondents spouse, children, father, mother, brothers and sisters and other dependents.

Land possession

The land possession means the cultivated area either owned by respondents family or obtained on borga / lease in term of full benefits.

Cropping Intensity

Cropping intensity of the respondents was expressed in percentage. It was measured by using the following formula:

$$\text{Cropping intensity} = \frac{\text{Total cropped area}}{\text{Net cropped area}} \times 100$$

Where, Net cropped area = Single cropped area + Double cropped area + Triple cropped area

Total cropped area = 1x Single cropped area +2x Double cropped area + 3x Triple cropped area

Annual family income

Annual family income refers to the actual amount of annual income of a respondent and his family earned from agricultural activities and other socially acceptable regular means, such as agricultural crops, fisheries, livestock, business, service, etc. during a year. It was expressed in thousand taka.

Credit received

Credit received refers to the actual amount of annual credit uptake by a respondent and his family from Bank, NGO, Samabay Samity, Money Lender, Businessman, relatives and other sources. It was expressed in thousand taka.

Extension Contact

This term 'extension contact' was used to refer to the degree of one's exposure to the eleven selected media of contact.

Organizational participation

Organizational participation of a farmer refers to his taking part in different organizations as different post bearer.

Training Exposure

It refers to the total number of days attended by the farmers in his life to the training on various agriculture related subject matter.

Knowledge on mixed cropping

It was the extent of basic understanding of the farmers in different aspects of mixed cropping. It includes the basic understanding of cultivation procedure of different crops.

Chapter 2
Review of Literature

CHAPTER II

REVIEW OF LITERATURE

In this chapter literatures relevant to the present study were reviewed. Information concerning the related studies was obtained by reviewing thesis, books, publications, journals, reports and magazines and searching internet. While searching these sources, the author could not find any study on the extent of adoption of mixed cropping by the farmers. A few research works have been done indirectly related to the study. However, the literatures have been organized into two sections and described below.

2.1 Relationships of the Selected Characteristics of the Farmers with their Extent of adoption of mixed cropping

There were eleven independent variables of this study which included age, level of education, number of family labor, land possession, cropping intensity, family annual income, credit received, extension contact, organizational participation, training exposure, knowledge on mixed cropping. Available literatures were reviewed to ascertain the nature of relationship of these variables of the farmers with their adoption of mixed cropping. In fact there was no literature directly related to the relationship between adoption of mixed cropping of the farmers and their selected characteristics. In this circumstance, the literatures related to their relationship between the selected characteristics of the farmers and their adoption of innovation are presented below in tabular form:

2.1.1 Age and adoption

Relationships of age of the farmers with their adoption of agricultural innovations have been presented below in tabular form :

Researcher	Year of research	Independent Variables	Dependent variable	Relationship	Country
Hossain and Crouch	1992	Age	Adoption of Farm Practices	Significant positive	Bangladesh
Hossain	1991	"	Adoption of Improved Wheat Practices	"	Bangladesh
Singh and Rajendra	1990	"	Adoption of Sugarcane Variety	"	India
Muttaleb	1995	"	Adoption of Improved Potato Technologies	No relationship	Bangladesh
Islam	1993	"	Adoption of Improved Potato Practices	"	Bangladesh
Saxena et al.	1990	"	Adoption of Wheat Technology	No relationship	India
Ali	1993	"	Adoption of STP Technology	Significant negative	Bangladesh
Haque	1993	"	Adoption of BR14 during Boro Season	"	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	"	Bangladesh
Khan	1993	"	Adoption of Insecticide.	"	Bangladeh

Young individuals are likely to be receptive to new ideas and things. Hence, one would expect a negative relationship between the age of the farmers and their adoption of agricultural innovations. It was found out of 10 studies reviewed three studies show positive relationship between age and agricultural innovations of the farmers, four studies showed negative relationship and three

no relationship. The findings of the studies reviewed do not indicate a consistent trend between the age of the farmers and their adoption.

2.1.2 Level of Education and adoption

Relationships between education of the farmers and their adoption of agricultural innovations as observed in 13 studies have been presented below:

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Education	Adoption of Improved Potato Technology	Significant positive	Bangladesh
Basher	1993	"	Adoption of Sugarcane Inter-cropping	"	Bangladesh
Haque	1993	"	Adoption of BR14 during Boro Season	"	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	"	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	"	Bangladesh
Khan	1993	"	Adoption of Insecticide	"	Bangladesh
Islam	1993	"	Adoption of Improved Potato Practices	"	Bangladesh
Hossain And Crouch	1992	"	Adoption of Farm Practices	"	Bangladesh
Okoro and Obibuaka	1992	"	Adoption of Recommended Management of Practice	"	Nigeria
Sainturi	1992	"	Adoption of Rubber Technology	"	Indonesia

Hossain	1991	"	Adoption of Improved Yheat Practice	"	Bangladesh
Saxena et al.	1990	"	Adoption of Rainfed Yheat Technology	"	IndIa
Ali	1993	"	Adoption of STP Technology of Sugarcane	No relationship	Bangladesh
Rahman	1993	"	Adoption of Improved Farm Practices	"	Bangladesh

Thirteen studies showed positive relationship while only two showed no relationship. The findings, therefore, indicate a positive relationship between education of farmers and adoption of farm innovations in general.

2.1.3 Family Labor and adoption

No literature was found related to relationship between number of family labor and adoption of mixed cropping or related innovations. But there were some literatures those tried to find out the relationship between family size and adoption.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Family size	Adoption of Improved Potato Technologies	Significant positive	Bangladesh
Okoro and Obibuaka	1992	"	Adoption of Recommended Management Practice	"	Nigeria
Basher	1993	"	Adoption of Sugarcane Inter-cropping	No relationship	Bangladesh

Islam	1993	"	Adoption of Improved Potato Practices	"	Bangladesh
Hossain	1991	"	Adoption of Improved Wheat Practices	"	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	Significant negative	Bangladesh

The findings do not indicate any consistent relationship between family size of the farmers and adoption of farm innovations. Therefore, these is a need to verify the relationship between family labor and adoption.

2.1.4 Land possession and adoption

Relationships between land possession and adoption of agricultural innovations as observed in 13 research studies showed that nine studies had positive relationship, one had negative and three had no relationship between land possession and adoption of innovation.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Farm size	Adoption of Improved Potato Technologies	Significant positive	Bangladesh
Islam	1993	"	Adoption of Improved Potato Practice	"	Bangladesh
Khan	1993	"	Adoption of Insecticide	"	Bangladesh
Rahman	1993	"	Adoption of Improved Farm Practices	"	Bangladesh
Hossain and Crouch	1992	"	Adoption of Farm Practices	"	Bangladesh

Okoro and Obibuaka	1992	"	Adoption of Recommended Management Practices	"	Nigeria
Bavalatti and Sundaraswa-my	1990	"	Adoption of Dry Land Farming Practices	"	India
Saxena et al.	1990	"	Adoption of Wheat Technology	"	India
Ali	1993	"	Adoption of STP Technology of Sugarcane	No relationship	Bangladesh
Basher	1993	"	Adoption of Sugarcane Inter-cropping	"	Bangladesh
Hossain	1991	"	Adoption of Improved Wheat Practices	"	Bangladesh
Haque	1993	"	Adoption of BR14 during Boro Season	Negative	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	"	Bangladesh

The findings indicate a general positive relationship between Land possesson and adoption. But there were some negative and no relationship. Therefore, there is need to verify the relationship.

2.1.5 Cropping intensity and adoption

No literature was found related to relationship between cropping intensity and mixed cropping or related matters.

2.1.6 Annual family income and adoption

Previous findings concerning relationship of income of the farmers with adoption of agricultural innovations as observed in four studies showed that three studies had positive relationship and one had no relationship.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Income	Adoption of Improved Potato Technology	Positive	Bangladesh
Haque	1993	"	Adoption of BR14 during Boro Season	"	Bangladesh
Bhatia and Singh	1991	"	Adoption Level of Technology	"	India
Rahman	1993	"	Adoption of Improved Farm Practices	No relationship	Bangladesh

The findings, therefore, indicate a consistent positive relationship of income of the farmers with adoption agricultural innovations. Farmers with higher income are likely to have better contact with change agents and also possess the ability to make investment for purchasing inputs needed for adoption of improved practices. This might be an explanation for the positive relationship of income with adoption of agricultural innovations.

2.1.7 Credit received and adoption

No literature was found related to relationship between credit received and mixed cropping or related matters.

2.1.8 Extension contact and adoption

Past studies showed the relationship between extension contact of the farmers and adoption of agricultural innovations as found in ten studies reviewed by the researcher. All the ten studies showed positive relationship.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Extension Contact	Adoption of Improved Potato Technologies	Significant positive	Bangladesh
Ali	1993	"	Adoption of STP Technology of Sugarcane	"	Bangladesh
Basher	1993	"	Adoption of Sugarcane Inter-cropping	"	Bangladesh
Haque	1993	"	Adoption of BR14 during Boro Season	"	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	"	Bangladesh
Islam	1993	"	Adoption of Improved Potato Practices	"	Bangladesh
Rahman	1993	"	Adoption of Improved Farm Practices	"	Bangladesh
Juliana et al.	1991	"	Adoption of IPM Practices	"	India
Hossain	1991	"	Adoption of Improved Wheat Practices	"	Bangladesh
Saxena et al.	1990	"	Adoption of Rainfed Wheat Technology	"	India

Findings of the studies indicate positive relationship of extension contact with adoption of agricultural innovations. Such a relationship might be due to the fact that through extension contact farmers became aware of different innovations and learnt their methods and procedure.

2.1.9 Organizational participation and adoption

Eight studies investigated relationships between organizational participation and adoption of technological innovations by the farmer. Six studies indicated positive relationship; only one study found no relationship and another one a negative relationship between organizational participation and the extent of adoption. Organizational participation helps an individual to go into greater depth in establishing contact with other people and change agents. It also broadens his knowledge and understandings through discussion meetings and exchange of ideas in various situations. Hence, organizational participation has a salutary effect on favorable disposing individuals towards innovations.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Basher	1993	Organizational participation	Adoption of Sugarcane Inter-cropping	Significant positive	Bangladesh
Haque	1993	"	Adoption of Improved Practices of Sugarcane	"	Bangladesh
Khan	1993	"	Adoption of Insecticide	"	Bangladesh
Islam	1993	"	Adoption of Improved Potato Practices	"	Bangladesh
Rahman	1993	"	Adoption of Improved Farm Practices	"	Bangladesh
Hossain	1991	"	Adoption of Improved Wheat Practices	"	Bangladesh
Muttaleb	1995	"	Adoption of Improved Potato Technology	No relationship	Bangladesh
Haque	1993	"	Adoption of BR14 during Boro Season	Significant negative	Bangladesh

From the above discussion, it is evident that there was a positive relationship between organizational participation of the respondents and their participation in improved agricultural extension activities.

2.1.10 Training exposure and adoption

Findings concerning relationship of training exposure of the farmers with adoption of agricultural innovations as observed in six studies showed studies that four had positive relationship and two had no relationship.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Haque	2003	Training Exposure	Adoption of modern maize cultivation technologies	Significant Positive	Bangladesh
Verma et al.	1989	Training Exposure	Attitude of rural women in improved home making tasks	"	India
Rahman	1986	"	adoption of improved practices in transplanted Aman rice	"	Bangladesh
Hossain	1981	"	Development of farming skill	"	Bangladesh
Islam	2002	"	Adoption of ecological agricultural practices	No relationship	Bangladesh
Basak	1997	"	Impact of participation in BRAC rural development activities	"	Bangladesh

The findings, therefore, indicate a consistent positive relationship of training exposure of the farmers with adoption agricultural innovations. Farmers with higher training exposure are likely to have better adoption of improved practices.

2.1.11 Knowledge and adoption

Findings concerning relationship of knowledge of the farmers with adoption of agricultural innovations as observed in three studies showed that one studies had positive relationship and two studies had no relationship.

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Reddy *et al.*	1987	Knowledge on practices in paddy production	Use of improved package of practices in paddy production	Significant Positive	India
Rahman	1986	"	Adoption of improved practices in rice	No relationship	Bangladesh
Haque	1993	"	Adoption of BR 14 variety	"	Bangladesh

The findings, therefore, indicate a consistent positive relationship of knowledge of the farmers with adoption agricultural innovations. Farmers with higher knowledge are likely to have better adoption agricultural innovations. This might be an explanation for the positive relationship of knowledge with adoption of agricultural innovations.

2.2 The 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 contains at least two important elements i.e. "a dependent variable" and "an independent variable". A dependent variable is that factors which appears, disappears or varies as the research introduces, removes or varies the independent variable. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. In view of prime findings of review of literature, the researcher constructed a conceptual model of the study, which is self-explanatory and is presented in Figure 2.1.

```
┌─────────────────────────────┐     ┌─────────────────────────────┐
│  INDEPENDENT VARIABLES      │     │   DEPENDENT VARIABLE        │
└──────────┐        ┌─────────┘     └──────────┐       ┌──────────┘
           ▼        ▼                          ▼       ▼
```

Selected characteristics of the Farmers: ♦ Age ♦ Level of education ♦ Number of family labor ♦ Land possession ♦ Cropping intensity ♦ Family annual income ♦ Credit received ♦ Extension contact ♦ Organizational participation ♦ Training exposure ♦ Knowledge on mixed cropping	Adoption of mixed cropping
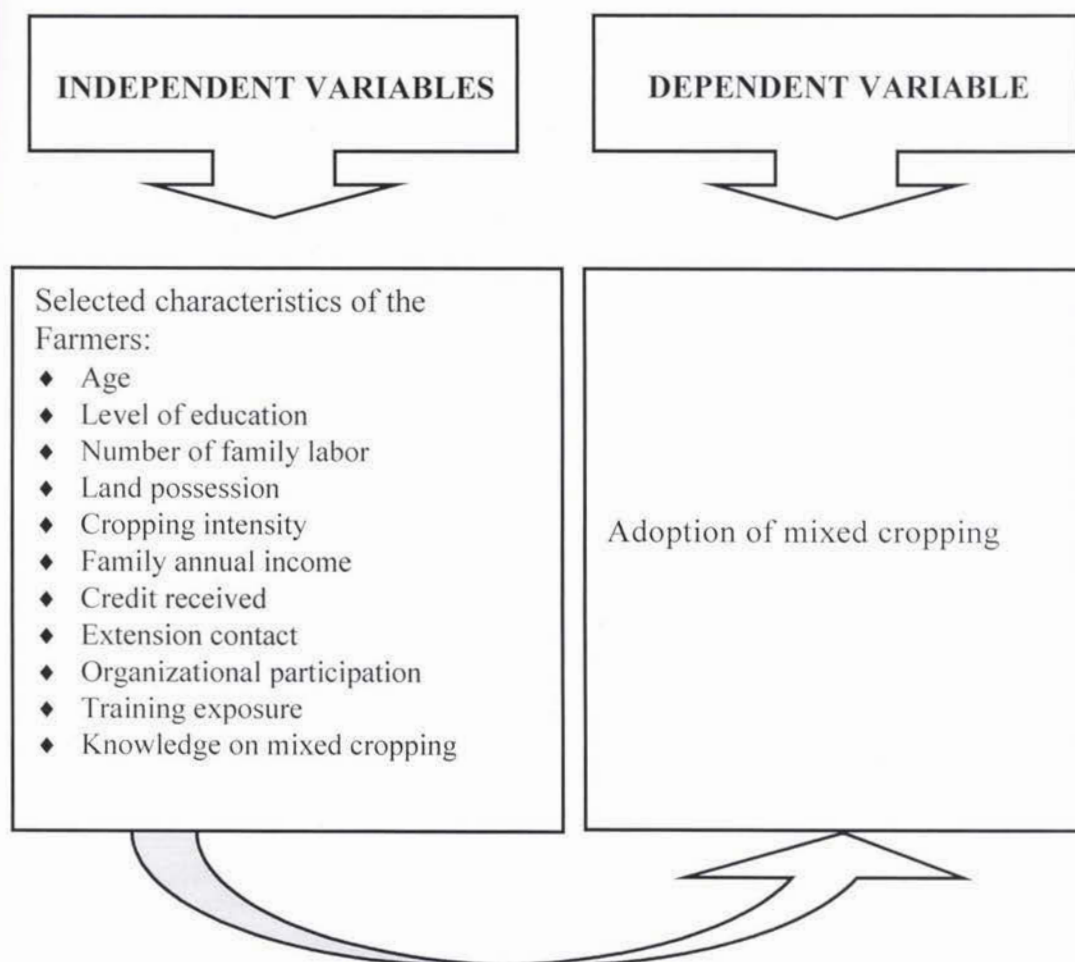
Figure 2.1 The Conceptual Framework of the Study

Chapter 3

Methodology

CHAPTER III

METHODOLOGY

3.1 Design of the Study

The design of the study was a descriptive survey research. That is, the study was designed to describe the mixed cropping in rabi season by the farmers of Madaripur Sadar Upazila and their selected personal and socio-economic characteristics. It was also designed to describe the relationship between selected characteristics of the farmers and their mixed cropping and assess the problems faced by the farmers in mixed cropping. Data were collected by means of conducting an interview with selected respondents. The independent variables included age, level of education, number of family labor, land possession, cropping intensity, annual family income, credit received, extension contact, organizational participation, training exposure and knowledge on mixed cropping. The dependent variable was adoption of mixed cropping in rabi season by the farmers.

3.2 Locale of the Study

The study was conducted in Madaripur Upazila under Madaripur district. The total area of Madaripur Upazila was 314 square kilometers and the total population was 352523 (BBS, 2006). There were 38 blocks with 224 villages under 14 Unions of this Upazila. During the last three years different crops were cultivated by the farmers in all the 38 blocks. For the study at first four unions were selected randomly out of 14 unions. Finally eight villages were randomly selected from the selected four unions covering two villages from every union in view of constraints imposed by availability of time and funds. These eight villages of Madaripur Upazila was the locale of the study. Figure 3.1 and Figure 3.2 show the map of the locale of the study.
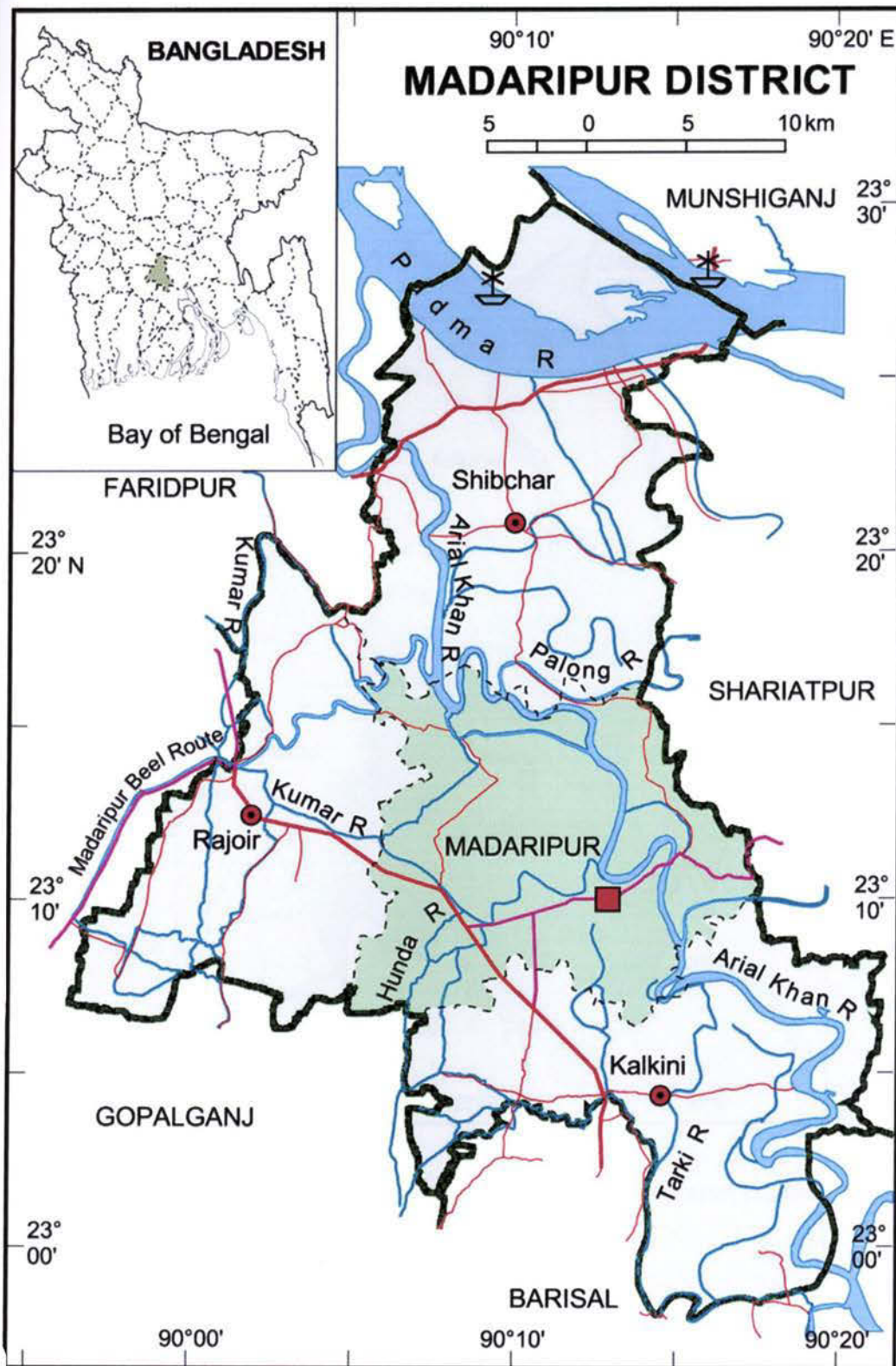
Fig. 3.1 Map of Madaripur District Showing the Madaripur Sadar Upazila
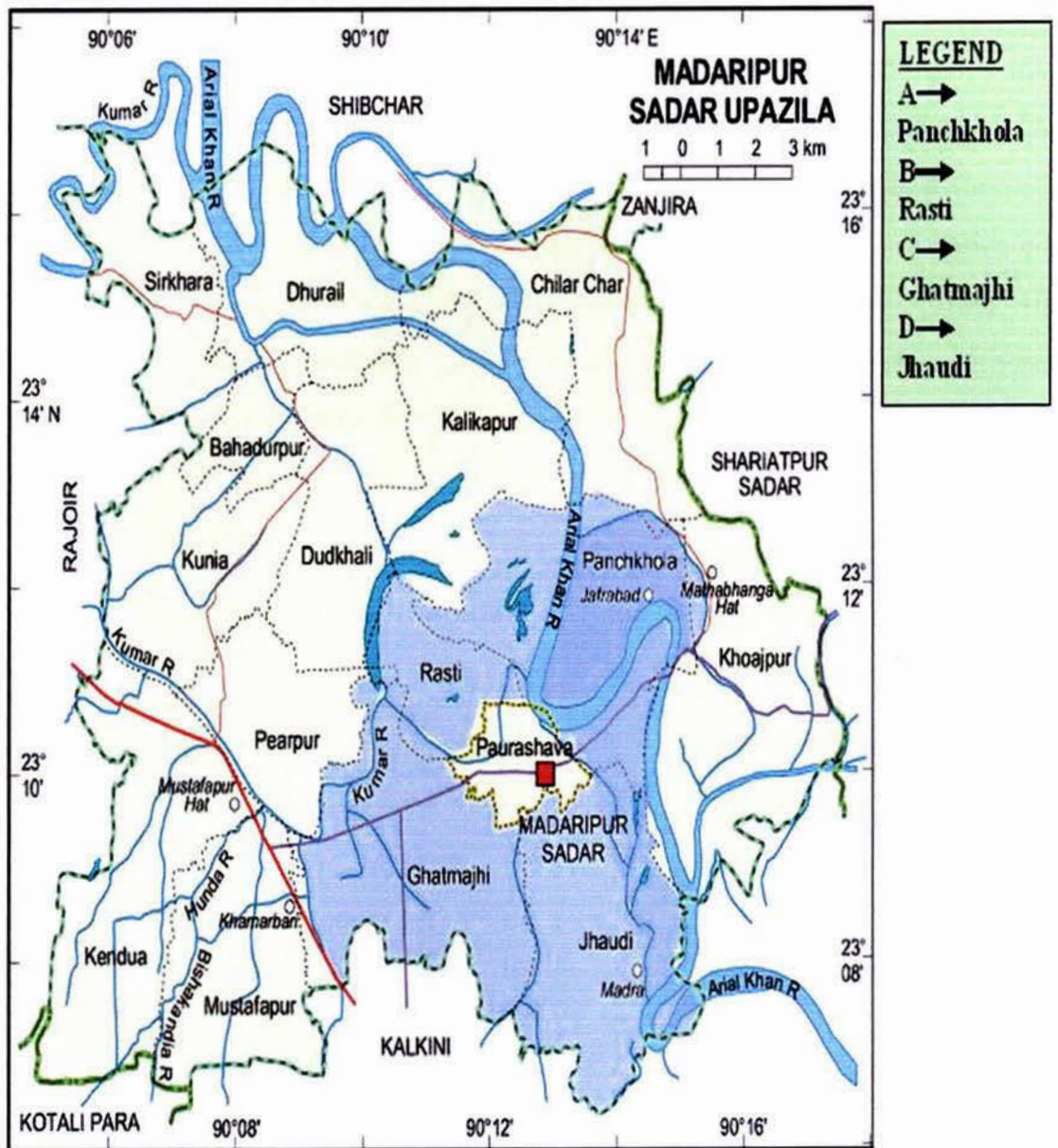
Fig. 3.2 Map of Madaripur sadar upazila showing study area (Union)

3.3 Population and Sample of the Study

There were 1003 farmers in the eight villages selected for the locale of the study which was constituted the population of the study. Data for this study were collected from a sample rather than the entire population. For better representation random sampling_method was used to select the sample. A sample population was obtained by taking 10 percent of the estimated population of eight randomly selected villages under four randomly selected unions. Thus 100 farmers constituted the sample of the study. Further 10 farmers were selected randomly which constituted the reserve list and those would be interviewed when farmer from the sample was not available at the time of interview. Distribution of the population, sample and reserve list is shown in Table 3.1.

Table 3.1 Distribution of the Population, Sample and Reserve Sample for the Study

Sl. No.	Union	Village	Population	Sample	Reserve sample
1.	Ghatmajhi	Hazir howla	211	21	2
		Korthee	150	15	1
2.	Rasti	Lokheegonj	161	16	2
		Rasti	100	10	1
3.	Jhaudi	Sayderbali	130	13	1
		Jhaudi	90	9	1
4.	Panchkholo	Mohiserchar	80	8	1
		Panchkhola	81	8	1
Total			1003	100	10

3.4 Independent Variables

A variety of factors are likely to influence the extent of adoption of mixed cropping. But it would not be possible in a single study to deal with all the factors. Hence, for selection of independent variables, the researcher went through the past related literature as far as possible. He had discussion with the

24

faculty members, experts and research fellows in agricultural extension education and related fields. He also carefully observed the personal and socio-economic characteristics of the farmers and their work passions. Availability of time, money and other resources were kept in view in selecting the variables. Considering the various relevant factors the researcher ultimately selected eleven personal and socio-economic characteristics of the farmers as independent variables of the study. The variables included: age, level of education, number of family labor, land possession, cropping intensity, annual family income, credit received, extension contact, organizational participation, training exposure and knowledge on mixed cropping.

3.5 Dependent Variable

Adoption of mixed cropping by the farmers was the only dependent variable of study.

3.6 Measurement of Variables
3.6.1 Measurement Independent Variables

Eleven personal and socio-economic characteristics of the farmers were selected as independent variables of this study. Procedures used in measuring the eleven characteristics are described below:

Age

Age of the respondents was calculated on the basis of total period of time from respondents' birth to the time of interview. It was obtained by asking direct question and was measured in terms of year. Since Bangladeshi rural people actually do not keep record of their birth date, age was sometimes based on arbitrary estimates.

Level of education

Level of Education was measured on the basis of schooling years'and one score was assigned for one year of schooling. If a respondent passed final examination of class V, his education score was taken as 5. If the respondent was educated in

Madrasa and the level of his education was equal to the level of class III, his education score was taken as 3. For illiterate respondents who had no formal schooling, the education score was taken as zero (0). Respondents who can sign only were given score as 0.5. Education score of a respondent was determined from his response to Item no. 2 of the interview schedule.

Number of family labor

Number of family labor of a respondent was measured on the basis of number of working member living with the family. It includes the respondent himself/herself, his/her spouse, children, father, mother, brothers and sisters, grandfather, grandmother and other dependents. Score of the number of family labor was assigned as follows:

Age of family members	Score
Up to 6 years	0.00
7 to 12 years	0.25
13 to 17 years	0.50
18 years and above	1.00

The scores for all the members were added together to obtain the family labor score.

Land possession

Data obtained in response to item no. 5 of the interview schedule formed the basis for determining the land possession of the respondent family. It was measured on the basis of the actual amount of land he and his family presently owned under cultivation. The land possession was measured in terms of hectare by using the following formula:

Land possession = A + B + C+ 1/2 (C +D)+ E

Where,

A = Homestead land

B = Own land under cultivation

26

C = Land taken from other as borga

D = Land given from other as borga and

E = Land taken from other as lease

Cropping intensity

Cropping intensity of the respondents was expressed in percentage. It was measured by using the following formula:

$$\text{Cropping intensity} = \frac{\text{Total cropped area}}{\text{Net cropped area}} \times 100$$

Where, Total cropped area = 1x Single cropped area + 2x Double cropped area + 3xTriple cropped area

Net cropped area = Single cropped area + Double cropped area + Triple cropped area

Annual family income

Income of a respondent was measured in thousand taka on the basis of total yearly earnings from agriculture and other sources of his family. Data obtained in response of item no. 6 of the interview schedule were used to determine the annual family income of the respondent. The method of ascertaining income from agriculture and other sources like service, business etc. were determined by asking direct question. Yearly earnings of all the members of the family from agriculture and other sources were added together to calculate the actual amount of family annual income of the respondent. A score of 1 (one) was assigned for the income of one thousand taka.

Credit received

Credit received of a respondent was measured in thousand taka on the basis of the amount of receiving credit in a year from bank, NGO, samabay samity, money lender, businessman, relatives and other sources. Data obtained in

response of Item no. 7 of the interview schedule were used to determine the credit received score of the respondent. The credit received score of a respondent was determined by adding all the credit received by him or his family members within one year of time. The score was assigned as 1 (one) for receiving credit of one thousand taka.

Extension contact

Extension contact refers to a farmer's nature of contact with eleven selected extension media. The respondents were asked to mention the nature of contacts with eleven selected media with five alternative responses as 'regularly', 'often', 'occasionally', 'rarely' and 'not at all' and scores were assigned to those alternative responses as 4,3,2,1 and 0 respectively. Logical frequencies of contact were considered for each of the alternative responses for each media as indicated in item no. 8 of interview schedule.

Thus extension contact score of a respondent could range from '0' to '44', while '0' (zero) indicating no extension contact and '44' indicating high extension contact.

Organizational participation

Organizational participation of a respondent was measured by the nature and duration of participation in 3 selected organizations. The score of organizational participation for a particular organization was computed in the following manner:

Organizational participation score = $\sum (N \times D)$

Where,

N = Nature of participation, D = Duration.

Score was assigned in the following way:

Nature of participation	Score
No participation	0
Ordinary member	1
Executive member	2
Executive officer	3

Duration of participation score was assigned in the following way:

Duration of participation	Score
No participation	0
1 year of participation	1
2 years of participation	2
3 years of participation	3
Above 3 years of participation	4

Organizational participation score of a respondent was obtained by adding his scores of participation in all the organizations. Thus organizational participation score of a respondent could range from '0' to '36', while '0' (zero) indicating no participation and '36' indicating very high organizational participation.

Training exposure

Training exposure of a respondent was obtained by the number of days that a respondent had received training in his or her entire life. It was indicated by the total number of days of training received by a respondent under different training programs.

Knowledge on mixed cropping

Knowledge of the farmers on mixed cropping was measured by asking 20 selected questions related to mixed cropping. A full score of 2 (two) was assigned for each correct answer and 0 (zero) score was assigned for the wrong or no answer. Partial score was assigned for partially correct answer. Therefore, for correct responses to all the questions, a respondent could get a total score of

'40', while for wrong responses to all the questions a respondent could get '0' (zero). However, the knowledge on mixed cropping scores of the respondents was computed by adding his scores for all the 20 questions. Thus, the knowledge on mixed cropping scores could range from '0' to '40', where '0' (zero) indicates very low knowledge on mixed cropping and '40' indicates very high knowledge on mixed cropping.

3.6.2 Measurement of dependent variable

Adoption of mixed cropping

Adoption of mixed cropping was the only dependent variable of the study. It was measured by the following formula for the rabi season of a particular year:

$$\text{Adoption of mixed cropping} = \frac{\textbf{Land under mixed cropping}}{\textbf{Potential area for mixed cropping}} \times 100$$

Adoption of mixed Cropping was measured for three years (2004-5, 2005-6, 2006-07). Finally adoption of mixed cropping was measured by average of three years as follows:

$$\text{Adoption of mixed Cropping} = \frac{\textbf{Total adoption of mixed cropping for three years}}{3}$$

Thus adoption of mixed cropping of the respondents ranged from 0-100, where '0' indicates no. adoption of mixed cropping and '100' indicates very high adoption of mixed cropping.

3.7 Measurement of Problems Faced Index (PFI) in Adoption of mixed Cropping

Seven problems were selected for the study after thorough consultation with supervisors, co-supervisors and relevant experts. The respondents were asked to response on four alternatives responses as 'high problem', 'medium problem' and 'low problem 'and 'not at all problem' for each of seven selected problems. Scores were assigned to those alternative responses as 3, 2, 1 and 0 respectively. Score for particular problem was measured by Problem Faced Index (PFI) as follows:

$$PFI = P_h \times 3 + P_m \times 2 + P_l \times 1 + P_n \times 0$$

Where,

PCI = Problem faced Index

P_h = No. of respondents faced high problem

P_m = No. of respondents faced medium problem

P_l = No. of respondents faced low problem

P_n = No. of respondents faced not at all problem

Thus PFI for a particular problem could range from '0' to '300', while '0' indicating no problem and '300' indicating highest problem faced. PFI for all the problems were determined. Finally a rank order was made on the basis of PFI.

Interview Schedule Development

Keeping the objectives of the study in view an interview schedule was carefully designed to collect relevant data. The schedule contained both closed and open-ended questions. Simple and direct questions were included in the schedule. Scale was developed to ascertain mixed cropping by the farmers of Madaripur sadar Upazila under Madaripur district. The interview schedule was pre-tested with 10 farmers of Madaripur sadar Upazila who adopted mixed cropping

31

practices. These ten respondents were not included in the sample list. The pre-test facilitated the researcher to examine the suitability of different questions and statements of the schedule. Apart from elimination of faulty questions and statements, other necessary corrections, modifications, additions and alterations were made in the schedule on the basis of comments of the experts and pretest results. The final version of the interview schedule was then prepared and printed for data collection from the respondents (Appendix A).

Collection of Data

Data were collected by interview procedure from 100 selected farmers by the researcher himself. The interview schedule prepared earlier was used for collection of data. Interviews were usually conducted with the respondents in their home. Before going to the respondents for interview, they were duly informed to ensure their availability on time. While starting interview with any respondent, the researcher took utmost care to establish rapport with the respondent so that he/she did not feel hesitant to furnish the desired information. Investigator explained clearly the purpose of the study to the respondents. The researcher explained/reviewed the issue to the respondents who failed to understand the question or recollect the previous activities. The researcher did not face any problem in collecting data rather he received excellent cooperation from the respondents during the time of interview. The Agriculture Extension Officer of Madaripur Sadar Upazila with his officials cordially helped the investigator to collect the data. Data were collected during November 15 to December15, 2007

Data analysis procedure

Collected data were coded, compiled and analyzed according to the objectives of the study. The SPSS (computer programmed) was used to perform the data analysis. Descriptive statistics such as number, percent, mean, standard deviation, range, and rank order were used to describe the data. To determine

the relationship between the selected personal and socio-economic characteristics of the farmers and their adoption of mixed cropping Pearson Product Moment correlation coefficient was computed. Throughout the study a 0.05 level of probability with 98 degrees of freedom was used to reject any null hypothesis.

Chapter 4

Results and Discussion

CHAPTER IV

RESULTS AND DISCUSSION

This chapter has been discussed in the four sub-sections according to the objectives of the study. **First** section deals with selected personal and socio-economic characteristics of the respondents, **second** section deals with extent of adoption of mixed cropping by the farmers, **third** section deals with relationship between the selected personal and socio-economic characteristics of the respondents and their extent of adoption of mixed cropping and **fourth** section deals with discussion on problems faced by the farmers in adoption of mixed cropping.

4.1 Selected characteristics of the respondents

A behavior of an individual is largely determined by his personal, social and economic characteristics. It was, therefore, assumed that the adoptions of mixed cropping by the farmers were influenced by their various personal and socio-economic characteristics. Some selected characteristics of the respondents have been studied and presented in Table 4.1.

Table 4.1 Farmers' Personal Characteristics Profile

Sl. No.	Characteristics	Measuring Unit	Possible range	Observed range	Mean	Standard deviation
1.	Age	Actual years	Unknown	27-60	38.16	7.84
2.	Level of Education	Years of schooling	Unknown	0-12	3.66	3.23
3.	Family labor	Number of Working Members	Unknown	1.0-4.5	2.06	.94
4	Land possession	Hectare	Unknown	0.12-1.25	0.51	0.23
5	Cropping intensity	Percentage	Unknown	118.18-300	206.70	28.31
6	Annual family income	'000' Taka	Unknown	35-110	65.57	20.00
7.	Credit received	'000' Taka	Unknown	0-20	5.57	5.0
8	Extension contact	Score	0-44	4-31	14.53	6.36

9	Organizational participation	Years of participation	Unknown	6-24	11.81	5.12
10	Training exposure	Score	Unknown	0-30	4.97	5.36
11	Knowledge on Mixed cropping	Score	0-40	14-36	24.04	5.16

4.1.1 Age

The observed age of the farmers ranged from 27 to 60 years with an average of 30.16 and a standard deviation of 7.84. On the basis of their age, the farmers were classified into three categories: "young aged" (up to 30), "middle aged" (31-45) and "old aged " (46 and above). The highest proportion (65 percent) of the farmers felt in the "middle aged" category while 20 percent of them felt in the "young" category and only 15 percent felt in the "old" category. The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2 Distribution of the Farmers According to their Age

Categories	Farmers (N = 100)	
	Number	Percent
Young (up to30 years)	20	20
Middle aged (31-45 years)	65	65
Old (46 years and above)	15	15
Total	100	100

Data contained in Table 4.2 indicated that a large proportion (85 percent) of the farmers were young to middle aged categories.

4.1.2 Level of Education

The level of education scores of the farmers ranged from 0 to 12 with an average of 3.66 and a standard deviation of 3.23. On the basis of their level of education, the farmers were classified into four categories, namely "illiterate/can sign only" (0-0.5), "primary" (1-5), "secondary" (6-10) and

35

"above secondary" (11 and above). The distribution of the farmers according to their education is shown in Table 4.3.

Table 4.3 Distribution of the Farmers According to their level of Education

Categories	Farmers (N = 100)	
	Number	Percent
Illiterate/can sign only (0-0.5)	40	40
Primary level (1-5)	38	38
Secondary level (6-10)	19	19
Above secondary level (above 10)	3	3
Total	100	100

Data contained in Table 4.3 indicated that the majority (40 percent) of the farmers were illiterate or sign only. Thirty eight and 19 percent has primary and secondary level of education respectively. Three percent of the respondent had above secondary level of education. That means that 60 percent of the respondents were literate.

4.1.3 Number of family labor

The number of family labor scores of the farmers ranged from 1.0 to 4.5. The average was 2.06 with a standard deviation of 0.94. On the basis of their number of family labor scores, the farmers were classified into the three categories as "small" (1.00-2.50), "medium" (2.51-3) and "large" (3.10 and above). Table 4.4.contains the distribution of the farmers according to their family labor.

Table4.4 Distribution of Farmers According to their number of Family Labor

Categories	Farmers (N = 100)	
	Number	Percent
Small (1.25-2.75)	80	80
Medium (2.76-4.25)	17	17
Large (4.26 and above)	3	3
Total	100	100

Data contained in Table 4.4 indicated that the findings revealed that 80 percent of the farmers had small family labor compared to 17 percent of them having medium family labor. The proportion of large family labor was 3 percent only.

4.1.4 Land possession

The land possession of the respondents varied from 0.12 ha to 1.25 ha. The average land possession was 0.51 hectares with a standard deviation of 0.23. The respondents were classified into the three categories based on their farm size "marginal"(up to 0.2 ha),"small" (up to 1.00), and "medium" (1.01 and above). The distribution of the farmers according to their land possession is shown in Table 4.5.

Table 4.5 Distribution of the Farmers According to their Land Possession

Categories	Farmers (N = 100)	
	Number	Percent
Marginal (up to 0.2 ha)	7	7
Small (0.21-1.00ha)	91	91
Medium (1.01ha and above)	2	2
Total	100	100

Data contained in Table 4.5 revealed that 91percent of the farmers had small possession of farms compared to7and 2 percent having marginal and medium farms.

4.1.5 Cropping intensity

The observed cropping intensity ranged from 118.18 to 300.00. The average cropping intensity was 206.70 with a standard deviation of 28.31. The respondents were classified into the two categories based on their cropping intensity "medium" (up to 200.00) and "high"(200.01 and above). The distribution of the farmers according to their cropping intensity area is shown in Table 4.6

Table4.6 Distribution of the Farmers According to their Cropping Intensity

Categories	Farmers (N = 100)	
	Number	Percent
Medium (up to 200.00)	57	57
High (200.01 and above)	43	43
Total	100	100

Data contained in Table 4.6 revealed that the majority (57 percent) of the farmers had medium cropping intensity and 43 percent of the respondents had high cropping intensity.

4.1.6 Annual family income

The observed family annual income of the respondents ranged from 35 to 110 thousands taka with an average of 65.57 thousand taka and a standard deviation of 20.00. Based on their family annual income, the farmers were classified into three categories: "low income" (up to 50 thousand taka), "medium income" (50.01 to 100 thousand taka) and "high income" (100.01 thousand taka and above). The distribution of the farmers according to their annual family income is shown in Table 4.7.

Table 4.7 Distribution of the Farmers According to their Annual Family Income

Categories	Farmers (N = 100)	
	Number	Percent
Low income (up to 50 thousand taka)	33	33
Medium income (50.01 to 100 thousand taka)	60	60
High income (100.01 and above)	7	7
Total	100	100

From Table 4.7, it was observed that the highest portion (60%) of the respondents had medium annual family income while 33 percent respondents had low and 7percent had high annual family income.

4.1.7 Credit received

The observed credit received scores of the respondents ranged from 0 to 20 thousand taka with an average of 5.57 thousand and a standard deviation of 5.03. Based on the observed credit received scores, the respondents were classified into three categories: "No credit received" (0), "low credit received" (up to 10 thousand taka) and "medium credit received" (10.01 thousand and above). The distribution of the respondents according to their credit received scores is shown in Table 4.8.

Table 4.8 Distribution of the Farmers According to their Credit Received

Categories	Farmers (N = 100)	
	Number	Percent
No credit received (0)	27	27
Low credit received (up to 10 thousand taka)	59	59
Medium credit received (10.01 thousand taka and above)	14	14
Total	100	100

Data presented in Table 4.8 showed that the highest proportion (59 percent) of the farmers belonged to "low credit received" category as compared to 27 and 14 percent having no and medium credit received category respectively.

4.1.8 Extension contact

The observed extension contact scores of the respondents ranged from 4 to 31 against the possible range of 0 to 44. The average was 14.53 and the standard deviation was 6.36. Based on their extension contact scores, the respondents were classified into three categories: "low" (up to 15), "medium" (16-30) and "high" (31 and above). The distribution of the respondents according to their extension contact is shown in Table 4.9.

Table 4.9 Distribution of the Farmers According to their Extension Contact

Categories	Farmers (N = 100)	
	Number	Percent
Low (up to 15)	68	68
Medium (16-30)	31	31
High (31 and above)	1	1
Total	100	100

Data contained in table. 4.9 indicated that the highest proportion (68 percent) of the farmers had low extension contact as compared to 31 and 1 percent having medium and high extension contact respectively.

4.1.9 Organizational participation

The observed organizational participation scores of the respondents ranged from 6 to 24 against the possible range of 0-36 with the average of 11.81 and a standard deviation of 5.12. On the basis of their organizational participation the farmers were classified into two categories: "low organizational participation" (up to 12), and "medium organizational participation" (13-24) .The distribution of the farmers according to their organizational participation scores is shown in Table 4.10.

Table 4.10 Distribution of the Farmers According to their Organizational Participation

Categories	Farmers (N = 100)	
	Number	Percent
Low organizational participation (up to 12)	65	65
Medium organizational participation (13to 24)	35	35
Total	100	100

Data contained in Table 4.10 revealed that the majority (65 percent) of the farmers had low organizational participation and 35 percent of the farmer had medium organizational participation respectively.

4.1.10 Training exposure

The observed training exposure scores of the respondents ranged from 0 to 30 with an average of 4.97 and a standard deviation of 5.36. On the basis of their observed training exposure scores, the farmers were classified into four categories: "no training exposure" (0), "low training exposure" (up to 10), medium training exposure" (11 to 20) and "high training exposure" (21 and above). The distribution of the farmers according to their training exposure is shown in Table 4.11.

Table 4.11 Distribution of the Farmers According to their Training Exposure

Categories	Farmers (N = 100)	
	Number	Percent
No training exposure (0)	26	26
Low exposure (up to 10)	67	67
Medium exposure (11-20)	5	5
High exposure (21 and above)	2	2
Total	100	100

Data contained in Table 4.11 showed that 26 percent of the farmers had no training exposure compared to 67, 5 and 2 percent having low, medium and high training exposure respectively.

4.1.11 Knowledge on mixed cropping

The observed knowledge on mixed cropping scores of the respondents ranged from 14 to 36 against the possible range of 0 to 40. The average was 24.04 and standard deviation was 5.16. Based on their knowledge on mixed cropping scores, the respondents were classified into three groups: "low knowledge" (up to 20), "medium knowledge" (21-30), and "high knowledge" (31 and above). The distribution of the farmers is shown according to their classified groups in table 4.12.

Table 4.12 Distribution of the Farmers According to their Knowledge on Mixed Cropping

Categories	Farmers (N = 100)	
	Number	Percent
Low (up to 20)	30	30
Medium (21-30)	60	60
High (31 and above)	10	10
Total	100	100

Data contained in Table 4.12 revealed that the majority (60percent) of the farmers had medium knowledge on mixed cropping while 30 percent had low knowledge and only 10 percent of the respondents had high knowledge on mixed cropping.

4.2 Adoption of mixed cropping

The observed adoption of mixed cropping scores of the respondents ranged from 11.11 to 100.00 against the possible range of 0-100 with an average of 39.37 and standard deviation of 19.56. On the basis of their mixed cropping scores, the farmers were classified into following three categories:

Categories	Scores
Low adoption of mixed cropping	0-33.33
Medium adoption of mixed cropping	33.34-66.67
High adoption of mixed cropping	> 66.67

The mixed cropping of the farmers according to their extent of adoption mixed cropping scores is shown in Table 4.13.

Table 4.13 Distribution of the Farmers According to their Adoption of Mixed Cropping

Categories	Farmers (N = 100)	
	Number	Percent
Low adoption of mixed cropping (0-33.33)	51	51
Medium adoption of mixed cropping (33.34-66.67)	40	40
High adoption of mixed cropping (> 66.67)	9	9
Total	100	100

The table 4.13 shows that highest proportion (51 percent) of the farmers had low adoption of mixed cropping, while 40 and 9 percent of them had medium and high adoption of mixed cropping respectively. It means that majority (91) of the respondents belonged to low to medium adoption of mixed cropping.

4.3 Relationship between the selected Characteristics of the Farmers and their Adoption of mixed cropping

Coefficient of correlation was computed in order to explore the relationship between the selected characteristics of the farmers and their adoption of mixed cropping. The selected characteristics constituted the independent variables and adoption of mixed cropping by the farmers constituted the dependent variable.

In this section relationship between eleven selected characteristics (independent variables) of the farmers viz. age, level of education, number of family labor, land possession, cropping intensity, annual family income, credit received,

43

extension contact, organizational participation, training exposure and knowledge on mixed cropping with the and dependent variable i.e. adoption of mixed cropping are described. Person's Product Moment Co-efficient of Correlation (r) has been used to test the hypothesis concerning the relationship between the variables. Five percent level of significance was used as the basis for rejection of any hypothesis.

The summary of the results of the correlation co-efficient indicates the relationships between the selected characteristics of the respondent and their adoption of mixed cropping (Table 4.14).

Table 4.14: Correlation coefficient between the selected variables

Dependent Variable	Independent Variables	Computed Value of 'r'	Table Value of 'r' at 98 Degrees of Freedom	
			5%	1%
Adoption of Mixed Cropping	Age	0.176^{NS}		
	Level of education	0.021^{NS}		
	Number of family labor	0.508^{**}		
	Land possession	0.053^{NS}		
	Cropping intensity	0.354^{**}		
	Annual family income	0.428^{**}	0.196	0.256
	Credit received	0.376^{**}		
	Extension contact	0.128^{NS}		
	Organizational participation	0.026^{NS}		
	Training exposure	0.286^{**}		
	Knowledge on mixed cropping	0.512^{**}		

^{NS} = Non significant
* = Significant at 0.05 level of probability
** = Significant at 0.01 level of probability

4.3.1 Relationship between age of the farmers and their adoption of mixed cropping

The relationship between age of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between age of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A negligible positive relationship was found to exist between the two concerned variables.

➢ The computed value of 'r' (0.176) was smaller than the table value ($\pm$ 0.196) with 98 degrees of freedom at 0.05 level of probability.

➢ The concerned null hypothesis was accepted.

➢ The co-efficient of correlation between the concerned variables was not significant at 0.05 level of probability.

The findings demonstrate that age of the farmers had no significant relationship with their adoption of mixed cropping. Muttaleb (1995), Islam (1993), Saxena et al. (1990) also found similar finding in their studies.

4.3.2 Relationship between level of education of the farmers and adoption of mixed cropping

The relationship between level of education of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between level of education of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A negligible positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (0.021) was smaller than the table value (± 0.196) with 98 degrees of freedom at 0.05 level of probability.

➢ The concerned null hypothesis was accepted.

➢ The co-efficient of correlation between the concerned variables was not significant at 0.05 level of probability.

The findings demonstrate that level of education of the farmers had positive but insignificant relationship with their adoption of mixed cropping. Ali (1993), Rahman (1993) also found similar relationship in their studies.

4.3.3 Relationship between number of family labor of the farmers and adoption of mixed cropping

The relationship between number of family labor of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between number of family labor of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A significant positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (0.508) was larger than the table value (± 0.256) with 98 degrees of freedom at 0.01 level of probability.

➢ The concerned null hypothesis was rejected.

The findings demonstrate that number of family labor of the farmers had significant positive relationship with their adoption of mixed cropping. It means that adoption of mixed cropping as increased with the increase of family labor.

4.3.4 Relationship between land possession of the farmers and adoption of mixed cropping

The relationship between land possession of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between land possession of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A negligible positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (.053) was smaller than the table value ($\pm$ 0.196) with 98 degrees of freedom at 0.05 level of probability.

➢ The concerned null hypothesis was accepted.

➢ The co-efficient of correlation between the concerned variables was not significant at 0.05 level of probability.

The findings demonstrate that land possession of the farmers had insignificant positive relationship with their adoption of mixed cropping.

4.3.5 Relationship between cropping intensity of the farmers and adoption of mixed cropping

The relationship between cropping intensity of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between cropping intensity of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➤ A significant positive relationship was found to exist between the two variables.

➤ The computed value of 'r' (.354) was greater than the table value (± 0.256) with 98 degrees of freedom at 0.01 level of probability.

➤ The concerned null hypothesis was rejected.

The findings demonstrate that cropping intensity of the farmers had significant positive relationship with their adoption of mixed cropping. It means that adoption of mixed cropping as increased with the increase cropping intensity.

4.3.6 Relationship between annual family income of the farmers and adoption of mixed cropping

The relationship between annual family income of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between annual family income of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A significant positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (0.428) was greater than the table value (± 0.256) with 98 degrees of freedom at 0.01 level of probability.

➢ The concerned null hypothesis was rejected.

The findings demonstrate that annual family income of the farmers had significant positive relationship with their adoption of mixed cropping. It was observed in the study area that the larger the annual family income of the farmers, the higher was their adoption of mixed cropping. It means that adoption of mixed cropping as increased with the increase of annual family income. . Such a relationship might be due to the fact that higher income increases capability to make investment for adopting improved technologies.

4.3.7 Relationship between credit received by the farmers and adoption of mixed cropping

The relationship between credit received by the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between credit received by the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A significant positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (0.376) was greater than the table value (± 0.256) with 98 degrees of freedom at 0.01 level of probability.

➢ The concerned null hypothesis was rejected.

The findings demonstrate that credit received of the farmers had significant positive relationship with their adoption of mixed cropping. It means that adoption of mixed cropping as increased with the increase of credit received. Such a relationship might be due to the fact that higher availability of enough capital increases capability to make investment for adopting improved technologies.

4.3.8 Relationship between extension contact of the farmers and adoption of mixed cropping

The relationship between extension contact of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between extension contact of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A negligible positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (0.128) was smaller than the table value ($\pm$ 0.196) with 98 degrees of freedom at 0.05 level of probability.

➢ The concerned null hypothesis was accepted.

The findings demonstrate that extension contact of the farmers had no significant positive relationship with their adoption of mixed cropping. It was observed in the study area that the more the extension contact of the farmers, the higher the adoption of mixed cropping. It means that through high extension contact farmers become aware and motivated to adopt crops like potato, mustard, mungbean and other crops. Ali (1993), Basher (1993), Haque (1993), Islam (1993), Muttaleb (1995) and many other researchers found significant positive relationship between extension contact and the extent of adoption of improved practices of different crops.

4.3.9 Relationship between organizational participation of the farmers and adoption of mixed cropping

The relationship between organizational participation of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between organizational participation of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A negligible positive relationship was found to exist between the two variables.

➢ The computed value of 'r' (0.026) was smaller than the table value ($\pm$ 0.196) with 98 degrees of freedom at 0.05 level of probability.

➢ The concerned null hypothesis was accepted.

The findings demonstrate that organizational participation of the farmers had no significant relationship with their adoption of mixed cropping.

4.3.10 Relationship between training exposure of the farmers and adoption of mixed cropping

The relationship between training received of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between training exposure of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

➢ A significant positive relationship was found to exist between the two variables.

> The computed value of 'r' (0.286) was greater than the table value ($\pm$ 0.256) with 98 degrees of freedom at 0.01 level of probability.

> The concerned null hypothesis was rejected.

The findings demonstrate that training exposure of the farmers had significant positive relationship with their adoption of mixed cropping. It means that adoption of mixed cropping as increased with the increase of training exposure. The reason might be that after completion of a successful training, farmers are expected to be aware of the benefits of mixed cropping and also have enough knowledge about the cultivation process of different crops.

4.3.11 Relationship between knowledge on mixed cropping of the farmers and adoption of mixed cropping

The relationship between knowledge on mixed cropping of the farmers and their adoption of mixed cropping was examined by testing the following null hypothesis:

"There was no relationship between knowledge on mixed cropping of the farmers and their adoption of mixed cropping".

The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

> A significant positive relationship was found to exist between the two variables.

> The computed value of 'r' (0.512) was greater than the table value ($\pm$ 0.256 with 98 degrees of freedom at 0.01 level of probability.

> The concerned null hypothesis was rejected.

The findings demonstrate that knowledge on mixed cropping of the farmers had significant positive relationship with their adoption of mixed cropping. It means that adoption of mixed cropping as increased with the increase of knowledge on

mixed cropping. The reason might be that with the increase of knowledge on mixed cropping farmers become aware of the benefits of mixed cropping.

4.4 Problem Faced in Adoption of Mixed Cropping

The observed problem faced index of the problems in adoption of mixed cropping ranged from 105 to 170. The selected seven problems faced by the respondents in adopting mixed cropping with their Problem Faced Index (PFI) are shown in Table 4.15.

Table 4.15 Problem Confrontation Index (PCI) with Rank Order

Description of problem	Number of Respondents Confronted				PFI	Rank Order
	High problem	Medium problem	Low problem	Not at all problem		
Lack of extension service	20	45	20	15	170	1
Lack of inputs in time	15	51	18	16	165	2
Lack of technical knowledge	23	42	10	25	163	3
Unfavorable climate	10	53	22	15	158	4
Difficult to practice mixed cropping	20	39	15	26	153	5
High pest attack	11	31	16	42	111	6
Less crop production by adopting mixed cropping	4	11	71	14	105	7

On the basis of PFI, it was observed that "lack of extension service" ranked first followed by "lack of inputs in time", "lack of technical knowledge", "unfavorable climate", "difficult to practice mixed cropping", "high pest attack" and "less crop production by adopting mixed cropping".

Chapter 5

Summary, Conclusions & Recommendations

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS

AND

RECOMMENDATIONS

This chapter presents the summary of findings, conclusions and recommendations of the study.

5.1 Summary of Findings

The major findings of the study are summarized below:

5.1.1 Selected characteristics of the respondents

Eleven characteristics of the farmers were selected for investigation in this study. The findings of eleven characteristics of the farmers are summarized below:

Age

The findings indicated that the large proportion (85 percent) of farmers were young to middle-aged.

Level of education

It was found that majority (40 percent) of the farmers was illiterate or could sign their name only compared to 38, 19 and 3 percent had primary, secondary and above secondary level of education respectively.

Number of family labor

The findings revealed that 80 percent of the farmers had small family labor compared to 17 percent of them having medium family labor. The proportion of large family labor was 3 percent only.

Land possession

It was found that 91 percent of the respondents had small land holding, 7 percent had marginal land holding and 2 percent had medium land holding.

Cropping intensity

It was found that 57 percent of the respondents had medium cropping intensity and 43 percent had high cropping intensity.

Annual family income

It was found that the highest portion (60 percent) of the respondents had medium annual family income while 33 percent respondents had low and 7 percent had high annual family income.

Credit received

The study indicated that the highest proportion (59 percent) of the farmer received low credit compared to 27 and 14 percent received no and medium credit respectively.

Extension contact

The study indicated that 68 percent of the respondents felt in low extension contact category compared to 31 percent falling in the medium extension contact and only one percent falling in the high extension category. It was evident that the majority (99 percent) of the respondents had low to medium contact with the different extension activities, agents and media.

Organizational participation

It was revealed that the majority (65 percent) of the farmers had low organizational participation and 35 percent of them had medium organizational participation.

Training exposure

The study revealed that one fourth (26 percent) of the farmers had no training exposure compared to 67, 5 and 2 percent having low, medium and high training exposure respectively.

Knowledge on mixed cropping

The study revealed that the majority (60 percent) of the farmers had medium knowledge on mixed cropping while 30 percent had poor knowledge and only 10 percent of the respondents had high knowledge on mixed cropping.

5.1.2 Adoption of mixed cropping

Majority (91 percent) of the respondents belonged to low to medium adoption of mixed cropping.

5.1.3 Relationship between dependent and independent variables of the respondents

Relationships of eleven selected characteristics of the farmers with their adoption of mixed cropping were investigated in this study.

The results indicated that number of family labor, cropping intensity, annual family income, credit received, training exposure and knowledge on mixed cropping had significant positive relationship with adoption of mixed cropping. Other five variables namely, age, level of education, land possession, extension contact and organizational participation had no significant relationship with adoption of mixed cropping.

5.1.4 Problem Faced in Adoption of Mixed Cropping

On the basis of PFI, it was observed that "lack of extension service" ranked first followed by "lack of inputs in time", "lack of technical knowledge", "unfavorable climate", "difficult to practice mixed cropping", "high pest attack" and "less crop production by adopting mixed cropping".

5.2 Conclusions

Based on the above findings the following conclusions were drawn:

1. Majority (91 percent) of the respondents belonged low to medium adoption of mixed cropping categories. Therefore, it may be concluded that the adoption of mixed cropping should be increased.

2. Family labor of the farmers showed a significant positive relationship on their adoption of mixed cropping in rabi season. However, considering that most of the farmers belonged under the small family labor group. Therefore, it may be concluded that motivation programmes should be taken specially for the farmers who have small family labor to adopt mixed cropping.

3. The relationship between cropping intensity and adoption of mixed cropping found to be positively significant. Therefore, it may be concluded that increased adoption of mixed cropping gave higher crop production through increase cropping intensity.

4. Annual family income and credit received of the farmers showed positive and significant relationship with their adoption of mixed cropping. One may, therefore, conclude that extension programme for giving farm management advice for increasing farm income or providing knowledge about the details procedure of receiving credit to the farmer would have a conductive effect in increasing adoption of mixed cropping.

5. There was a positive and significant relationship between training exposure and adoption of mixed cropping. So, it can be concluded that adoption of mixed cropping increases with the increase of training exposure of the farmers.

6. Knowledge on mixed cropping of the farmers had positive and significant relationship their extent of adoption of mixed cropping. This indicates that adoption of mixed cropping increases with the increase of knowledge on mixed cropping.

5.3 Recommendations

5.3.1 Recommendation for policy implications

1. Mixed cropping can increase the sources of human food.But in the present study the extent of adoption of mixed cropping among the farmers was low to medium. It is, therefore, recommended that effective steps should be taken to motivate the farmers in accepting mixed cropping.

2. Family labor of the farmer had significant positive relationship with adoption of mixed cropping. Therefore, it may be recommended that necessary steps should be taken by the concerned authority, so that the farmers specially those who have small family labor could adopt mixed cropping in a larger scale.

3. Cropping intensity had significant positive relationship with adoption of mixed cropping. Therefore, it may be recommended that policy makers, planners and extension providers should take necessary motivational programme to encourage farming community to increase cropping intensity.

4. Family annual income and credit received had significant positive relationship with adoption of mixed cropping. Therefore, it may be recommended that concerned authority should supply more credit to the farmers so that they can invest more in adopting mixed cropping.

5. Organizational participation had significant positive relationship with adoption of mixed cropping. Therefore, it may be recommended that concern authority should take necessary action so that the farmers could increase organizational participation.

6. Training exposure and knowledge on mixed cropping of the farmers had positive significant relationship with their adoption of mixed cropping. Therefore, it may be recommended that concern authority should take necessary motivational program like training on mixed cropping so that the farmers could increase their knowledge on mixed cropping.

5.3.2 Recommendation for Future Research

The following recommendations are made for future research:

1. To arrive at generalizations as to the adoption of mixed cropping behavior of the farmers in the country and to draw up policy measures for the whole of the nation, similar research efforts are needed at other locations.

2. This study investigated the effects of eleven personal and socio-economic characteristics of the farmers on their extent of adoption of mixed cropping. It is, therefore, recommended that further study should be conducted involving other related characteristics.

3. The study was conducted to find out the adoption of mixed cropping. Further research should be taken to find out the cropping pattern, crop rotation and similar topics.
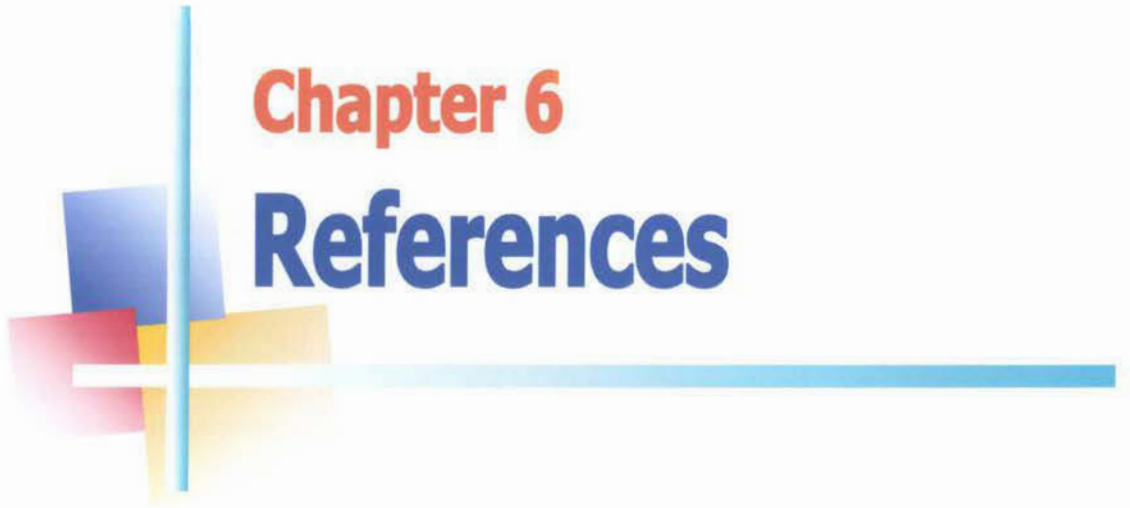
Chapter 6
References

CHAPTER VI

REFERENCES

Ali, M. K. 1993. Farmers Response to Spaced Transplanting Technology of Sugarcane.Unpublished *M.S. Thesis*. Department of Agricultural Extension Education. Institute of Postgraduate Studies in Agriculture. Salna, Gazipur.

Anonymous,1990.Fourth Five Year Plan 1990-95.Planning Comniission. Ministry of Planning, Govt. of he People's Republic of Bangladesh, Sher-e-Bangla Nagar, Dhaka.

Anonymous,1985. Third Five Year Plan 1985-90, Planning Commission. Ministry of Planning, Govt. of he People's Republic of Bangladesh, Sher-e-Bangla Nagar, Dhaka.

BBS. 2006 .Statistical Year Book of Bangladesh. 2006. Bangladesh Bureau of Statistics, Government of the people's Republic of Bangladesh.

Basher, M. K. 1993. Adoption of Inter-cropping in Sugarcane Cultivation. Unpublished *M.S. (Ag. Ext. Ed.) Thesis*.Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.

Bavalatti, V. G. and B. Sundaraswamy, 1990. Adoption of Dry Land Farming-Practices by the Farmers of Biiapur District. Indian Journal of Extension Education, 26(3& 4) : 67-69.

Basak, N. C. 1997. Impact of BRAC Rural Development Activities as Perceived by the Participating Women *M.S.(Ag. Ext. Ed.)Thesis*. Department of Agricultural Extension Education Bangladesh Agricultural University, Mymensingh.

Bhatia, R S. and R. Singh, 1991. Agricultural Engineering Technologies in Puniab. Indian Journal of Extension Education, 27(3 &4): 28-34.

Goode, W. J. and P. K. Hatt, 1952. Methods in Social Research. New York: Mc. Graw-Hill book company, Inc.

Haque, M. E. 1993. Adoption of BR14 during Boro Season. Unpublished *M.S. Thesis*. Department of Agricultural Extension Education. Institute of Postgraduate Studies in Agriculture, Salna, Gazipur.

Haque, M .M. 1993. Adoption of Improved Practices in Sugarcane cultivation by the Sugarcane Growers of Sreepur Upazila of Gazipur district. Unpublished *M. S. (Ag. Ext.Ed.)Thesis.*Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Haque, M. M. 2003. Farmers adoption of modern maize cultivation technologies. *M.S. (Ag. Ext. Ed.)Thesis,* Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Hossain, M. A. 1991. Adoption of Behavior of Contact Wheat Grower of Sadar Upazila of Jamalpur District. Unpublished *M. Sc. (Ag. Ext. Ed.) Thesis,* Dept. of Agricultural Extension Education,Bangladesh Agricultural University, Mymensingh.

Hossain, M. D. 1981. Relationships of Selected Characteristics of the Jute Growers with their Adoption of Improved Practices of Jute Cultivation. Unpublished *M. Sc. (Ag. Ext. Ed.) Thesis.* Department of Agricultural Extension Education,Bangladesh Agricultural University, Mymensingh.

Hossain, S. M. A. and B. R. Crouch, 1992. Patterns and determinants of Adoption of Farm Practices: Some Evidence from Bangladesh Agricultural Systems. Journal of Agriculture, 38: 1-15.

Islam M. M. 1993. Adoption of Improved Practices in Potato Cultivation by the Potato Farmers of Sonatola Union under Bogra District. Unpublished *M. Sc. (Ag. Ext. Ed.) Thesis.* Department of Agricultural Extension Education,Bangladesh Agricultural University, Mymensingh.

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

Islam, S. M. Nazmul 1994. Factors Associated with the Adoption of Aquaculture Technology Through Tricaldown System of Extension in Selected Upazilas of Rajshahi Division.Unpublished *M.S. Thesis.* Department of Agricultural Extension Education. Institute of Postgraduate Studies in Agriculture, Salna, Gazipur.

Juliana, *C. S.* Annamalaim R. and S. Smasundaram, 1991. Adoption of Integrated Pest   Management Practices. Indian Journal of Extension Education, 27(3&4): 23-27.

Khan, M .A. H. 1993. Adoption of Insecticides and Related Issues in the Villages of Pachar Union, Madaripur District. Unpublished *M. S. (Ag. Ext. Ed.) Thesis*. Department of Agricultural Extension Education,Bangladesh Agricultural University, Mymensingh.

Muttaleb, M. A. 1995. Relationship of Selected Characteristics of Potato Growers with their Adoption of Improved Potato Technologies. Unpublished *M. S. (Ag. Ext. Ed.) Thesis*. Department of Agricultural Extension Education,Bangladesh Agricultural University, Mymensingh.

Okoro, F. U. and L. U. Obibuaka, 1992. Factors Influencing the Adoption of Improved Oil Palm Management Practices among Small Land Holders in IMO State. Nigeria. Bangladesh Journal of Extension Education, 7(1 & 2): 45-52.

Rahman, M. M. 1993. An Investigation into Characteristics of the Farmers Related to adoption of improved farm practices of Boro Rice Cultivation. Unpublished *M.S. Thesis*. Department of Agricultural Extension Education. Institute of Postgraduate Studies in Agriculture, Salna, Gazipur.

Rahman, M. M. 1986. Correlates of Adoption of Improved Practices in Transplanted Aman Rice. Bangladesh Journal of Extension Education, Vol. 1(2): 75

Reddy, P. R., M. M. Reddy and D. R. Reddy, 1987. "Impact of national demonstration on knowledge level attitude and adoption behavior of farmers in Ranaga Reddy district of Andhra Pradesh state." *Journal of Research APAU*, 15 (1): 35-38.

Saxena. K. K., N. C. Jain and S. C. Pandya, 1990. Transfer of Rainfed Wheat Technology and its Adoption by the Farmers III Malwa Region. Indian Journal of Extension Education, 26 (3&4) 70-73.

Singh, S. P. and Rajendra, 1990. A study on Adoption of Improved Sugarcane Variety. Indian Journal of Extension Education, 26 (1&2): 110-111.

Verma, T. V. Jain and S. Devi. 1989. A Study on Gain in Knowledge and Change in Attitude Through Training on Improved Homemaking Task. *Indian Journal of Extension Education.* 25(1&2): 75.

Zaltman, G., R .Duncanand and J.Holbek, 1973. Innovations and Organizations. New York: John Wiley and Sons.

AN
INTERVIEW SCHEDULE
(English Version)
FOR COLLECTION OF DATA
ON

"ADOPTION OF MIXED CROPPING IN RABI SEASON BY THE FARMERS OF MADARIPUR SADAR UPAZILA"

Sample no.............
Name of respondent: ....
Father/Husband's Name: ....……
Village: ....
Union: ....
Upazila: ....
Districts: ....

(Please answer the following questions. Provided information will be kept confidential and will be used only for research purpose.)

1. Age

How old are you?

.... years.

2. Level of Education
Please mention your educational attainment :.

a) Don't know how to read or write.

b) Can sign only.

c) Passed ....class.

3. Number of family labor

Please mention the number of your family member in the following age groups:

    a) up to 6 years .... person

    b) 7 to 12 years .... person

    c) 13 to 17 years ....person

    d) 18 years and above .... person

4. Land possession

Please indicate the area of land of your family.

Described of land	Local unit (decimal)	ha	Land possession									
			Single cropped area		Double cropped area		Triple cropped area		Net cropped area		Total cropped area	
			Local unit ( )	ha	Local unit ( )	ha	Local unit ( )	ha	Local unit ( )	ha	Local unit ( )	ha
a) Homestead land												
b) Own land under own cultivation												
c) Own land given to others as borga												
d) Land taken from others as borga												
e) Land taken from others as lease												
Total												

Cropping intensity =   %

5. Annual Family Income

Please indicate your annual family income (in Taka).

Source of Income	Amount of Income (in Taka)
a) Agriculture	
b) Cattle, goat etc.	
c) Duck, poultry etc.	
d) Fisheries	
e) Service	
f) Business	
g) Others	
Total	

6. Credit Received

(a) Did you receive credit last year for crop cultivation?

Yes [ ]   No [ ]

(b) If you received credit mention the source and amount.

Source of Credit	Amount of Received Credit (in Taka)
Bank	
NGO	
Samabay Samily	
Money Lender	
Businessman	
Neighbor	
Others	
Total	

7. Extension Contact

Please mention the nature of contact with the following extension media:

Type of Contact	Source of Contact	Nature of Contact				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Not at all (0)
Personal Contact	Ideal farmer	5 and more times/month	4-5 times/month	2-3 times/ month	1 time/ month	0 time/ month
	Sub Assistant Agricultural Officer	5 and more times/month	4-5 times/ month	2 -3times/ month	1 time/ month	0 time/ month
	NGO Worker	3 and more times/month	3 times/ month	2 times/ month	1 time/ month	0 time/ month
	Additional Agriculture Officer/UAO	3 and more times/year	3 times/ year	2 times/ year	1 time/ year	0 time/ year
Group Contact	Method Demonstration	2 and more times/year	1 time/ year	1 time/ 2 year	1 time/ 4 year	0 time/ year
	Group Meeting	5and more times/6 month	4-5 times/ 6 month	2-3 times/ 6 month	1 time/ 6 month	0 time/ 6 month
	Attending Field Days	2 and more times/year	1 time/ year	1 time/ 2 year	1 time/ 4 year	0 time/ year
Mass Contact	Listening Radio programs on agriculture	3 and more times/week	3 times/ week	2 times/ week	1 time/ week	0 time/ week
	Watching TV programs on agriculture	3 and more times/month	3 times/ month	2 times/ month	1 time/ month	0 time/ month

Reading agricultural news in newspapers	3 and more times/month	3 times/ month	2 times/ month	1 time/ month	0 time/ month
Booklet/Leaflet/ Krishi Kotha/ Samprosa-ron Barta/Ikkhu Samachar	3and more times/year	3 times/ year	2 times/year	1 time/ year	0 time/ year

8. Organizational Participation

Sl. No.	Name of Organization	Level of Participation (years)			
		No participation	Ordinary Member	Executive Member	Executive Officer
1.	Samobay Samity				
2.	NGO organized group				
3.	Volunteer Committee				

9. Training Exposure

Did you receive agriculture related training?

Yes ☐   No ☐

If answer is yes, mention the followings:

Sl. No.	Name of Training Course	Name of Organization	Duration (Date)
a.			
b.			
c.			
d.			
Total			

10. Knowledge on mixed cropping

Please answer the following questions.

Sl. No.	Questions	Score Full	Score Obtained
a.	What do you mean by mixed cropping?	2	
b.	What is the benefit of mixed cropping?	2	
c.	What is the favorable soil of mixed cropping?	2	
d.	Mention name of two disease of pulse crop.	2	
e.	Mention two names of insect of pulse crop.	2	
f.	Mention two names of variety of lentil.	2	
g.	How rust disease of lentil can be controlled?	2	
h.	Mention two names of variety of cheakpea.	2	
i.	How pod borer of cheakpea.can be controlled?	2	
j.	Mention two names of variety of grasspea.	2	
k.	How downey meldow of can be controlled?	2	
l.	Mention two names of oil crop.	2	
m.	Mention two names of disease of oil crop.	2	
n.	Mention two names of insect of oil crop.	2	
o.	Mention two names of variety of mustard.	2	
p.	How Aphid of mustard can be controlled?	2	
q.	Mention two important disease of mustard.		
r.	Why Urea fertilizer is needed in fewer amounts in pulse crop?	2	
s.	Why pulse and oil crops cultivation is declining?	2	
t.	Mention two names of green manure crop.	2	
	Total	40	

11. Adoption of mixed cropping

Please mention your land under mixed cropping with potential area during rabi season of the past three years.

Year	Potential area (ha)	Land under mixed crop
2004-05		
2005-06		
2006-07		

12. Problems on practicing mixed cropping

Please mention the level of problem confronted by you in adopting mixed cropping.

Sl. No.	Description of problem	Level of Problem			
		High	Medium	Low	Not at all
1.	Less crop production by adopting mixed cropping				
2.	Difficult to practice mixed cropping				
3.	Lack of technical knowledge				
4.	Lack of extension service				
5.	Lack of inputs in time				
6.	Unfavorable climates				
7.	High pest attack				

Thank you for your co-operation.

Date :

_____

Signature of interviewer

APPENDIX- B
Correlation Matrix of the dependent and independent variables (N = 100)

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	Y
X_1	1.000	-	-	-	-	-	-	-	-	-	-	-
X_2	-.343**	1.000	-	-	-	-	-	-	-	-	-	-
X_3	.499**	-.109	1.000	-	-	-	-	-	-	-	-	-
X_4	-.022	.233**	.165	1.000	-	-	-	-	-	-	-	-
X_5	-.020	-.098	-.041	-.248*	1.000	-	-	-	-	-	-	-
X_6	-.089	.175	.305**	.454**	-.046	1.000	-	-	-	-	-	-
X_7	-.162	.306**	.099	.345**	0.084	.398**	1.000	-	-	-	-	-
X_8	-.235*	.703**	-.122	0.139	.074	0.80	.266**	1.000	-	-	-	-
X_9	-.334**	.572**	-.171	.065	.051	0.052	.301**	-.574**	1.000	-	-	-
X_{10}	-.261**	.619**	.037	.241*	.153	0.232*	.231*	0.389**	.388**	1.000	-	-
X_{11}	-.160	.380**	.132	0.122	0.344**	.284**	.368**	.478**	.317**	.414**	1.000	-
Y	0.176	0.024	0.508**	0.053	0.354**	0.428**	0.376**	0.128	0.026	0.286**	0.512**	1.00

* = Correlation is significant at 0.05 level of probability
** = Correlation is significant at 0.01 level of probability

X_1 =	Age		X_7 =	Credit received
X_2 =	Education		X_8 =	Extension contact
X_3 =	Number of family labor		X_9 =	Organizational participation
X_4 =	Land possession		X_{10}=	Training exposure
X_5 =	Cropping intensity		X_{11}=	Knowledge on mixed cropping
X_6 =	Annual family income		Y =	Adoption of mixed cropping