

**ADOPTION OF CROP DIVERSIFICATION BY THE FARMERS  
OF KALIAKOIR UPAZILA UNDER GAZIPUR DISTRICT**

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SHER-E-BANGLA NAGAR, DHAKA -1207**

**December 2006**

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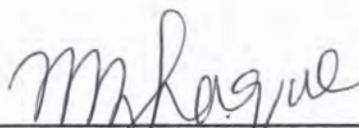
**A Thesis  
Submitted to the Faculty of Agriculture,  
Sher-e-Bangla Agricultural University, Dhaka,  
in partial fulfillment of the requirements  
for the degree of**

**MASTER OF SCIENCE  
IN  
AGRICULTURAL EXTENSION AND INFORMATION SYSTEM  
SEMESTER: JULY-DECEMBER, 2006**

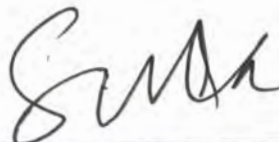
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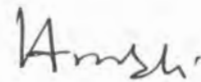
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## CERTIFICATE

This is to certify that the thesis entitled “**ADOPTION OF CROP DIVERSIFICATION BY THE FARMERS OF KALIAKOIR UPAZILA UNDER GAZIPUR DISTRICT**” 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 *bonafide* research work carried out by **MOHAMMAD MASUM KHAN**, Registration No. **01841** 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**



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**(Asst. Prof. Md. Sekender Ali)**  
**Supervisor**

## ACKNOWLEDGEMENT

All praises and thanks to almighty Allah, the supreme ruler of the universe who enabled the researcher to complete this study.

The author with a deep sense of respect expresses his heartfelt gratitude to his respectable supervisor Md. Sekender Ali, Assistant Professor, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for his untiring and painstaking guidance, valuable suggestions, continuous supervision and scholastic co-operation that have made it possible to complete this piece of research and reviewing the entire manuscript.

The author deems it a proud privilege to express his heartfelt indebtedness, sincere appreciation and highest gratitude to co-supervisor Professor M. Zahidul Haque, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for his cordial inspiration, guidance and continuous counseling during the tenure of conducting this study.

The author expresses his gratitude and cordial thanks specially to Professor Md. Shadat Ulla, Chairman, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University. The author expresses his gratitude and indebtedness to all the honourable course teachers of the Department of Agricultural Extension and Information System, namely Professor Mohammad Hossain Bhuiyan, Associate Professor Md. Rafiquel Islam for their kind help and co-operation in various stages towards completion of this research work.

The author desires to express his special gratitude to all the respondents of the study area for their cordial co-operation during data collection.

Last but not least, the author expresses his heartfelt gratitude and indebtedness to Mr. Md. Jashim Uddin, Additional Agriculture Officer, Kaliakoir Upzilla, Gazipur, his beloved father Mr. Md. Jalal Uddin Khan and mother Mrs. Monoara Begum, Mrs. Shahnaj Parvin, Instructor, Agricultural Training and Management Development Institute (ATMDI), Goalbathan, Kaliakoir, Gazipur and friends for their inspiration, encouragement and blessings that enabled him to complete this research work.

The Author

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# **ADOPTION OF CROP DIVERSIFICATION BY THE FARMERS OF KALIAKOIR UPAZILLA UNDER GAZIPUR DISTRICT**

## **ABSTRACT**

The main purpose of the study was to determine the extent of crop diversification by the farmers of Kaliakoir upazilla under Gazipur district and to explore the relationships between the selected characteristics of the respondents and their extent of adoption of crop diversification. The study was conducted in four unions covering eight villages of Kaliakoir upazila under Gazipur district. Data were collected from 100 farmers by using a pre-tested interview schedule during the period from October 20 to November 20, 2006. From the study it was found that the highest proportion (38 percent) of the farmers had high adoption of crop diversification compared to 32 and 30 percent having low and medium adoption of crop diversification 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 farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification had significant positive relationship with the adoption of crop diversification while age, level of education, family size and number of family labor had no significant relationship with the adoption of crop diversification. On the basis of descending order of Problem Confrontation Index, the farmers confronted the problems were “lack of technical knowledge”, “lack of extension service”, “lack of inputs in time”, “unfavourable climate”, “high pest attack”, “difficult to practice crop diversification” and “less crop production by adopting crop diversification”.

## CHAPTER I

### INTRODUCTION

#### 1.1 General Background

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 (GOB) 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 crops 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 (Anonymous, 1991).

This has prompted the Ministry of Agriculture of the Government of Bangladesh to attach priority to the policy of Crop Diversification 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 Crop Diversification Programme with Canadian and Dutch assistance was launched during 1990 considering the most important and realistic action programme 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 Crop Diversification 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 (DGIS) 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 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 (Anonymous, 1993).

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 programme.

The CDP was marking to increase the production of selection 13 crops. The present researcher thought that more crops should be included in crop diversification programs. No previous research was conducted to find out the extent of adoption of crop diversification. On the above consideration the researcher felt necessity to conduct research entitled “Adoption of Crop Diversification by the Farmers of Kaliakoir Upazila Under Gazipur District”.

## **1.2 Statement of the Problem**

Among all other agricultural practices only crop diversification has been taken as present research topic. In adoption of crop diversification farmers have opportunity to increase the participation level in production of tubers, oilseeds and pulses crops. 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 crop diversification. Some farmers in contrast, showed totally reverse attitudes. This study is, therefore, designed to making an in-depth analysis of the extent of crop diversification by the farmers.

A little research has been conducted to examine extent of farmers' crops diversification 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 crop diversification.

Any person who is experienced in how change occurs is aware that some innovations become popular soon and some very slowly. Yet there are some which despite immense promotional efforts hardly find their way to the end users. This experience is common in promotion of change in any area of human behavior but particularly in the field of agriculture. One therefore, is tight to ask why one farm practice is more readily adopted than others. There might be some innate characteristic of the practice itself which may accelerate or retard its rate of adoption.

In order to understand the process underlying the adoption of crop diversification, the researcher undertook an investigation entitled "Adoption of

Crop Diversification by the farmers of Kaliakoir Upazila under Gazipur district. The purpose of the study was to determine the extent of crop diversification and to ascertain its relationships with the selected characteristics of the farmers. The present study, therefore, aims to provide information regarding the following questions:

- (1) What were the personal and socio-economic characteristics of the farmers of the study area?
- (2) What was the extent of adoption of crop diversification by the farmers?
- (3) What personal and socio-economic characteristics of the farmers in the study area influenced extent of crop diversification by the farmers? and
- (4) What were the problems being faced by the respondents in adopting crop diversification?

### **1.3 Objective of the Study**

The specific objectives of the study were:

1. To describe some selected personal and socio-economic characteristics of the farmers, the selected characteristics are: age, level of education, family size, number of family labor, farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification.
2. To determine the extent of adoption of crop diversification by the farmers.
3. To determine the relationship between the extent of adoption of crop diversification by the farmers and their selected personal and socio-economic characteristics.
4. To determine the problems confrontation of the farmers in adoption of crop diversification.



#### **1.4 Limitation of the Study**

The study was undertaken to understand the extent of adoption of crop diversification 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 507 Upazilas of Bangladesh only Kaliakoir Upazila has been selected as study area.
2. The study was confined in four out of nine Unions of Kaliakoir 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 & Hatt, 1952)”. In order to examine the relationship between variables, research hypotheses are formulated first which state anticipated relationship (positive or negative) between the variables. However, for statistical test, it is necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between variables. If a null hypothesis is rejected on the basis of empirical test, it is then concluded that there is a relationship between the concerned variables. The following null hypothesis was formulated to explore the relationships of the variables:

“There was no significant relationship between the crop diversification by the farmers and any of their following selected characteristics”

- a. Age
- b. Level of Education
- c. Family Size
- d. Number of Family Labor
- e. Farm Size
- f. Family Annual Income
- g. Credit Received
- h. Extension Contact
- h. Organizational Participation
- i. Training Exposure and
- j. Knowledge on Crop Diversification.

## **1.7 Definition of the Terms**

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

### **Crop Diversification:**

Crop diversification refers to the degree of diversity of crop raised by the farmers.

### **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.

### **Family Size**

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

### **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.

**Farm Size**

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

**Family Annual Income**

Family annual 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.

**Knowledge on Crop Diversification**

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

**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.

**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.

**Organizational participation**

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

## CHAPTER II

### REVIEW OF LITERATURE

Synthesis of the related research and literature relevant to the study are furnished herewith. 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 crop diversification by the farmers. A few research works have been done indirectly related to study. However, the literatures have been organized into following three sections to set the context of the study.

#### **2. Past Research Findings**

##### **2.1 Section I: Literature related to the concept of crop diversification**

It is diversity which ensures ecological balance (stability) while mono-culture is the most unstable ecosystem and susceptible to things like pest outbreak. Therefore, increasing diversity is one of the most important points in ecological agriculture for ensuring stability of farming.

In addition, diversity varies income sources in a farm which reduces the risk of total failure of crops. Farming methods which ensure diversity include the followings:

1. Diverse cropping
2. Mixed cropping
3. Crop rotation
4. Planting permanent trees and grasses in the boundary area
5. Keeping various animals (livestock, fish, bees, etc.).

## 2.2 Literature Related to Relationships between the Selected Characteristics of the Farmers and their Extent of Adoption of Crop Diversification

There were eleven independent variables of this study which included age, level of education, family size, number of family labor, farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification. Available literatures were reviewed to ascertain the nature of relationship of these variables of the farmers with their crop diversification. In fact there was no literature directly related to the relationship between crop diversification of the farmers and their selected characteristics. Here it may be mentioned that extent of crop diversification means the extent of adoption of crop diversification. In this circumstance, the relationship between the selected characteristics of the farmers and adoption are presented below in tabular form:

### 2.2.1 Age and adoption

Relationships of age of the farmers with their adoption of agricultural innovations have been presented in summary form in Table 2.1.

**Table 2.1. Relationship between Age and Farmers' Extent of Adoption**

Researcher	Year of research	Independent variables	Dependent variable	Relationship	Country
Hossain and Crouch	1992	Age	Adoption of Farm Practices	Positive	Bangladesh
Okoro and Obibuaka	1992	"	Adoption of Recommended Munagement Practices	"	Nigeria
Hossain	1991	"	Adoption of Improved Wheat Practices	"	Bangladesh
Singh and Raiendra	1990	"	Adoption of Sugarcane Variety	"	India
Muttaleb	1995	"	Adoption of Improved Potato Technologies	No relationship	Bangladesh
Islam	1993	"	Adoption of Improved Potato Practices	"	Bangladesh
Rahman	1993	"	Adoption of Improved	"	Bangladesh

Researcher	Year of research	Independent variables	Dependent variable	Relationship	Country
Saxena et al.	1990	"	Adoption of Wheat Technology	No relationship	India
Ali	1993	"	Adoption of STP Technology	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.	"	Bangladesh

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. But Table 2.1 shows that out of 12 studies reviewed four studies show positive relationship between age and agricultural innovations of the farmers, four studies show negative relationship and four no relationship. The findings of the studies reviewed do not indicate a consistent trend between the age of the farmers and their adoption.

### 2.2.2 Level of Education of the Farmers and their Extent of Adoption

Relationships between education of the farmers and their adoption of agricultural innovations as observed in 13 studies have been presented in Table 2.2.

**Table 2.2. Relationship between Level of Education and Farmers' Extent of Adoption**

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Education	Adoption of Improved Potato Technology	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

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
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	"	Bangladesh
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

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

### 2.2.3 Family Size of the Farmers and their Extent of Adoption

Out of six studies reviewed two show positive relationships, one negative relationship and three no relationship (Table 2.3).

**Table 2.3. Relationship between Family Size of Farmers and their Extent of Adoption**

Research	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Family size	Adoption of Improved Potato Technologies	Positive	Bangladesh



Research	Year of research	Independent variable	Dependent variable	Relationship	Country
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	Negative	Bangladesh

The findings do not indicate any consistent relationship between family size of the farmers and adoption of farm innovations. Family size alone probably does not significantly influence farmers' extent of adoption.

#### **2.2.4 Relationship between Number of Family Labor and Farmers' Extent of Adoption**

No literature was found related to relationship between number of family labor and crop diversification or related matters.

#### **2.2.5 Farm Size of the Farmers and their Extent of Adoption**

Table 2.5 shows relationships between farm size and adoption of agricultural innovations as observed in 13 research studies. Here nine studies show positive relationship, one negative and three no relationship.

**Table 2.5. Relationship between Farm Size and Farmers' Extent of Adoption**

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Farm size	Adoption of Improved Potato Technologies	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
Sainturi	1992	"	Adoption of Rubber Technology	"	Indonesia
Bavalatti and Sundaraswamy	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 farm size and adoption. Farmers with larger farms are likely to have higher income and better contact with change agents. This might be the reason for the positive relationship generally observed between farm size and adoption.

### 2.2.6 Income of the Farmers and their Extent of Adoption

Table 2.6 shows the findings concerning relationship of income of the farmers with adoption of agricultural innovations as observed in five studies. Three studies show positive relationship and two shows no relationship.

**Table 2.6. Relationship between Income and Farmers' Extent of Adoption**

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
Hossain	1990	"	Adoption of Improved Wheat Technology	"	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.

### 2.2.7 Relationship between Credit Received and Farmers' Extent of Adoption

No literature was found related to relationship between credit received and adoption of crop diversification or related matters.

### 2.2.8 Extension Contact of the Farmers and their Adoption

Table 2.8 shows 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 show positive relationship.

**Table 2.8. Relationship between Extension Contact of the Farmers' and their Extent of Adoption**

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Muttaleb	1995	Extension Contact	Adoption of Improved Potato Technologies	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.

### 2.2.9 Organizational Participation of the Farmers and their Adoption of Agricultural Innovations

Eight studies listed in Table 2.9 investigated relationships between organizational participation and adoption by farmers of technological innovations. 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.

**Table 2.9. Relationship between Organizational Participation and Extent of Adoption by Farmers**

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Basher	1993	Organizational participation	Adoption of Sugarcane Inter-cropping	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	1995	"	Adoption of BR14 during Boro Season	Negative	Bangladesh

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

#### 2.2.10 Training Exposure of the Farmers and their Adoption of Agricultural Innovations

Table 2.10 shows the findings concerning relationship of training exposure of the farmers with adoption of agricultural innovations as observed in six studies. Four studies show positive relationship and two studies show no relationship.

**Table 2.10. Training Exposure of the Farmers and their Adoption of Agricultural Innovations**

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Haque	2003	Training Exposure	Adoption of modern maize cultivation technologies	Positive	Bangladesh
Verma <i>et al.</i>	1989	Training Exposure	Attitude of rural women in improved home making tasks of	"	Bangladesh
Rahman, M.M.	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. This might be an explanation for the positive relationship of training exposure with adoption of agricultural innovations.

### 2.2.11 Relationship between Knowledge and Farmers' Extent of Adoption

Table 2.11 shows the findings concerning relationship of knowledge of the farmers with adoption of agricultural innovations as observed in eight studies. Six studies show positive relationship and two studies show no relationship.

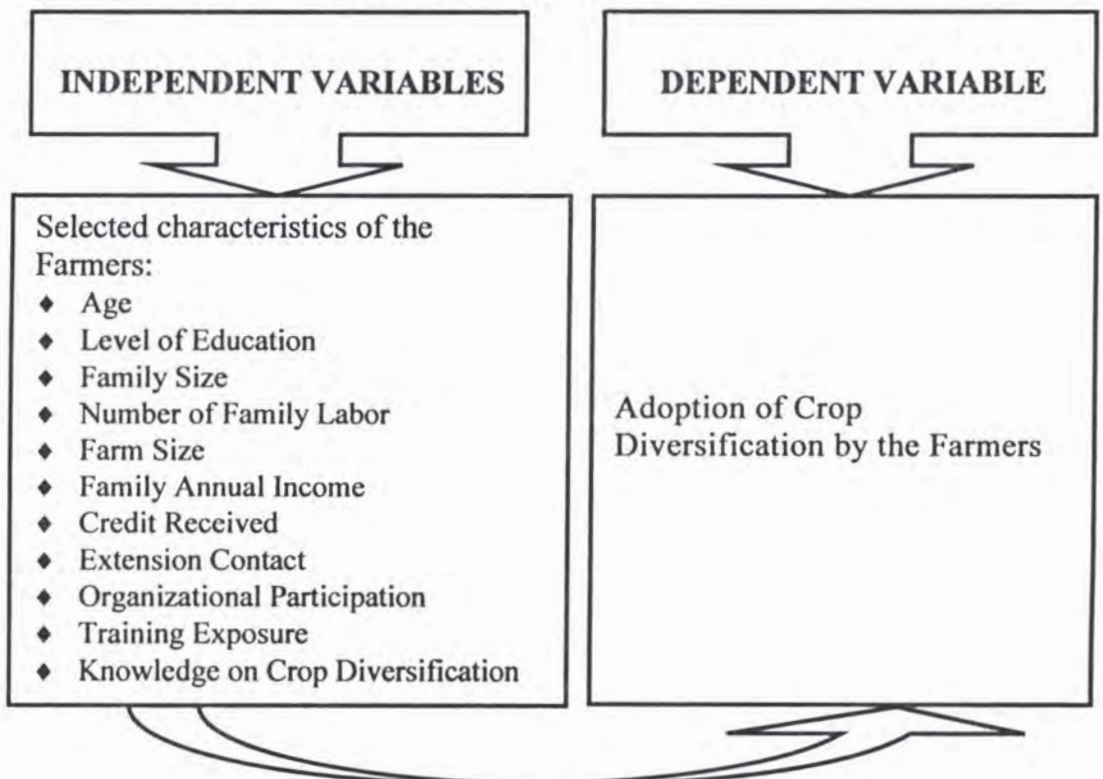
**Table 2.11. Relationship between Knowledge and Farmers' Extent of Adoption**

Researcher	Year of research	Independent variable	Dependent variable	Relationship	Country
Sardar	2002	Knowledge	Adoption of IPM practices	Positive	Bangladesh
Sarkar	1997	"	Adoption of improved potato cultivation practices	"	Bangladesh
Alam	1997	"	Adoption of improved potato cultivation practices	"	Bangladesh
Moullik <i>et al.</i>	1996	"	Adoption of nitrogenous fertilizers among the cultivators.	"	India
Reddy <i>et al.</i>	1987	"	Use of improved package of practices in paddy production	"	India
Koch	1985	"	Adoption of Agricultural Innovations	"	South Africa
Rahman	1995	"	Adoption of improved practices	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.

### 2.3 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 (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. 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.



**Figure 2.1 The Conceptual Framework of the Study.**



## 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 crop diversification by the farmers of Kaliakoir Upazila under Gazipur district and their selected personal and socio-economic characteristics. It was also designed to describe the relationship between selected characteristics of the farmers and their crop diversification and assess the problems faced by the farmers in crop diversification. Data were collected by means of conducting an interview with selected respondents. The independent variables included age, level of education, family size, number of family labor, farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification. The dependent variable was adoption of crop diversification by the farmers of Kaliakoir Upazila under Gazipur district.

#### **3.2 Locale of the Study**

The study was conducted in Kaliakoir Upazila under Gazipur district. The total area of Kaliakoir Upazila was 314 square kilometers and the total population was 267003 (BBS, 2006). There were 38 blocks with 289 villages under 9 Unions of this Upzila. 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 9 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 Kaliakoir Upazila was the locale of the study. Figure 3.1 and Figure 3.2 showed the map of the locale of the study.

### Study Area



Figure 3.1: A Map of Gazipur District Showing Locale of the Study.

## Study Areas

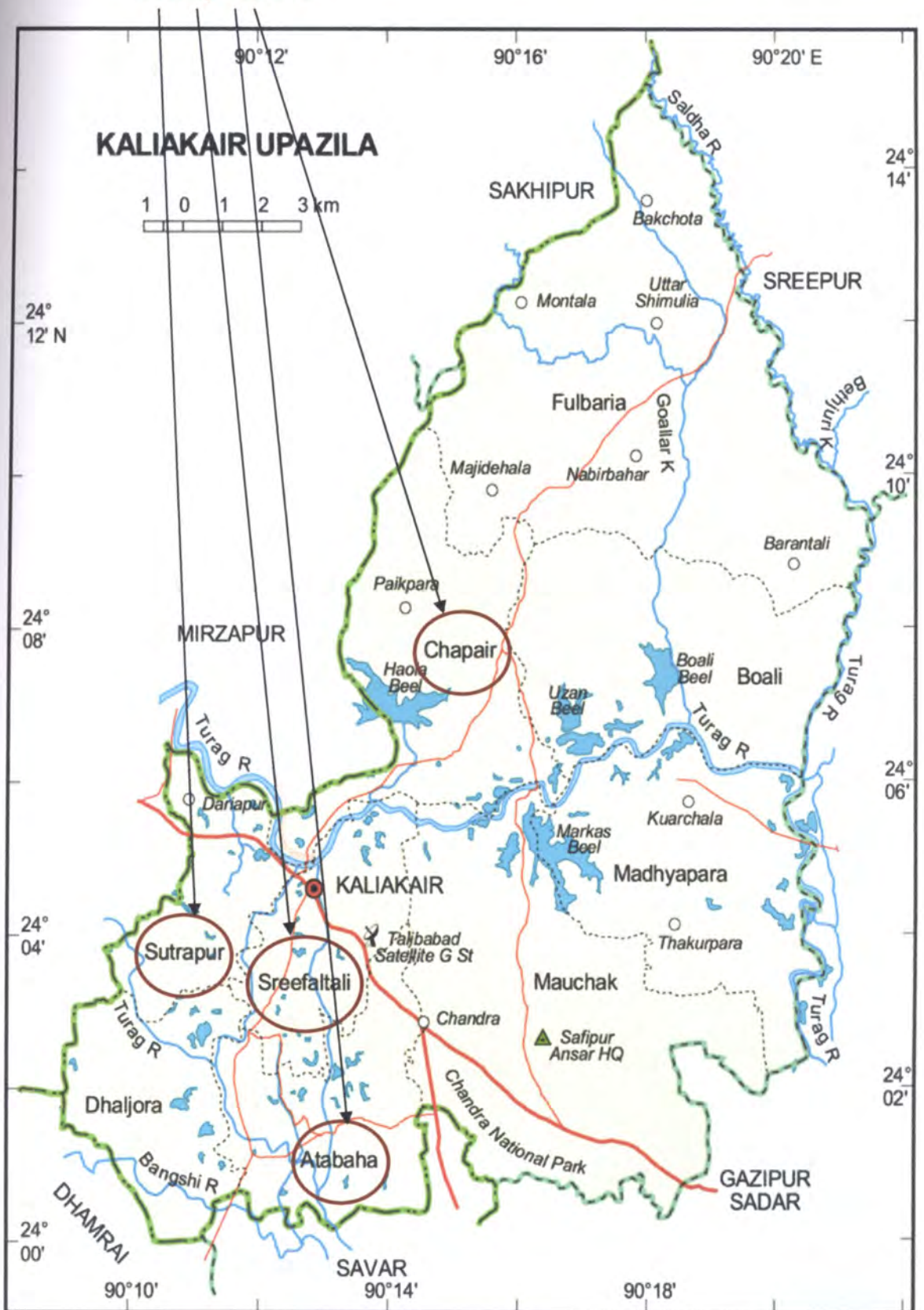


Figure 3.2: A Map of Kaliakoir Upazila Showing the Locale of the Study.

### 3.3 Population and Sample Size of the Study

There were 1002 farmers in these eight villages selected for the locale of the study is 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 100 farmers. A sample population was obtained by taking 10 percent of the estimated population of eight randomly selected villages under four 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 any farmers from the sample were not available at the first 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.	Chapair	Madi Asulai	110	11	1
		Rashidpur	247	25	2
2.	Atabaha	Kandapara	160	16	2
		Begunbari	101	10	1
3.	Shreefaltali	Goalbathan	140	14	1
		Gozaria	79	8	1
4.	Sutrapur	Hijoltoli	83	8	1
		Kathaltoli	82	8	1
Total			1002	100	10

### 3.4 Variables of the Study

Ezekiel and Fox (1969) defined a variable as any measurable characteristics which can assume varying or different values in successive individual cases. In descriptive research, the measurement and selection 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.

#### **3.4.1 Selection of Independent Variables**

Findings of the past researches indicate that a variety of factors are likely to influence the extent of crop diversification. But it would not be possible in a single study to deal with all the factors. Hence in studying the extent of crop diversification by the farmers, the researcher needs to the variables. For selection of independent variables, the researcher went through the past related literature as far as possible. He had discussion with the 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, family size, number of family labor, farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification.

#### **3.4.2 Selection of Dependent Variable**

The dependent variable of the study was the extent of crop diversification by the farmers of Kaliakoir Upazila under Gazipur district.

### **3.5 Measurement of Variables**

#### **3.5.1 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' 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.

##### **Family Size**

Family size of a respondent was measured on the basis of number of members living with the family. It includes the respondent himself, his spouse, children, father, mother, brothers and sisters, grandfather, grandmother and other dependents.

### **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, his spouse, children, father, mother, brothers and sisters, grandfather, grandmother and other dependents. Score of the number of family labor was assigned as follows:

<u>Age of Family Members</u>	<u>Score</u>
Up to 6 years	0.00
6 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.

### **Farm Size**

Data obtained in response to item no. 5 of the interview schedule formed the basis for determining the farm size 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 farm size was measured in terms of hectare by using the following formula:

$$\text{Farm Size} = A + B + C + \frac{1}{2}(D + E) + F$$

Where,

A = Uncultivated land of homestead;

B = Cultivated land of homestead;

C = Own land cultivated by respondent;

D = Cultivated land taken as barga;

E = Cultivated land given as barga; and

F = Cultivated land taken as lease.

### **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 family annual income of the respondents. 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 respondents. 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 the 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.



Type of Contact	Source of Contact	Extent of Contact				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Not at all (0)
Personal Contact	Ideal farmer	6 and more times/month	4-5 times/month	2-3 times/month	1 time/month	0 time/month
	NGO Worker	4 and more times/month	3 times/month	2 times/month	1 time/month	0 time/month
	Sub Assistant Agricultural Officer	4 and more times/month	3 times/month	2 times/month	1 time/month	0 time/month
	Additional Agriculture Officer/UAO	4 and more times/year	3 times/year	2 times/year	1 time/year	0 time/year
Group Contact	Method Demonstration	3 and more times/year	1 time/year	1 time/2 year	1 time/4 year	0 time/year
	Group Meeting	6 and 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 to agricultural programmes in Radio	4 and more times/week	3 times/week	2 times/week	1 time/week	0 time/week
	Watching agricultural programmes in Television	4 and more times/month	3 times/month	2 times/month	1 time/month	0 time/month

This extension contact score of a respondent could range '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 4 selected organizations. The score of organizational participation for a particular organization was computed in the following manner:

Organizational participation score = Summation of (P X D)

Where,

P = Participation score, D = Duration score.

Participation score was assigned in the following way:

<u>Nature of participation</u>	<u>Score</u>
No participation	0
Ordinary member	1
Executive member	2
Executive officer	3

Duration of participation score was assigned in the following way:

<u>Duration of participation</u>	<u>Total score</u>
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 '48', while '0' (zero) indicating no participation and would indicate no participation and '48' indicating very high organizational participation.

### **Training Exposure**

Training exposure score 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 Crop Diversification**

Knowledge of the farmers on crop diversification was measured by asking 20 selected questions related to crop diversification. 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 crop diversification scores of the respondents was computed by adding his scores for all the 20 questions. Thus, the knowledge on crop diversification scores could range from '0' to '40', where '0' (zero) indicates low knowledge on crop diversification and '40' indicates very high knowledge on crop diversification.

### **3.5.2 Measurement of Dependent Variable**

#### **Adoption of Crop Diversification**

Adoption of crop diversification was the only dependent variable of the study. It was measured by the following formula for a particular year:

$$\text{Adoption of Crop Diversification} = \frac{\text{Number of Crop Raised}}{\text{Net Crop Area (ha)}}$$

For measuring adoption of crop diversification the respondents were asked to indicate year-wise information about how many crops they had cultivated during the last three years, namely, 2003-2004, 2004-2005 and 2005-2006 and

how much potential land they had to cultivate. Let us assume that a farmer had cultivated 24, 20 and 30 crops in 2003-2004, 2004-2005 and 2005-2006 respectively. He had 1.25 ha, 1.20 ha and 0.75 ha potential land to cultivate in 2003-2004, 2004-2005 and 2005-2006 respectively. Then year-wise adoption of crop diversification of that farmer were as follows:

<u>Year</u>	<u>Adoption of Crop Diversification</u>		
In 2003-2004	=	$\frac{24}{1.25}$	= 19.20
In 2004-2005	=	$\frac{20}{1.20}$	= 16.67
In 2005-2006	=	$\frac{13}{0.75}$	= 17.33
Total	=	53.20	= 53.20

**Finally the year-wise adoption of crop diversification was measured by the following way:**

$$\text{Adoption of Crop Diversification} = \frac{\text{Total Adoption of Crop Diversification}}{\text{Number of Year}}$$

For the above example the crop diversification score was as follows:

$$\text{Adoption of Crop Diversification} = \frac{53.20}{3} = 17.73$$

### **3.6 Measurement of Problems Confrontation in Adoption of Crop Diversification**

Seven problems were selected for the study after thorough consultation with supervisors, co-supervisors and relevant experts. The respondents were asked to 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 Confrontation Index (PCI) as follows:

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

Where,

PCI = Problem Confrontation Index

$P_h$  = No. of respondents confronted high problem

$P_m$  = No. of respondents confronted medium problem

$P_l$  = No. of respondents confronted low problem

$P_n$  = No. of respondents confronted not at all problem

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

### **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 crop diversification by the farmers of Kaliakoir Upazila under Gazipur district. The interview schedule was pre-tested with 10 farmers of Kaliakoir Upazila who adopted crop diversification 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' respondents 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 Kaliakoir with his officials cordially helped the investigator to collect the data. Data were collected during October 20 to November 20, 2006.

### **Data Analysis Procedure**

Collected data were coded, compiled and analyzed according to the objectives of the study. The SPSS (computer programme) was used to perform the data analysis. Descriptive statistics such as number and percent distribution 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 crop diversification Pearson Product Moment correlation coefficient was computed. Throughout the study a 0.05 and 0.01 level of probability with 98 degrees of freedom was used to reject any null hypothesis.

## CHAPTER IV

### RESULTS AND DISCUSSION

This chapter has been discussed in the following 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 crop diversification by the farmers, **third** section deals with relationship between the selected personal and socio-economic characteristic of the respondents and their extent of adoption of crop diversification and **fourth** section deals with discussion on problems confrontation of the farmers in adoption of crop diversification.

#### **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 crop diversification by the farmers were influenced by their various personal and socio-economic characteristics. Some selected characteristics of the respondents of this study 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	25-70	42.81	9.28
2.	Level of Education	Years of schooling	Unknown	0-14	5.48	3.60
3.	Family size	Number of Members	Unknown	2-14	5.94	2.73
4.	Family labor	Number of Working Members	Unknown	1.25-7.00	3.59	1.45
5.	Farm size	Hectare	Unknown	0.13-2.48	1.09	0.54
6.	Family annual income	In Tk.1000	Unknown	27-212	109.67	53.33
7.	Credit received	In Tk.1000	Unknown	0.00-42.00	9.28	11.97
8.	Extension contact	Scaling	0-44	5-38	20.78	8.40
9.	Organizational participation	Years of participation	0-48	0-20	7.26	6.31
10.	Training exposure	Scaling	Unknown	0-45	9.15	11.76
11.	Knowledge on crop diversification	Scaling	0-40	6-31	12.15	5.63



#### 4.1.1 Age

The observed age scores of the farmers ranged from 25 to 70 with an average of 42.81 and a standard deviation of 9.28. On the basis of their age scores, the farmers were classified into three categories: "young" (25-30), "middle aged" (31-45) and "old" (46 and above). The highest proportion (61 percent) of the farmers fell in the "middle aged" category while 10 percent of them fell in the "young" category and only 29 percent fell 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 (25-30)	10	10
Middle aged (31-45)	61	61
Old (46 and above)	29	29

Data contained in Table 4.2 indicated that a large proportion (71 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 14 with an average of 5.48 and a standard deviation of 3.60. On the basis of their level of education scores, the farmers were classified into four categories, namely "illiterate/can sign only" (0-0.5), "primary" (1-5), "secondary" (6-10) and "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 )	21	21
Primary level( 1-5 )	34	34
Secondary level( 6-10 )	41	41
Above secondary level (above 10)	4	4

Data contained in Table 4.3 indicated that the majority (41 percent) of the farmers had secondary level of education compared to 34 and 4 percent primary and above secondary level of education respectively. Twenty one percent of the respondent were illiterate. That means that 79 percent of the respondents were literate. Kaliakoir was very near to Dhaka and the respondents were very progressive. Therefore, the literacy rate was higher than the national average.

#### 4.1.3 Family Size

The family size scores of the farmers ranged from 2 to 14. The average was 5.94 with a standard deviation of 2.73. On the basis of their family size scores, the farmers were classified into the following three categories: "small family" (2-4), "medium family" (5-6) and "large family" (7 and above). Table 4.4 contains the distribution of the farmers according to their family size.

**Table 4.4: Distribution of farmers according to their family size**

Categories	Farmers (N = 100)	
	Number	Percent
Small family (2-4)	38	38
Medium family (5-7)	39	39
Large family (8 and above)	23	23

Data contained in Table 4.4 revealed that the findings revealed that 39 percent of the farmers had "medium family" family compared to 38 percent "small family" and 23 percent "large family".

#### 4.1.4 Number of Family Labor

The number of family labor scores of the farmers ranged from 1.25 to 7.00. The average was 3.59 with a standard deviation of 1.45. On the basis of their number of family labor scores, the farmers were classified into the three categories: "small" (1.25-2.75), "medium" (2.76-4.25) and "large" (4.26 and above). Table 4.5 contains the distribution of the farmers according to their family labor.

**Table 4.5: Distribution of farmers according to their number of family labor**

Categories	Farmers (N = 100)	
	Number	Percent
Small (1.25-2.75)	32	32
Medium (2.76-4.25)	46	46
Large (4.26 and above)	22	22

Data contained in Table 4.5 indicated that the findings revealed that 46 percent of the farmers had medium family labor compared to 32 percent of them having small family labor. The proportion of large family labor was 22 percent only.

#### 4.1.5 Farm Size

The farm size of the respondents varied from 0.13 ha to 2.48 ha. The average farm size was 1.09 hectares with a standard deviation of 0.54. The respondents were classified into the four categories based on their farm size: "small" (up to 1.00), and "medium" (1.01 and above). The distribution of the farmers according to their farm size is shown in Table 4.6.

**Table 4.6: Distribution of the farmers according to their farm size**

Categories	Farmers (N =100)	
	Number	Percent
Small (up to 1.00)	52	52
Medium (1.01 and above)	48	48

Data contained in Table 4.6 revealed that 52 percent of the farmers possessed small farms compared to 48 percent having medium farms and none of them had large farms.

#### **4.1.6 Family annual income**

The observed family annual income of the respondents ranged from 27 to 212 thousands taka with an average of 109.67 thousand taka and a standard deviation of 53.33. Based on their family annual income, the farmers were classified into three categories: "low income" (up to 60 thousand taka), "medium income" (60.01 to 120 thousand taka) and "high income" (120.01 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 family annual income**

Categories	Farmers (N = 100)	
	Number	Percent
Low income (up to 60 thousand taka)	23	23
Medium income (60.01 to 120 thousand taka)	46	46
High income (120.01 and above)	31	31

From Table 4.7, it was observed that the highest portion (46%) of the respondents had medium income while 23 percent respondents had low income and 31 percent had high income.

#### 4.1.7 Credit received

The observed credit received scores of the respondents ranged from 0 to 42 thousand taka with an average of 9.28 thousand and a standard deviation of 11.97. Based on the observed credit received scores, the respondents were classified into three categories: “No credit received” (0), “low credit received” (up to 20 thousand taka) and “medium credit received” (20.01 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)	53	53
Low credit received (up to 20 thousand taka)	32	32
Medium credit received (20.01 thousand taka and above)	15	15

Data presented in Table 4.8 showed that the highest proportion (53 percent) of the farmers belonged to “no credit received” category as compared to 32 and 15 percent having low and medium credit received category respectively.

#### 4.1.8 Extension contact

The observed extension contact scores of the respondents ranged from 5 to 38 against the possible range of 0 to 44. The average was 20.78 and the standard deviation was 8.40. 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)	32	32
Medium (16-30)	53	53
High (31 and above)	15	15

Data contained in table. 4.9 indicated that the highest proportion (53 percent) of the farmers had medium extension contact as compared to 32 and 15 percent having low and high extension contact respectively.

#### 4.1.9 Organizational participation

The observed organizational participation scores of the respondents ranged from 0 to 20 against the possible range of 0 to 48 with an average of 7.26 and a standard deviation of 6.31. On the basis of their organizational participation, the farmers were classified into three categories: "low organizational participation" (up to 4), "medium organizational participation" (5-10) and "high organizational participation" (11 and above). 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 10)	76	76
Medium organizational participation (11 and above)	24	24

Data contained in Table 4.10 revealed that the majority (76 percent) of the farmers had low organizational participation, while 24 percent of them had medium organizational participation. Nobody had high organizational participation.

#### 4.1.10 Training exposure

The observed training exposure scores of the respondents ranged from 0 to 45 with an average of 9.15 and a standard deviation of 11.76. 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 7), "medium training exposure" (8 to 15) and "high training exposure" (16 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)	33	33
Low exposure (up to 7)	30	30
Medium exposure (8-15)	14	14
High exposure (16 and above)	23	23

Data contained in Table 4.11 showed that one third (33 percent) of the farmers had no training exposure compared to 30, 14 and 23 percent having low, medium and high training exposure respectively.

#### 4.1.11 Knowledge on crop diversification

The observed knowledge on crop diversification scores of the respondents ranged from 6 to 31 against the possible range of 0 to 40. The average was 12.15 and standard deviation was 5.63. Based on their knowledge on crop diversification scores, the respondents were classified into three groups: "low knowledge" (up to 13), "medium knowledge" (14-26), and "high knowledge" (27 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 crop diversification**

Categories	Farmers (N = 100)	
	Number	Percent
Poor (up to 13)	77	77
Medium (14-26)	18	18
High (27 and above)	5	5

Data contained in Table 4.12 revealed that the majority (77 percent) of the farmers had low knowledge on crop diversification while 18 percent had medium knowledge and only 5 percent of the respondents had low knowledge on crop diversification.

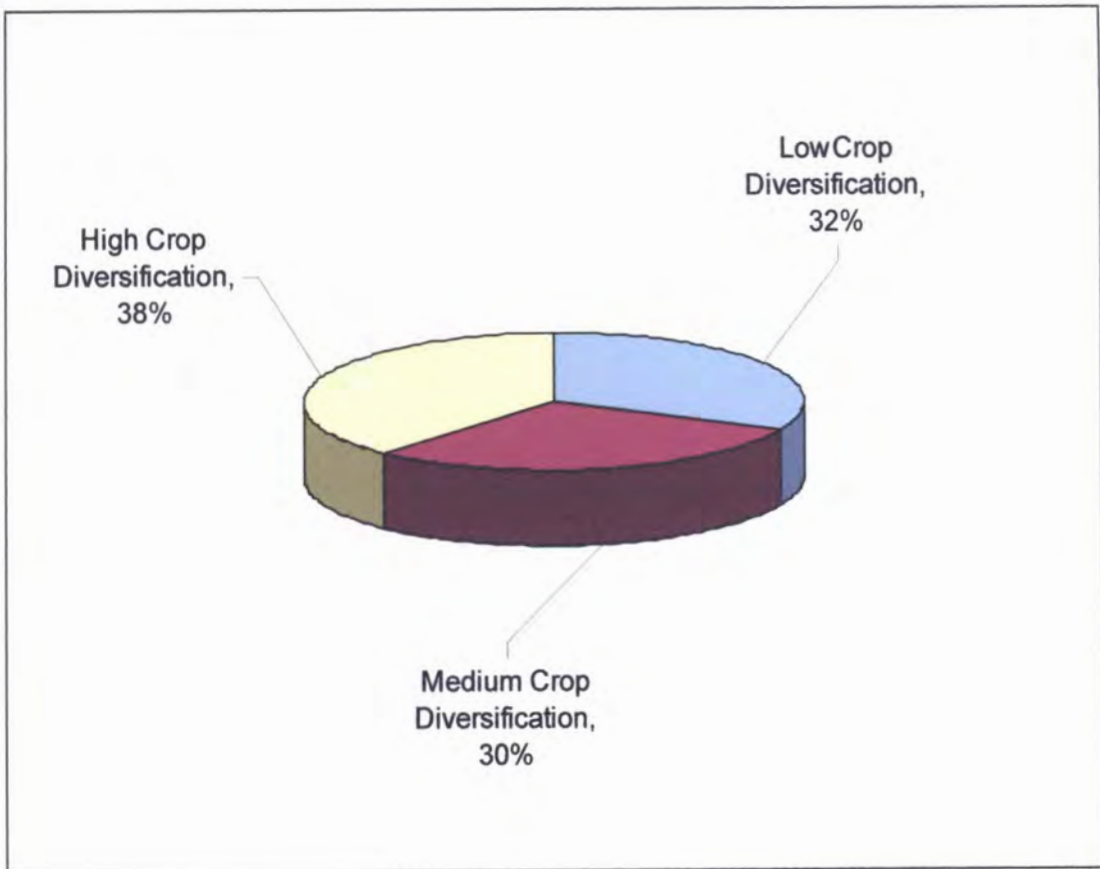
#### **4.2 Extent of adoption of crop diversification**

The observed crop diversification scores of the respondents ranged from 4.81 to 37.38 with an average of 20.74 and a standard deviation of 8.49. On the basis of their crop diversification scores, the farmers were classified into following three categories:

<u>Categories</u>	<u>Scores</u>
Low crop diversification	< Mean – 0.5 sd, i.e. < 16.5
Medium crop diversification	Mean ± 0.5 sd, i.e. 16.6 – 25
High crop diversification	> Mean + 0.5 sd, i.e. > 25

The distribution of the farmers according to their extent of adoption crop diversification scores is shown in Figure 4.1.





**Figure 4.1: Pie Graph Showing Different Categories of Crop Diversification**

Figure 4.1 shows that highest proportion (38 percent) of the farmers had high adoption of crop diversification, while 32 and 30 percent of them had low and medium adoption of crop diversification respectively. Therefore, it may be concluded that majority (62) of the respondents belonged to low to medium adoption of crop diversification categories.

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### **4.3 Relationship between the Characteristics of the Farmers and their Adoption of Crop Diversification**

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

In this section relationship between eleven selected characteristics (independent variables) of the farmers viz. age, education, family size, number of family labor, farm size, family annual income, credit received, extension contact, organizational participation, training exposure, knowledge on adoption of crop diversification and dependent variable i.e. adoption of crop diversification 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 and one percent level of significance were used as the basis for rejection of any hypothesis.

The summary of the results of the correlation co-efficient indicating the relationships between the selected characteristics of the respondent and their adoption of crop diversification is shown in Table 4.13.

**Table 4.13: 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%
Crop Diversification of the Farmers	Age	-0.023 <sup>NS</sup>	0.196	0.256
	Level of Education	0.155 <sup>NS</sup>		
	Family Size	0.026 <sup>NS</sup>		
	Number of Family Labor	0.087 <sup>NS</sup>		
	Farm Size	0.296**		
	Family Annual Income	0.362**		
	Credit Received	0.207*		
	Extension Contact	0.313*		
	Organizational Participation	0.200**		
	Training Exposure	0.383**		
	Knowledge on Crop Diversification	0.233*		

<sup>NS</sup> = 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 adoption of crop diversification**

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

“There was no relationship between age of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between age of the farmers and their adoption of crop diversification was found to be  $-0.023^{NS}$  as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a negative trend.
- A negligible relationship was found to exist between the two variables.
- The computed value of 'r' (0.023) 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 negative but insignificant relationship with their crop diversification. It was observed in the study area that the older farmers had lower adoption of crop diversification. Muttaieb (1995), Islam (1993), Rahman (1993), Saxena et al. (1990) also found similar relationship in their studies.

#### **4.3.2 Relationship between level of education of the farmers and adoption of crop diversification**

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

“There was no relationship between level of education of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between level of education of the farmers and their adoption of crop diversification was found to be 0.155<sup>NS</sup> as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A negligible relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.155) 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 level of education of the farmers had positive but insignificant relationship with their adoption of crop diversification. Ali (1993), Rahman (1993) also found similar relationship in their studies.

### 4.3.3 Relationship between family size of the farmers and adoption of crop diversification

The relationship between family size of the farmers and their adoption of crop diversification was examined by testing the following null hypothesis:

“There was no relationship between family size of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between family size of the farmers and their adoption of crop diversification was found to be 0.026<sup>NS</sup> as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A negligible 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 co-efficient of correlation between the concerned variables was not significant at 0.05 level of probability.

The findings demonstrate that family size of the farmers had positive but insignificant relationship with their adoption of crop diversification. Basher (1993), Islam (1993) and Hossain (1991) found similar relationship in their studies.

#### **4.3.4 Relationship between number of family labor of the farmers and adoption of crop diversification**

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

“There was no relationship between number of family labor of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between number of family labor of the farmers and their adoption of crop diversification was found to be 0.087<sup>NS</sup> as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A negligible relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.087) 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 number of family labor of the farmers had positive but insignificant relationship with their adoption of crop diversification.

#### **4.3.5 Relationship between farm size of the farmers and adoption of crop diversification**

The relationship between farm size of the farmers and their adoption of crop diversification was examined by testing the following null hypothesis:

“There was no relationship between farm size of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between farm size of the farmers and their adoption of crop diversification was found to be 0.296\*\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A high relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.296) 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 co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that farm size of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that farmers having larger farm size had higher adoption of crop diversification. It means that larger the farm size, greater the extent of adoption of crop diversification. The high relationship might be due to the fact that level of farm size enables the farmers to allocate extra land for the practice of adoption of crop diversification. Hossain and Crouch (1992), Sainturi (1992), Islam (1993), Khan (1993), Muttaleb (1995) and many other researchers reported similar relationship.



#### **4.3.6 Relationship between family annual income of the farmers and adoption of crop diversification**

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

“There was no relationship between family annual income of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between family annual income of the farmers and their adoption of crop diversification was found to be 0.362\*\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A high relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.362) 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 co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that family annual income of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that the larger the family annual income of the farmers, the higher the adoption of crop diversification. This means that raise in annual income of the farmers enable them to invest for the high cost technology related to adoption of crop diversification. Bhatia and Singh (1991), Haque (1993) and Muttaleb (1995) found similar relationship with the income.

#### **4.3.7 Relationship between credits received by the farmers and adoption of crop diversification**

The relationship between credits received by the farmers and their adoption of crop diversification was examined by testing the following null hypothesis:

“There was no relationship between credits received by the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between credits received by the farmers and their adoption of crop diversification was found to be 0.207\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A moderate relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.207) was greater than the table value ( $\pm 0.196$ ) with 98 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.05 level of probability.

The findings demonstrate that credits received of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that the farmers who received more credits had high crop diversification.

#### **4.3.8 Relationship between extension contact of the farmers and adoption of crop diversification**

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

“There was no relationship between extension contact of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between extension contact of the farmers and their adoption of crop diversification was found to be 0.313\*\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A high relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.313) 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 co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that extension contact of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that the more extension contact of the farmers, the higher the adoption of crop diversification. 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 similar 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 crop diversification**

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

“There was no relationship between organizational participation of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between organizational participation of the farmers and their crop diversification was found to be 0.200\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A moderate relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.200) was greater than the table value ( $\pm 0.196$ ) with 98 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.05 level of probability.

The findings demonstrate that organizational participation of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that the more organizational participation of the farmers, the higher was the adoption of crop diversification. Haque (1993), Khan (1993), Islam (1993), Rahman (1993), Hossain (1991) had found similar relationship with organizational participation.

#### **4.3.10 Relationship between training exposure of the farmers and adoption of crop diversification**

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

“There was no relationship between training received of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between training received of the farmers and their adoption of crop diversification was found to be 0.383\*\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A high relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.383) 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 co-efficient of correlation between the concerned variables was significant at 0.01 level of probability.

The findings demonstrate that training exposure of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that farmers having more training exposure had higher adoption of crop diversification. Haque (2003), Verma *et al.* (1989), Rahman, M.M. (1986) and Hossain (1981) had found similar relationship in their studies.

#### 4.3.11 Relationship between knowledge on crop diversification of the farmers and adoption of crop diversification

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

“There was no relationship between knowledge on crop diversification of the farmers and their adoption of crop diversification”.

Computed value of the co-efficient of correlation between knowledge on crop diversification of the farmers and their adoption of crop diversification was found to be 0.233\* as shown in Table 4.13. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A moderate relationship was found to exist between the two variables.
- The computed value of ‘r’ (0.233) was greater than the table value ( $\pm 0.196$ ) with 98 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variables was significant at 0.05 level of probability.

The findings demonstrate that knowledge on crop diversification of the farmers had significant positive relationship with their adoption of crop diversification. It was observed in the study area that farmers having more knowledge on crop diversification had higher adoption of crop diversification. Sardar (2002), Sarkar(1997), Alam(1997), Moullik *et al.* (1996), Reddy *et al.* (1987), Koch (1985) had found similar findings.

#### 4.4 Problem Confrontation in Adoption of Crop Diversification

The observed problem confrontation scores of the problems ranged from 52 to 173. The selected seven problems confronted by the respondents in adopting crop diversification with their Problem Confrontation Index (PCI) were shown in Table 4.14.

**Table 4.14 Problem Confrontation Index (PCI) with Rank Order**

Sl. No	Description of problem	Number of Respondents Confronted				PCI	Rank Order
		Large problem	Medium problem	Low problem	Not at all problem		
1.	Lack of technical knowledge	15	53	22	10	173	1
2.	Lack of extension service	17	47	20	14	165	2
3.	Lack of inputs in time	20	35	22	23	152	3
4.	Unfavourable climate	3	43	39	15	134	4
5.	High pest attack	11	25	49	15	132	5
6.	Difficult to practice crop diversification	4	10	69	17	101	6
7.	Less crop production by adopting crop diversification	5	10	17	68	52	7

On the basis of PCI, it was observed that “lack of technical knowledge” ranked first followed by “lack of extension service”, “lack of inputs in time”, “unfavourable climate”, “high pest attack”, “difficult to practice crop diversification” and “less crop production by adopting crop diversification”.

## 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 (71 percent) of farmers were young to middle-aged.

##### **Level of Education**

It was found that majority (41 percent) of the farmers had secondary level of education compared to 21, 34 and 4 percent illiterate, primary and above secondary level of education respectively.

##### **Family Size**

The findings revealed that 39 percent of the farmers had medium family compared to 38 percent small family and 23 percent large family.



### **Number of Family Labor**

The findings revealed that 46 percent of the farmers had medium family labor compared to 32 percent of them having small family labor. The proportion of large family labor was 22 percent only.

### **Farm Size**

It was found that 52 percent of the respondents had small land holding, 48 percent had medium land holding.

### **Family Annual Income**

It was found that the highest portion (46 percent) of the respondents had medium income while 23 percent respondents had low income and 31 percent had high income.

### **Credit Received**

The study indicated that the highest proportion (53 percent) of the farmers received no credit compared to 32 and 15 percent received low and high credit respectively.

### **Extension Contact**

The study indicated that 56 percent of the respondents fell in the medium extension contact category compared to 34 percent falling in the low extension contact and 10 percent falling in the high extension category. It was evident that the majority (90 %) of the respondents had low and medium contact with the different extension activities, agents and media.

### **Organizational Participation**

It was revealed that the majority (76 percent) of the farmers had low organizational participation, while 24 percent of them had medium organizational participation.

### **Training Exposure**

The study revealed that one third (33 percent) of the farmers had no training exposure compared to 30, 14 and 23 percent having low, medium and high training exposure respectively.

### **Knowledge on Crop Diversification**

The study revealed that the majority (77 percent) of the farmers had low knowledge on crop diversification while 18 percent had medium knowledge and only 5 percent of the respondents had high knowledge on crop diversification.

#### **5.1.2 Crop Diversification**

The study revealed that the highest proportion (38 percent) of the farmers had high adoption of crop diversification, while 32 and 30 percent of them had low and medium adoption of crop diversification respectively. Therefore, it may be concluded that majority (62) of the respondents belonged to low to medium adoption of crop diversification categories.

#### **5.1.3 Relationship between dependent and independent variables of the respondents**

Relationships of eleven selected characteristics of the farmers with their adoption of crop diversification were investigated in this study. The characteristics were age, level of education, family size, number of family labor, farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification. Relationships of all the characteristics with adoption of crop diversification were examined by co-efficient of correlation test.

The results indicated that farm size, family annual income, credit received, extension contact, organizational participation, training exposure and knowledge on crop diversification had significant positive relationship with adoption of crop diversification. Other four variables namely, age, level of education, family size and number of family labor had no significant relationship with crop diversification.

#### **5.1.4 Problem Confrontation**

Problem confrontation was the barrier to crop diversification. Therefore, Government organizations (GOs) as well as Non-Government Organizations (NGOs) should provide adequate services to the respondents so that they could overcome those problems which were found to be their hindrances against taking part in crop diversification.

#### **5.2 Conclusions**

Based on the above findings the following conclusions were drawn:

1. Of the 100 farmers, 32 percent had low adoption of crop diversification, 30 percent had medium and only 38 percent had high adoption of crop diversification. It might be, therefore, concluded that majority (62 percent) of the respondents belonged low to medium adoption of crop diversification categories. From the above findings it could be said that the adoption picture of crop diversification was quite satisfactory.
2. Correlation test indicated positive relationship between farm size of the farmers and adoption of crop diversification. This might be due to the fact that large farmers have excess land for production of minor crops. It may, therefore, be concluded that larger farm size would be helpful to increase the extent of adoption of crop diversification.

3. Family annual income and credit received of the farmers showed positive and significant relationship with their adoption of crop diversification. Such a relationship might be due to the fact that higher income or availability of enough capital increases capability to make investment for adopting improved technologies. 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 conducive effect in increasing adoption of crop diversification.

4. Extension contact of the farmers had positive and significant relationship with their adoption of crop diversification. This means that the higher the contact with different extension teaching methods, the higher was their adoption of crop diversification. Such relationship might be due to the fact that the farmers with higher exposure to extension methods received more useful information and became more motivated to adopt crop diversification. It may, therefore, be concluded that adoption of crop diversification would be increased if the farmers were more exposed to extension media.

5. A positive significant relationship was found between organizational participation of the farmers and their adoption of crop diversification. The reason behind it might be that the farmers become more conscious about the benefits of crop diversification with the involvement of different organization. Through participation in different organizations, an individual comes in contact with other persons and new ideas. It exercises such influence on the individuals that favorably dispose them towards acceptance of new ideas. As a result their view to crop diversification changes positively and they adopt it very quickly. Therefore, it can be concluded that more organizational participation should be encouraged among the farmers to adopt crop diversification.

6. There was a positive and significant relationship between training exposure and adoption of crop diversification. The reason might be that after completion of a successful training, farmers are expected to be aware of the benefits of crop diversification and also have enough knowledge about the cultivation process of different crops. So, it can be concluded that adoption of crop diversification increases with the increase of training exposure of the farmers.

7. Knowledge on crop diversification of the farmers had positive and significant relationship with their extent of adoption of crop diversification. The reason might be that with the increase of knowledge on crop diversification farmers become aware of the benefits of crop diversification. This indicates that adoption of crop diversification increases with the increase of knowledge on crop diversification.

8. On the basis of problem confrontation index, it was concluded that the farmers were confounded by the problems like lack of technical knowledge, Lack of extension service, Lack of inputs in time, unfavorable climate, high pest attack, difficult to practice crop diversification, less of production by adopting crop diversification.

### **5.3 Recommendations**

#### **5.3.1 Recommendation for policy implications**

1. Crop diversification is important sources of nutrients that make diets for human beings more balanced. But in the present study the extent of adoption of crop diversification among the farmers was low to medium. It is, therefore, recommended that effective steps should be taken to motivate the farmers in accepting crop diversification.

2. Farm size had significant positive relationship with adoption of crop diversification. Therefore, it may be recommended that concerned authorities should take necessary motivational program specially to low and medium farm sized farmers so that they can practice more crop diversification.

3. Family annual income and credit received had significant positive relationship with adoption of crop diversification. Therefore, it may be recommended that concerned authority should supply more credit to the farmers so that they can invest more in adopting crop diversification.
4. Extension contact and organizational participation had significant positive relationship with adoption of crop diversification. Therefore, it may be recommended that concern authority should take necessary action so that the farmers could increase their extension contact and organizational participation.
5. Training exposure and knowledge on crop diversification of the farmers had positive significant relationship with their adoption of crop diversification. Therefore, it may be recommended that concern authority should take necessary motivational program like training on crop diversification so that the farmers could increase their knowledge on crop diversification.
6. On the basis of PCI, it was observed that “lack of technical knowledge” ranked first followed by “lack of extension service”, “lack of inputs in time”, “Unfavorable climates, high pest attack”, “difficult to practice crop diversification” and “less crop production by adopting crop diversification”.

### **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 crop diversification 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 crop diversification. 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 crop diversification. Further research should be taken to find out the cropping pattern, crop rotation and similar topics.

## CHAPTER 6

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**APPENDIX**

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

**“CROP DIVERSIFICATION BY THE FARMERS OF KALIAKOIR UPAZILA  
UNDER GAZIPUR DISTRICT”**

Sample no.....  
Name of respondent: .....  
Father/Husband’s Name: .....  
Village: .....  
Union: .....

*(Please answer the following question. Provided information will be kept confidentially 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) I passed .....class.

**3. Family Size**

How many family members do you have?

..... person.

#### 4. Number of family labor

- a) Below 6 years ..... person
- b) 6 to 12 years ..... person
- c) 13 to 17 years ..... person
- d) 18 years and above .....person

#### 5. Farm Size

Please indicate the area of land of your family.

Land type	Land Ownership	
	Local unit (Decimal)	Hectares
a) Uncultivated land on homestead		
b) Cultivated land on homestead		
c) Own land under own cultivation		
d) Own land given to others as borga		
e) Land taken from others as borga		
g) Land taken from others as lease		
Total		

#### 6. Family Annual Income

Please indicate your family annual 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	

## 7. 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	

## 8. 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)	Occasion-ally (2)	Rarely (1)	Not at all (0)
Personal Contact	Ideal farmer	6 and more times/month	4-5 times/month	2-3 times/month	1 time/month	0 time/month
	NGO Worker	4 and more times/month	3 times/month	2 times/month	1 time/month	0 time/month
	Sub Assistant Agricultural Officer	4 and more times/month	3 times/month	2 times/month	1 time/month	0 time/month
	Additional Agriculture Officer/UAO	4 and more times/year	3 times/year	2 times/year	1 time/year	0 time/year
Group Contact	Method Demonstration	3 and more times/year	1 time/year	1 time/2 year	1 time/4 year	0 time/year
	Group Meeting	6 and 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

Type of Contact	Source of Contact	Extent of Contact				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Not at all (0)
Mass Contact	Listening Radio programs on agriculture	4 and more times/week	3 times/week	2 times/week	1 time/week	0 time/week
	Watching TV programs on agriculture	4 and more times/month	3 times/month	2 times/month	1 time/month	0 time/month
	Reading agricultural news in newspapers	4 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	4 and more times/year	3 times/year	2 times/year	1 time/year	0 time/year

### 9. 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.	School Committee				
4.	Madrassa/Mosque Committee				

### 10. 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			

## 11. Knowledge on Crop Diversification

Please answer the following questions.

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

## 12. Crop Diversification

Mention the name of cultivated crop and area of land during last three years.

Name of Crop	Amount of Cultivable Land (ha)		
	2003-2004	2004-2005	2005-2006
Agronomical Crop	Aus Rice		
	Aman Rice		
	Boro Rice		
	Wheat		
	Jute		
	Sweet Potato		
	Pulse Crop		
	Oil Crop		
Spices	Chili		
	Onion		
	Garlic		
	Tarmaric		
	Zinger		
	Dhania		

Name of Crop		Amount of Cultivable Land (ha)		
		2003-2004	2004-2005	2005-2006
Vegetables	Potato			
	Papaya			
	Tomato			
	Brinjal			
	Bottle Guard			
	Sweet Guard			
	Chal Kumra			
	Bean			
	Puishak			
	Lalshak			
	Datashak			
	Palonshak			
	Reddish			
	Pointed Guard			
	Cabbage			
	Cauliflower			
	Snake Guard			
	Kakrol			
	Okra			
	Bitter Guard			
	Jhinga			
	Ponge Gurad			
	Carrot			
Cucumber				
Khira				
Others				
Total				

### 13. Problems Confrontation in Crop Diversification

Please mention the level of problem confronted by you in adopting crop diversification.

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

Thank you for your co-operation.

Signature of interviewer  
Date:



## APPENDIX – B

### Correlations Matrix of Independent and Dependent Variables

VARIABLE	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	Y
X1	1											
X2	-.081	1										
X3	.463**	-.179	1									
X4	.266**	.030	.568**	1								
X5	.168	.370**	.089	.206*	1							
X6	.162	.283**	.199*	.213*	.775**	1						
X7	.138	.218*	.189	.092	.245*	.231*	1					
X8	-.077	.149	-.162	-.090	.062	-.020	.043	1				
X9	.213*	.268**	.168	.278**	.356**	.329**	.340**	-.080	1			
X10	.204*	.195	.238*	.259**	.383**	.440**	.409**	-.012	.335**	1		
X11	.260**	.063	.423**	.313**	.237*	.316**	.213*	-.053	.311**	.276**	1	
Y	-.023	.155	.026	.087	.296**	.362**	.233*	.207*	.313**	.383**	.200*	1

\* = Correlation is significant at the 0.05 level (2-tailed)

\*\* = Correlation is significant at the 0.01 level (2-tailed)

X1 = Age

X2 = Level of Education

X3 = Family Size

X4 = Number of Family Labor

X5 = Farm Size

X6 = Family Annual Income

X7 = Knowledge on Crop Diversification

X8 = Credit Received

X9 = Extension Contact

X10 = Training Exposure

X11 = Organizational Participation

Y = Crop Diversification