

**ADOPTION OF INTERCROPPING IN SUGARCANE
BY THE FARMERS**

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**ADOPTION OF INTERCROPPING IN SUGARCANE
BY THE FARMERS**

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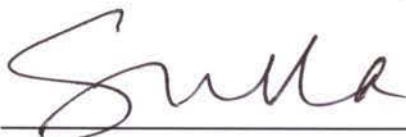
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CERTIFICATE

This is to certify that the thesis entitled "ADOPTION OF INTERCROPPING IN SUGARCANE BY THE FARMERS" submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM, embodies the result of a piece of *bona fide* research work carried out by MD. SADEKUZZAMAN, Registration No. 00549 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 :

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Place : Dhaka, Bangladesh

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Dedicated To
My Beloved Parents

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ABSTRACTS

The study was undertaken in four sub-zones of Shampur Sugar Mills Ltd. under Badarganj Upazila of Rangpur district aiming to determine the relationship of eleven selected characteristics with the extent of adoption of intercropping in sugarcane. A sample of 104 farmers were selected randomly from a population of 520 sugarcane growers of the study area. Data were collected during 5th September-15th October 2006, by using interview schedule in a face to face situation. Findings revealed that more than three-fourth (77 percent) of the respondents had low to medium adoption of intercropping in sugarcane. Pearson product moment correlation coefficients were computed to examine the relationships between the concerned variables. Out of eleven selected characteristics of the farmers age, education, farm size, annual family income, sugarcane cultivation knowledge, training exposure and organizational participation had significant positive relationship with their adoption of intercropping in sugarcane. Other four variables, i.e., family size, family labour, credit received and extension contact had no significant relationships with their adoption of intercropping in sugarcane.

Chapter 1



Introduction

CHAPTER I

INTRODUCTION

1.1 General Background

Sugarcane is a long durational, vegetative propagated plant. In the economic point of view, it is the second most important cash crop and fairly resistant crop to stress like drought and flood. It is the major sugar or gur (gaggary) producing crop of Bangladesh.

Intercropping is a type of multiple cropping. It is the judicious utilization of time and space to increase total crop output per unit area. The process of growing and harvesting a short duration crop before canopy development and growth phase of main crop is very much helpful for farmers to avert risk of crop failure. This means intercropping in many countries is essentially considered and used by the farmers as a tool for risk aversion in agriculture. In Bangladesh, intercropping is a common and known practice. But the level of raising intercrops scientifically is far from satisfaction. Bangladesh is one of the most densely populated countries of the world. There exists a little scope of horizontal expansion of land for increasing agricultural productivity. To increase farm income the only way thus remains is to undertake intensive use of land through scientific farming and multiple cropping. Intercropping is a very good practice to increase total yield balancing the nutritional requirements, higher monetary return, and greater resource-utilization and to fulfil the diversified needs of the farmers (Singh, et. al., 1986).

Intercropping with sugarcane is very important for small and medium farmers, for the sugar industry and for the country as a whole. Many farmers are now practicing intercropping. Although farmers grow intercrops with sugarcane, but in most cases these are not often being practiced scientifically. For scientific intercropping, the following factors need to be considered: (i) early planting (ii) choosing a suitable compatible intercrop (iii) irrigating intercrops (iv) applying additional fertilizers (v) line sowing of intercrops (vi) non-branching type of intercrops and (vii) sugarcane varieties having slow early growth etc and very few farmers consider above factors.

In Bangladesh, intercropping with sugarcane is very much essential for the farmers (i) to increase their total income and (ii) to keep sugarcane in cultivation especially in high and medium highland. Sugarcane as mentioned earlier is a long duration crop and requires 12-16 months. This means that sugarcane farmers after investing about Tk.25,000.00 per hectare need to wait 12-16 months for getting return. Most small and medium farmers who are mainly the share-croppers in Bangladesh cannot afford to wait for such a long period due to poor financial condition as well as higher demand for food and vegetables for ever increasing population. Under this situation, such farmers are compelled to think about discontinuation of sugarcane cultivation. Because, during this 12-16 months period many farmers can grow 2-3 crops which provides income supplies at 3-4 times within the same time. So, in most cases it is a natural and genuine decision of the farmers to discontinue sugarcane unless the farmers are provided a scope of getting intermediate return from sugarcane field. And this is only and effectively possible through raising intercrops with sugarcane. Scientists have succeeded to generate technologies for raising two successive intercrops and thus creating almost similar number of crops within the same period.

Intercropping demands sufficient knowledge and skills in Agriculture. It also requires additional investment requirement. Additional input in the form of seed, fertilizer and labor inputs put extra pressure on farmers. Adoption of intercropping in sugarcane by the farmers is a special type of behavior. Some farmers do it and others do not. Some do it very effectively and scientifically, others cannot do it in that way. Some farmers put less area, others divert most sugarcane areas in intercropping. Some factors are expected to exert influence on fluctuation of intercropping behavior of adoption pattern of intercropping with sugarcane. But, a very few research works have been conducted earlier to find out the adoption of intercropping in sugarcane farmers. On this consideration, the present research felt necessity to conduct a study entitled "Adoption of intercropping in Sugarcane by the farmers."

1.2 Statement of the Problem

With a view to have an understanding on the extent of adoption of intercropping in sugarcane by the farmers, the researcher undertook a research study entitled "Adoption of Intercropping in Sugarcane by the farmers." The purpose of the study was to determine the extent of adoption of intercropping in sugarcane cultivation and also to ascertain the relationships of the selected characteristics of the sugarcane growers with their adoption of intercropping in sugarcane. The present investigation is concerned with the adoption of intercropping (innovations) which is a major concern in Agricultural extension. This was done by seeking answer to the following questions:

1. What were the characteristics of the farmers?
2. What were the extents of adoption of intercropping in sugarcane by the farmers?
3. What were the relationships of the selected characteristics of the farmers with their adoption of intercropping in sugarcane?

1.3 Specific Objectives

Considering the above mentioned problems, the following specific objectives were selected in order to give proper direction to the study:

1. To determine and describe the selected characteristics of the farmers.

The selected characteristics of the farmers were:

- i. Age
 - ii. Education
 - iii. Family size
 - iv. Family labor
 - v. Farm size
 - vi. Annual family income
 - vii. Sugarcane cultivation knowledge
 - viii. Credit received
 - ix. Extension contact
 - x. Training exposure
 - xi. Organizational participation
2. To determine and describe the extent of adoption of intercropping in sugarcane by the farmers.
 3. To explore the relationships of the selected individual characteristics of the farmers with their extent of adoption of intercropping in sugarcane.

1.4 Scope and Limitation of the Study

The purpose of the study was to have an understanding of the extent of adoption of intercropping in sugarcane. However, in order to make the study manageable and meaningful from the research point of view, it was necessary to impose certain limitations as follows:

1. The study was confined to four sub-zone namely Mill gate, Badarganj, Nagerhat and Sukurerhat under Shampur Sugar Mills Ltd.

2. Characteristics of the cane growers are many and varied but only eleven were selected for investigation in this study.
3. Population for the present study were kept confined within the heads of the intercropping cane growing farm families because they were the major decision makers in the adoption of intercropping in sugarcane.
4. Facts and figures collected by the investigator applied to the situation prevailing during the year 2003-04, 2004-05 and 2005-06.
5. For information about the study, the researcher depended on the data as furnished by the selected farmers during their interview with him.

Although, the findings of the study will be specifically applicable to four sub-zone of Shampur Sugar Mills, the findings will also have implication for other areas of the country having similarities to the study area. Thus the findings are expected to be useful to the extension workers and planners for preparation of programs for rapid adoption of intercropping in sugarcane by the farmers. The findings may also be helpful to the field workers of different nation building department/ organization including NGO's to improve their technique and strategy of action for effective working with the rural people, to generate rural employment and to improve rural economy and thus for alleviation of the poverty.

1.5 Assumptions

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Good,1945). The researcher had the following assumptions in mind while undertaking this study.

1. The respondents included in the sample for this study were competent enough to furnish proper responses to the queries included in the interview schedule.

2. The researcher who acted as interviewer was well adjusted to the social environment of the study area. Hence the data collected can be treated as reliable.
3. The responses furnished by the respondents were reliable. They expressed the truth about convictions and opinions.
4. Views and opinions furnished by the intercropping sugarcane growers included in the sample were representative views and opinions of the whole population of the study area.
5. The findings of the study will have general application to other parts of the country with similar personal, socioeconomic and cultural conditions of the study area.

1.6 Statement of Hypothesis

A hypothesis is a proposition which can be put to a test to determine its validity. It may seem contrary to or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test (Goode and Hatt 1952). In broad sense, hypothesis may be broadly divided into two categories, a) research hypothesis (H_1) and b) null hypothesis (H_0). When an investigator tries to find out relationship between variables, then first formulates research hypothesis which states anticipated relationships between the variables. On the other hand, when a researcher tries to perform statistical test, then it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the concerned variables.

The following null hypothesis was formulated to explore the relationships of the selected characteristics of the farmers with their adoption of intercropping in sugarcane.

“There is no relationship between the selected characteristics of the farmers and their adoption of intercropping in sugarcane.”

1.7 Definition of the Terms

A number of key terms used throughout the study are defined in this section for clarity of understanding.

Intercropping: When two crops are grown together on the same land at the same period, in space between two rows of main crop, the system of cultivation is known as intercropping. One of the crops is known as the principal crop and is generally of long duration and other crop is known as the intercrop or additional crop having shorter duration. Usually a deep rooted crop is selected as principal crop and a shallow rooted one is chosen as intercrop. In this study sugarcane has been considered as the principal crop and potato, mustard, cabbage, lentil and onion were considered as the intercrops.

Adoption: Adoption is the implementation of a decision to continue the use of an innovation. However, adoption of intercropping in sugarcane cultivation refers to one's use of the intercropping practice in sugarcane and one's decision of use in future. It is an individual decision-making process.

Age: It is defined as the period of time from the birth of the intercropping sugarcane growers to the time of interview. It was measured in terms of year.

Education: Education of a sugarcane grower is defined as the ability of an individual to read and write or formal education received up to a certain standard. Education was measured in terms of actual year of successful schooling.

Family size: Family size of sugarcane growers refers to the actual number of member in this family.

Family labour: Family labour of a sugarcane grower refers to the actual number of labour in his family (including himself) during the period of study.

Farm size: The term refers to the cultivated area either owned by a farmer or obtained from others on “borga” system, the area being estimated in terms of full benefit to the farmers. The right of the farmers on land taken on lease from others is regarded as ownership in estimating the farm size. Farm size was measured in terms of hectares.

Annual Family Income: The term annual family income refers to the annual gross income or total earning of a respondent himself and the members of his family from agriculture, service, business and other sources during a year. It was expressed in taka. However a unit scores of one (1) was assigned for each thousand taka income.

Sugarcane cultivation knowledge: It is the extent of basic knowledge of a sugarcane grower in different aspects of agricultural subject matters. It includes the basic understanding of cane cultivation.

Credit received: Credit received of a respondent refers to the amount of credit actually received by him from institutional or non-institutional sources.

Extension contact: This term refers to one’s becoming accessible to the influence of extension program through different extension teaching methods.

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: Organization participation refers to ones involvement in different organization as ordinary member, executive committee members and officer bearers for a period of time.

Chapter 2

Review of Literature



CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review the literature having relevance to the present study. This present study is primarily concerned with the adoption of intercropping in sugarcane. The researcher made an elaborate search of available literature for this purpose. But, a very few study dealing with the relationship of the characteristics of sugarcane growers with their adoption of intercropping in sugarcane cultivation was available in course of the review of literature. Considerable work has been done in the field of adoption of improved varieties of crops and other agricultural innovations in USA and other foreign countries. In Bangladesh, research in adoption of agricultural innovations has also started and some studies have already come out from the Bangladesh Agricultural University, Mymensingh, Sher-e-Bangla agricultural University and other agricultural research organizations. A number of studies were available which investigated relationships of the characteristics of the farmers with their adoption of different innovations (Intercropping of sugarcane may be regarded as innovations). However, this chapter is divided into following three sections:

Section I: Concept of intercropping in sugarcane

Section II: Relationship of the selected characteristics of the farmers with their adoption of different innovations

Section III: Conceptual framework of the study

2.1 Concept of Intercropping in Sugarcane

Bashar (1993) revealed that about half (48.57 percent) of the respondents had medium adoption of intercropping compared to 19.05 percent having low and 32.38 percent having high adoption of intercropping.

Intercropping with sugarcane is a popular practice in sugar mill zones in Bangladesh. Sugarcane is a long duration crop (about 16 months) grown in a considerable inter row spacing of 75 to 122 cm. The temporary vacant space in between two rows makes room for raising short duration winter crops at the early stage of cane growth (Ali, et al., 1989). Intercropping with sugarcane was introduced to harvest several advantages. One of the most important considerations was to produce an additional crop with minimum investment without affecting the overall production of the main crop i.e. sugarcane (Ali, et al., 1989 and Kabir, 1988).

Intercropping with sugarcane is highly profitable. Generally potato, garlic, onion, tomato and mustard are the major crops grown as intercrops with sugarcane (Shaheen, et al., 1989). Potato is the best suitable intercrop to grow with sugarcane. Ali, et al. (1989) found that intercropping potato with sugarcane increases substantial cane yield compared to pure stand sugarcane irrespective of different row arrangement.

Kabir (1988) observed that potato, mung and gram were found as most compatible intercropping with sugarcane by the farmers which helped in reducing the cost of sugarcane cultivation. He found that the highest return per hectare was obtained from sugarcane + potato (Tk. 26,774.01) followed by sugarcane + gram (Tk.16,176.63), sugarcane + mustard (Tk.11,754.56), sugarcane + lentil (Tk.5,968.30) and sugarcane as a sole crop (Tk.5,792.49).

This means that the net return from every intercrop combination with sugarcane was higher than that of sugarcane as a sole crop. All these literatures revealed that intercropping with sugarcane is a profitable practice compared to sole cropping of sugarcane. Intercropping with crops like potato helps to increase the yield of main crop i.e. sugarcane compared to its pure stand.

2.2 Relationship of the Selected Characteristics of the Farmers with their Adoption of Different Innovations

The findings of studies dealing with the relationships of the characteristics of the farmers with their adoption of different innovations were of interest to the researcher and it was deemed pertinent to review the findings of such studies in brief. Expert opinions and findings of previous studies relating to the association of selected variables with the adoption of innovations.

Eleven characteristics of the sugarcane growers were selected as independent variables of this study. The researcher made utmost effort to search out studies dealing with the relationships of each of the selected characteristics with the adoption of innovations. This section presents a review of expert opinions and past studies relating to the association between the selected independent variables and adoption of innovations. The presentation has been made in eleven sub-sections. Each sub-section dealing with the literature on the relationship of one of the independent variables and adoption of innovations.

2.2.1 Age and adoption of innovations

Many researchers observed that in most cases, age of the farmers had no relationship with adoption of improved crop production practices.

Bashar (1993) conducted a study on the adoption of intercropping in sugarcane cultivation and found a negative relationship between age and adoption of intercropping.

Beal and Sibley (1967) conducted a combined study on the adoption of agricultural technology by the Indians of Guatemala indicated that there was a significant negative relationship between the age score and farm practices adoption score. Similar findings between age and adoption of improved farm practices had also been reported by Krishna (1969) and Bezborra (1980).

Haque (1984) conducted a study on the adoption of improved farm practices in sugarcane cultivation in some selected areas of Jessore district. He found a significant positive relationship between age and the adoption of improved practices. Similar results were also found by Ali *et al.* (1986).

Iqbal (1963) found that elderly farmers were more apt to adopt modern agricultural practices as compared to other age groups. Similar positive relationship between age and adoption of innovations had also been reported by Islam (1971).

Reddy and Kivlin (1968) found that age was not a significant factor in respect of adoption of either ten agricultural practices considered collectively or that of HYV alone. Similar findings between age and adoption of improved farm practices had also been reported by Hossain (1971) and Singh (1989).

Karim (1973) found no relationship between age and adoption of fertilizers. Similar findings between age and adoption of improved farm practices of the farmers had also been reported by Rahman (1973), Sobhan (1975), Razzaque (1977), Hossain (1981), Ali and Chowdhury (1983) and Singh (1989).

Shetty (1968) undertook a study on agricultural innovations of rice farmers and found that age was negatively related to the innovation. Similar findings between age and adoption of new farm practices had also been found by Lionberger (1966), Shamsuzzoha (1967) and Ali (1993).

2.2.2 Education and adoption of innovations

Most diffusion researchers in their studies showed significant positive relation between farmers own education and adoption of improved crop production practices.

Bashar (1993) found a positive and highly significant relationship between education and adoption of intercropping in sugarcane.

Marsh and Coleman (1955) revealed a significant positive relationship between educations of the farmers with their adoption of recommended practices. Similar findings between education of the farmers and adoption of different agricultural practices had also been reported by Dimit (1957), Rahim(1961), Bose and Saxena (1965), Chaudhary *et al.* (1968), Reddy and Kivlin (1968), Hossain (1971), Rao (1976), Halim (1982), Haque (1984) and Ali *et al.* (1986).

Mannan (1972) did not find any significant relationship between education of the farmers and adoption of IR-20. Similar findings had also been found by Singh (1989).

Sobhan (1975) found that education of the farmers had no relationship with their adoption of winter vegetable cultivation. Similar findings were also observed in other studies (Islam,1971; Hossain, 1981; and Ali, 1993).

Zaidi (1960) after conducting a survey in Comilla development area and found that farmers adopting the improved methods of aman cultivation were better educated. Ahmed (1968) also found similar findings between education and adoption of improved agricultural practices in aus crop. However, positive relationship between education score and farm practice adoption score was also found in the studies conducted by Beal and Sibley (1967) and Karim (1973).

Krishna (1969) found a significant negative relationship between education of the farmers and their adoption of hybrid maize.

2.2.3 Family size and adoption of innovations

Bashar (1993) revealed that there was no significant relationship with the adoption of intercropping and sugarcane growers.

Ali et al. (1986) found that adoption increased significantly with the increase of family size. Family size were also found to be significantly related to adoption of recommended practices by Igodan *et al.* (1988).

Asaduzzaman (1979) observed significant negative contribution of consuming unit (i.e. family size) an extent of HYV paddy adoption in Bangladesh.

Ali (1993) found that family size exhibited no significant relationship with STP adoption behavior of sugarcane farmers. However, no relationship between the family size and adoption of improved practices had also been reported by Mustafi *et al.* (1987).

2.2.4 Family labour and adoption of innovations

Bashar (1993) reported that family labour had a significant positive relation with the adoption of intercropping in sugarcane.

Muhammad (1974) found that there is no relationship between family labour of the farmers and their adoption of insect control measures.

A study conducted by Wilkening *et al.* (1962) provided little evidence to the effect of labour force upon practice adoption. None of the practice scores were significantly associated with a number of men on the farm.

2.2.5 Farm size and adoption of innovations

Bashar did not find any significant relationship between farm size of the sugarcane growers and adoption of intercropping in sugarcane.

Ali and Chowdhury (1983) found a positive significant relationship between family land holding size (i.e. farm size) and adoption behavior of sugarcane growers. Similar relationships between the farm size and adoption of improved farm practices of the farmers had also been reported by Reddy and Kilvin (1968) and Haque (1984).

Wilson and Gallup (1955) reported that percentage of farmers and home makers adopting new practices and rate of adoption of such practices tended to increase with the increase in size of farm i.e. positive relationship between size of the farm and adoption of new practices in his study. Similar finding between farm size and adoption of improved farm practices of the farmers had also been reported by Rahim (1961), Ali (1962), Lionberger (1966), Beal and Sibley (1967), Ahmed (1968), Gaikward *et al.* (1969), Hossain (1971), Karim (1973).

Ali *et al.* (1986) found a strong negative relationship between farm size and adoption of improved sugarcane production technologies. Similar findings have also been reported by Asaduzzaman and Islam (1976) and Asaduzzaman (1979). Iqbal (1963) found that larger size was crucial factor to distinguish adopters from non-adopters.

Inayetullah (1962) did not find any relationship between size of farm and the adoption potential. This finding is very much in agreement with that of Islam (1971) and (1972). However, Sobhan (1975), Singh (1989) and Ali (1993) found that there was no significant relationship between farm size of the farmers and their adoption of improved farm production technologies.

2.2.6 Annual family income and adoption of innovations

Bashar (1993) observed that no significant relationship between the adopters of intercropping in sugarcane and their annual family income.

Thomson (1968) found a positive relationship between the income and adoption of farm practices. Similar results had also been found by Rogers and Shoemaker (1971) and Rahman(1973).

Haque (1984) conducted a study on the adoption of improved practices in sugarcane cultivation and found a positive relationship between annual income and adoption of improved practices. Similar findings had also been reported by Al-Mogel (1985).

Beal and Sibley (1967) in their combined study did not find any significant relationship between value of principal crops score (i.e income) and the farm practice adoption. Similar findings between income and adoption of improved practices of the jute growers had also been reported by Hossain (1981) and

Singh (1989). However, Sahay (1961) analyzed the income on improved agricultural techniques. He found that adoption was significantly influenced by income.

2.2.7 Sugarcane cultivation knowledge and adoption of innovations

Bashar conducted a study and found positively relationship among the knowledge and adoption of intercropping in sugarcane growers.

Koch (1985) found that there was a strong positive relationship between knowledge and adoption. This finding is very much in agreement with that of Rogers and shoemaker (1971). However, a significant difference was found between participant and non-participant farmers with respect of knowledge level and adoption behavior and there was significant association between knowledge and adoption with respect to adoption of an improved package of practices in paddy production by participant and non-participant farmers as reported by Reddy *et al.*(1987).

Moulik et al. (1966) found a significant positive relationship between agricultural knowledge and adoption of nitrogenous fertilizers among cultivators. Similar findings between agricultural knowledge and adoption had also been reported by Hoffer and Slangland (1958), Ernest (1973), Ramachandran (1974), Somasundaran and Singh (1978), Bezborra (1980), Grewal (1980), Ali and Chowdhury (1983), Ali *et al.* (1986) and Ali(1993).

2.2.8 Credit received and adoption of innovations

Bashar (1993) found that credit received exhibited no significant relationship with the adoption of intercropping in sugarcane growers.

Beal and Sibley (1967) in their study found a positive relationship between credit availability and adoption of agricultural technology. This observation is very much in agreement with that of Rahman (1974).

Haque (1984) found a significant positive relationship between credit availability and adoption of improved cane cultivation technologies.

Hossain (1981) found a significant relationship between credit availability and adoption of improved farm practices.

Reddy and Kivlin (1968) from a study of three Indian villages concluded that credit availability was not significantly related to adoption of HYV.

2.2.9 Extension contact and adoption of innovations

Bashar (1993) revealed a positive relationship between the intercrop of sugarcane growers and extension contact.

Donelan (1985) found that improvement of extension services to the farmer is one factor that can help to raise cane yield per acre and thus produce required tonnage on smaller acreage. Similar positive relationship between extension contact and adoption of innovation of the farmers had also been reported by Wilson and Gallup (1955), Beal and Sibley (1967), Reddy and Kivlin (1968), Muhammad (1974), Halim (1982) and Naike and Rao (1989).

Ali (1993) conducted a study and found a significant positive relationship between extension contact and adoption. Similar results had also been found by Fliegel (1956), Hardee (1965), Mouliket *et al.* (1966), Rao (1976), Bezbora (1980), Grewal (1980), Hossain (1981), Haque (1984), Osunlogun *et al.* (1986), Mustafi *et al.* (1987) and Igodan *et al.* (1988).

Ali *et al.* (1986) found no relationship between contact with extension workers and farmers adoption behavior of improved crop production technologies. Similar results had also been found by Halim (1982) and Bashar (1993).

2.2.10 Training exposure and adoption of innovations

Hossain (1981) found a positive relationship with training exposure and development of farming skill.

Haque (2003) found a positive relationship with training experience and modern technology.

A positive relationship was also found between training experience and adoption of improved practices in transplanted Aman rice by Rahman. M. M.(1986).

Islam (2002) was also found that there is no relationship between training experience and adoption of ecological agricultural practices.

2.2.11 Organizational participation and adoption of innovations

Bashar (1993) observed that the relationship between organizational participation and adoption of intercropping in sugarcane had positive and significant.

Islam and Halim (1976) found that there was a relationship between adoption of innovations by individuals and their participation in organizations. A positive relationship was also found by Hossain (1971) and Rahman (1973) between organizational participation and adoption of transplanted aman practices.

Haque (1984) reported a highly significant positive relationship between organizational participation and adoption of improved cane production technologies.

Marsh and Coleman (1955) in a combined study found that the participation of farm Bureau and attendance and participation in formal organization were significantly associated with adoption of recommended farm practices. Similar findings between organizational participation and adoption of farm practices had also been reported by Rahim (1961), Reddy and Kilvin (1968), Mannan (1972), Karim (1973) and many other researchers.

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 when constructed properly contains at least two important elements i.e. "a dependent variable" and "an independent variable". A dependent variable is that factor which appears, disappears or varies as the 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.

The independent variables of selected characteristics of the farmers were age, education, family size, family labor, farm size, annual family income, sugarcane cultivation knowledge, credit availability, extension contact, training exposure and organizational participation. On the other hand, the dependent variable was only the adoption of intercropping in sugarcane.

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.

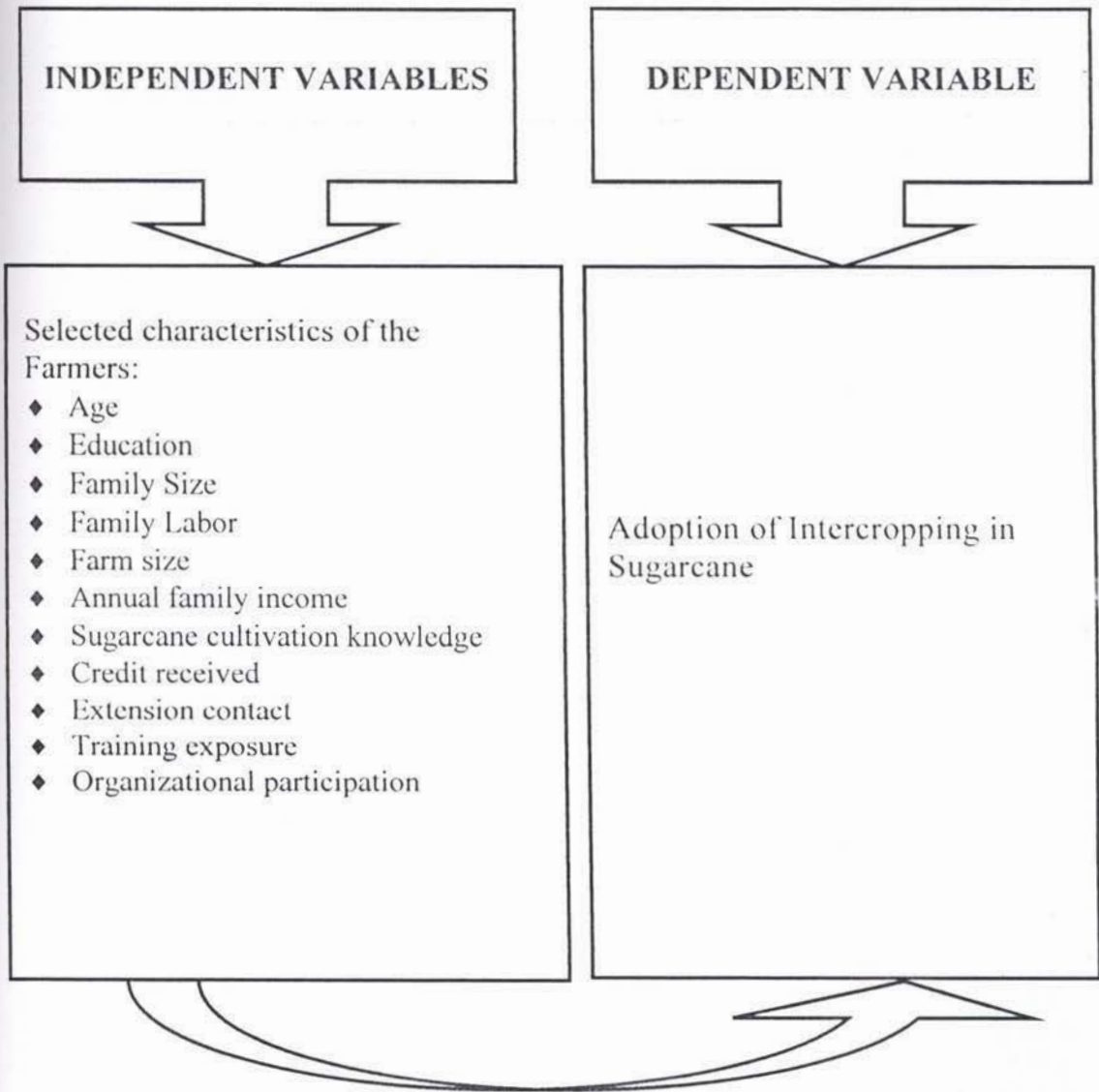


Figure 2.1 Conceptual Framework of the Study

Chapter 3

Methodology



CHAPTER III

METHODOLOGY

3.1 Locale of the Study

Four sub-zones, namely: Mill gate, Badarganj, Nagerhat, Sukurerhat in Shampur Sugar-Mills. under Rangpur district was purposively selected as the locale of the study. A map of Rangpur district showing the locale of the study is presented in Figure 3.1.

3.2 Population of the Study

All the sugarcane growers of the study area constituted the population of the study. An up-to-date list of all the sugarcane growers of the selected four sub-zones of Shampur Sugar Mills area was prepared with the help of respective Assistant Cane Development Officers (extension) and Cane Development Assistants of Shampur Sugar Mills. There were 520 sugarcane growers in selected four sub-zones at the time of conducting this study which constituted the population of the study.

3.3 Sample and sampling Procedure

Proportionately twenty percent of the 520 sugarcane growers i.e. 104 sugarcane growers were selected from the list of population by using a table of random numbers (Blalock, 1960). These 104 intercropping growers constituted the sample for this study. However, a reserve list of 20 growers was also prepared. Farmers in the reserve list were used only when a respondent included in the original list was not available during the collection of data. The distribution of sample farmers and those in the reserved list are shown in the Table 3.1

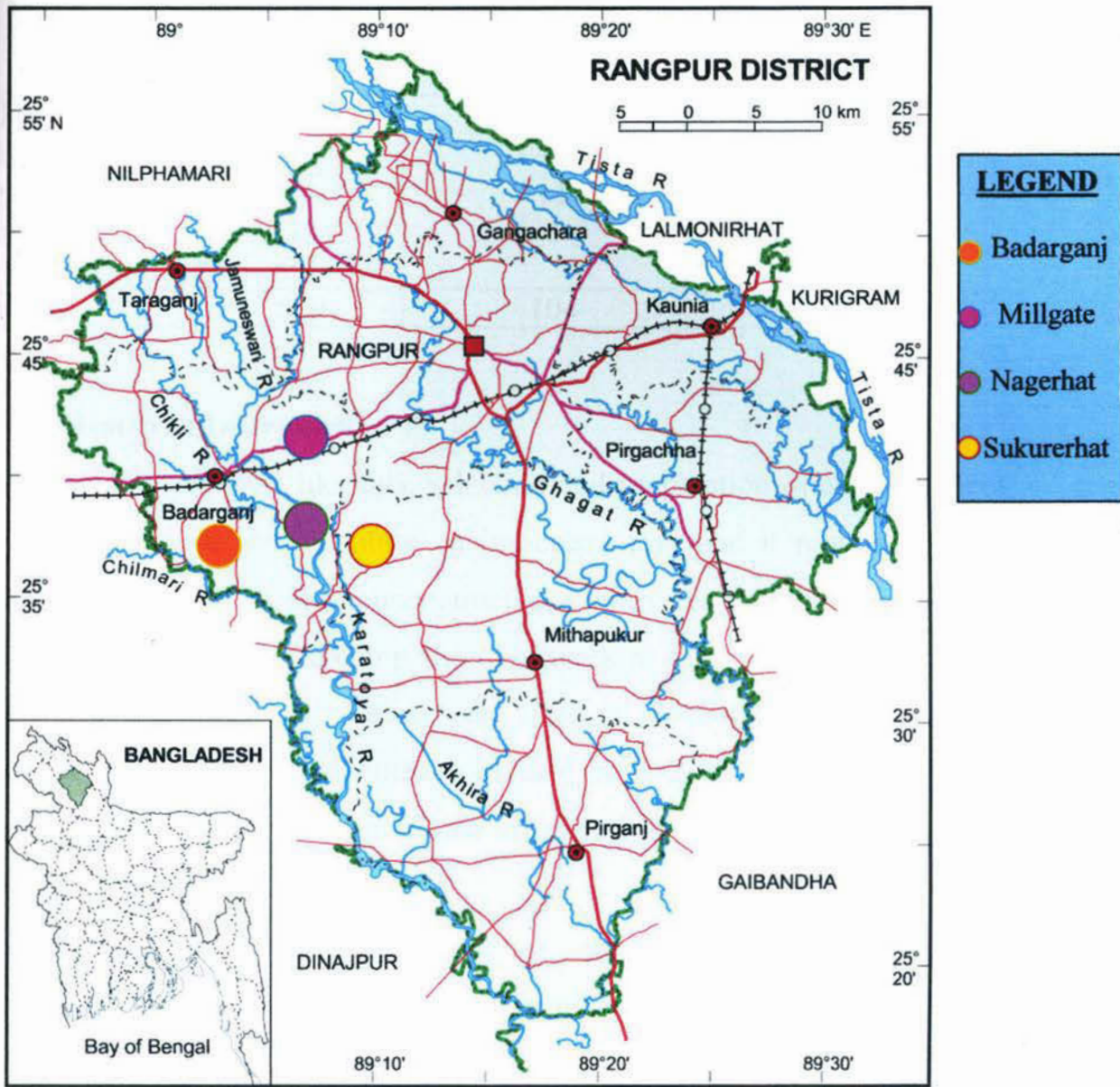


Fig. 3.1: Map of Rangpur District showing the locale of the study

Table 3.1. Distribution of population and sample of farmers in different sub-zone of Shampur Sugar Mills Ltd.

Name of the sub-zone	Population (sugarcane growers)	Number of sugarcane growers included in the sample	Number of sugarcane growers included in reserved list
Mill gate	276	52	10
Badarganj	165	36	5
Nagarhat	54	11	3
Sukurerhat	25	5	2
Total	520	104	20

3.4 The Research Instrument

In a descriptive research like this, selection and preparation of an instrument for collecting evidence constitute an important task and it requires a very careful consideration. A previously structured interview schedule was used as data gathering device in keeping the objectives in mind. Fixed-alternatives, open-ended questions and scales were used in constructing the schedule whenever necessary. The schedule contained both closed and open form of questions. An English version of the interview schedule may be seen in appendix-B.

Appropriate scales were developed to operationalize some selected characteristics of the farmers and the dependent variable. The schedule was prepared in Bengali for clear understanding on the part of the respondents. It may be recalled that the schedules were pre-tested in actual field situations and necessary corrections, modifications and alternations were made before finally cyclostyled the schedule in its final form.

3.5 Collection of Data

A house to house survey was conducted personally by the investigator himself to collect data. Advance information was given to the respondents before going to them for interview. Interviews were usually conducted with the respondents in their homes during their leisure time. Whenever any respondent faced difficulty in understanding any question, care was taken with all possible efforts to explain the same clearly with a view to enabling him to answer correctly. The Cane Development Assistants and local leaders helped the investigator greatly in this investigation.

Twenty sugarcane growers of the original list were not available for interview and hence, these 20 respondents were interviewed from the reserve list. Excellent co-operation was obtained from all the respondents and others concerned in the field at the time of data collection. The entire process of collecting data took 41 days from 5th September to 15th October 2006.

3.6 Handling of Data

All the individual responses to the questions in the interview schedule were transferred to a master sheet to facilitate tabulation. Tabulation and cross tabulations were done on the basis of categories developed by the investigator himself. For this purpose, qualitative data were converted into quantitative ones by means of suitable scoring unit as and when necessary.

3.7 Variables of the Study

In a descriptive social research the selection of variables constitute an important task. In this connection, the investigator looked into the literature to widen his understanding about the nature and scope of the variables involved in the research studies. Ezekiel and Fox (1959) stated variable as any measurable characteristics which can assume varying or different values in

successive individual cases. An independent variable is that factor which is manipulated by the experimenter in his attempt to ascertain the relationship to an observed phenomenon. A dependent variable, on the other hand, is that factor which appears, disappears, or varies as the experimenter introduces, removes or varies the independent variables (Townsend, 1953). The dependent variable is often called the 'criteria' or 'predictive variable' whereas the independent variables are called 'treatment', 'experimental' or 'antecedent' variable (Deobold 1973).

3.8 Independent Variables

The appropriate selection of variables is the important part of the research. Various factors may influence the farmers to adopt the intercropping of sugarcane, but in a single study it is neither possible, nor desirable to deal with all the factors. Thus it is required to select the variables with the consideration of the limitations in respect of time, money and other resources available to the researcher.

For selection of independent variables, the researcher went through the related literature as far as possible. He had discussion with the relevant experts and researchers in agricultural extension and related fields. Therefore, considering the farmers' behavior (observed), condition and the limitations in respect of time, money and other resources available to the researcher, eleven characteristics of the farmers were selected as the independent variables for this study. The selected variables included age, education, family size, family labor, farm size, annual family income, sugarcane cultivation knowledge, credit received, extension contact, training exposure and organizational participation.

3.8.1 Measurement of Independent Variables

In order to conduct the study in accordance with the objectives, it was necessary to measure the selected independent variables. Eleven characteristics of the farmers were selected as independent variables of this study. The procedure followed for measuring the independent variables are briefly discussed below:

Age

Age of a respondent referred to the period of time from his birth to the time of interview. It was measured in terms of actual years.

Education

Education was defined as the ability of an individual to read and write, or formal education received up to a certain standard. Actual year of successful schooling was taken as the education score of a respondent. If a respondent passed the S.S.C. examination, his education score was taken as 10, if passed the final examination of class V his education score was taken as 5 and if a respondent had education outside school, his education score was determined according to the level of his education in relation to the educational standard in school. If a respondent did not know how to read and write his education score was taken as zero (0). A score of 0.5 was given to those who could sign their name only.

Family size

Family size was measured in terms of actual number of members in his family (including himself) during the period of study. The scoring was made by the actual number mentioned by the respondents. For example, if a respondent had six members in his family then his family size score was 6.

Family labour

Family labour was measured in terms of actual number of labour in his family (including himself) during the period of study. Whether family labour was immature, semi mature or mature one, the labour being estimated in terms of full labour (mature). The family labour score of a respondent was measured by using the following formula.

$$\text{Family labour} = A_1 + \frac{2}{3} (A_2) + \frac{1}{3} (A_3)$$

Where, A_1 = Number of labour 18 years of age and above

A_2 = Number of labour from 12 to below 18 years

A_3 = Number of family labour below 12 years of old

Farm size

Size of farm was the area on which a farmer continued his farming operation during the period under study whether it was owned by him as well as those (if any) obtained from others by borga, lease or other means. The area being estimated in terms of full benefit to the farmers. The farm size of a respondent was measured by using the following formula.

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

Where, A_1 = Homestead land

A_2 = Self cultivated owned land

A_3 = Cultivated area taken as lease or mortgage from others

A_4 = Cultivated area taken from other on borga system and

A_5 = Cultivated area given to others on borga system

Annual family income

The term annual family income refers to the annual gross income of a respondent himself and the members of his family from agriculture, service, business and other sources during a year. All the earnings of a respondent

were added together to determine his gross annual income and it was measured in taka. A unit score of one was taken for every Tk. 1000.00 of annual family income.

Sugarcane cultivation knowledge

Sugarcane cultivation knowledge of the respondents was measured with the help of sugarcane cultivation knowledge scale consisting 20 questions related to various aspects of sugarcane cultivation. A score of 2 was given to correct answer to a question. Partial score was given to partially correct answer. A score of zero (0) was given to wrong or no answer to a question. Thus a respondent could get a highest score of 40 for correct answer to all the 20 questions and a lowest score of zero (0) for wrong or no answer to all the 20 questions.

Credit received

Credit received by a respondent refers to the amount of credit actually received by him. During interview each respondent was asked to indicate the amount of credit received from various institutional and non-institutional sources. Credit received was initially measured in taka, however, a unit score of 1 (one) was taken for Tk. 1000.

Extension contact

Extension contact was defined as one's extent of exposure to different extension teaching methods. It was assumed that the more contact an individual would have with different extension teaching methods, the more would be the influence of extension education on him. In this study an extension contact score was computed for each respondent on the basis of the nature of his contact with thirteen extension teaching media. The scoring system for these above 13 extension contact media were as follows:

<u>Nature of contact</u>	<u>Weights assigned</u>
Regularly	4
Often	3
Occasionally	2
Rarely	1
Not at all	0

Logical frequencies of visits were assigned to each of the five nature of contact. The weights obtained by a respondent for his contacts with all the above extension media were added together to get his extension contact score. Extension contact scores could range from 0 to 52, where 0 indicated no contact and 52 indicate very high contact with extension teaching media.

Training exposure

Training exposure score of a respondent was obtained by the number of days that a respondent had received training on sugarcane cultivation 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.

Organizational participation

Organizational participation of the respondents was measured according to the nature of their participation in different organizations during the time of interview. This was multiplied by its duration i.e. number of years. Scores were assigned in the following manner for participation in each organization.

<u>Nature of participation</u>	<u>Scores</u>
No participation	0
Ordinary member for 1 year	1
Executive committee member for 1 year	2
Executive committee office bearer for 1 year	3

Finally organizational participation score of a respondent was determined by the total score he obtained for all the organizations he participated.

3.9 Dependent Variable

Adoption of intercropping in sugarcane cultivation was the dependent variable of this study. Adoption of intercropping in this study, however, covered 2003-04, 2004-05 and 2005-06 cropping seasons.

3.9.1 Measurement of Dependent Variable

Adoption of different intercropping in sugarcane cultivation was measured on the basis of the extent of adoption of different intercrops by the cane growers for 3 years (2003-04, 2004-05 and 2005-06).

Adoption of Intercropping (AI) in this study was computed by using the following formula:

$$\sum e / p$$

$$\text{Adoption of Intercropping (AI)} = \frac{\sum e / p}{Ps} \times 100$$

Where,

\sum = Summation of e / p for period of time

e = Extent of intercropping in sugarcane i.e. actual area for intercropping in sugarcane in a particular year

P = Potential area (i.e. possible area) of sugarcane intercropping in in a particular year.

Ps = Period of study. In this study it is 3 years (2003-04, 2004-05 and 2005-06).

Adoption of intercropping was expressed in percentage. Hence, the Adoption of intercropping of a sugarcane grower could range from 0 to 100 percent,

where, 0 indicating no adoption of sugarcane intercropping and 100 indicating highest adoption of intercropping in sugarcane.

3.10 Statistical Treatments

Data collected for this study were compiled, tabulated, coded and analyzed in according with the objectives of the study. Qualitative data were converted into quantitative data by means of suitable scoring method wherever necessary. Descriptive statistics such as range, mean, standard deviation were used in describing the variables of the study. Pearson product moment correlation co-efficient were used in order to explore the relationship between concerned variables. Correlation matrix was computed to determine the interrelationships among the variables (Appendix A).

Chapter 4

Results and Discussion



CHAPTER IV

RESULT AND DISCUSSION

The findings of the study and interpretation of results are presented in this chapter. These are conveniently presented in three sections according to the objectives of the study. The first section deals with the selected characteristics of the farmers, the second section deals with the adoption of intercropping in sugarcane by the farmers, the third section deals with the relationship between the selected characteristics of the farmers and their adoption of intercropping in sugarcane.

4.1 Selected Characteristics of the farmers

The salient features of the selected characteristics of the sugarcane growers are shown in Table 4.1 and described in the following sub-sections:

4.1.1 Age

The age of the growers ranged from 19 to 75 years, the average being 42.36 years and the standard deviation of 14.06. On the basis of age, the growers were classified into three categories as shown in Table 4.2.

Table 4.2. Distribution of the Sugarcane Farmers According to their Age

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Young	Upto 30 years	25	24
Middle-aged	31-50 years	55	52
Old	>50 years	24	24
Total		104	100.00

Table 4.1. Salient Features of the Selected Characteristics

Selected Characteristics	Measuring unit	Possible range	Observed range	Mean	Standard Deviation
1. Age	Year	Unknown	19-75	42.36	14.06
2. Education	Schooling year	Unknown	0-18	6.95	4.72
3. Family size	No. of family member	Unknown	3-16	5.55	2.31
4. Family labour	Score	Unknown	2-9.01	3.62	1.79
5. Farm size	Hectare	Unknown	.36-10.93	3.09	2.53
6. Annual family income	'000' Taka	Unknown	13-430	182.29	121.58
7. Sugarcane cultivation knowledge	Score	0-40	14-40	30.36	7.16
8. Credit received	'000' Taka	Unknown	0-240	22.97	26.73
9. Extension contact	Score	0-56	11-42	23.92	7.48
10. Training exposure	No. of days	Unknown	0-7	2.16	1.82
11. Organizational participation	Score	Unknown	0-9	2.16	2.3

Data contained in Table 4.2 indicated that the highest proportions (52 percent) of the farmers were in the middle-aged category compared to 24 percent and 24 percent under young and old categories respectively. It indicates that more than three-fourth (76 percent) of the respondents in the study area comprised either young or middle-aged categories. Rahim (1974), Munammad (1974), Sobhan (1975), Haque (1984) and Ali (1993) also found similar findings in their studies. However, Hossain (1981) found that the highest proportion (42 percent) of the jute growers were young, while 36 percent were middle-aged and 22 percent old.

4.1.2 Education

The level of education score of the respondents ranged from 0 to 18, the average being 6.95 and the standard deviation of 4.72. Based on their level of education, the farmers were grouped into five categories. The categories and the distribution of the respondents according to their education are presented in Table 4.3.

Table 4.3. Distribution of the Farmers According to their Education

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
No education	0 Schooling year	9	9
Can Sign Only	0.5 Schooling year	20	19
Primary education	1-5 Schooling year	7	7
Secondary education	6-10 Schooling year	46	44
Above secondary education	> 10 Schooling year	22	21
Total		104	100.00

It was evident from Table 4.3 that a large proportion (44 percent) of the farmers had secondary education compared to 9 percent with no education, 19 percent could sign their name only, 7 percent had primary education and to 21 percent had above secondary education.

4.1.3 Family Size

The family size of the farmers ranged from 3 to 16 with an average of 5.55 and standard deviation of 2.31. Based on the of family size, the respondents were divided into three categories. These categories and the distribution of the respondents according to their family size are shown in Table 4.4.

Table 4.4. Distribution of the Farmers According to their Family Size

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Small size	<4 No. of family member	41	39
Medium size	4-8 No. of family member	54	52
Large size	>8 No. of family member	9	9
Total		104	100.00

Data presented in Table 4.4. indicated that the highest proportion (52) of the respondents fell under the medium family size category compared to 39 percent small and to 9 percent large family size categories. These findings also indicated that most (91%) of the respondents had small to medium family size.

4.1.4 Family Labour

The range of computed family labour scores of the farmers was 2 to 9. The average score was found to be 3.62 and the standard deviation of 1.79. The family labour scores of the respondents were classified into three categories as shown in Table 4.5.

Table 4.5. Distribution of the Farmers According to their Family Labour

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Low family labour	<3 Score	53	51
Medium family labour	3-5 Score	39	38
High family labour	>5 Score	12	11
Total		104	100.00

Data shown in Table 4.5 revealed that the highest proportion (51 percent) of the respondents had low family labour compared to 38 percent having medium family labour and 11 percent having high family labour. Muhammad (1974) and Hossain (1983) also found almost similar findings in their studies.

4.1.5 Farm size

Farm size in the study area was found to vary from 0.36 to 10.93 hectares. The average farm size was 3.09 hectares with a standard deviation of 2.53. The respondents were classified into three categories on the basis of their farm size as shown in Table 4.6.

Table 4.6. Distribution of the Farmers According to their Farm Size

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Small farm size	< 1.0 ha.	25	24
Medium farm size	1-3 ha.	38	37
Large farm size	> 3 ha.	41	39
Total		104	100.00

Data presented in Table 4.6 revealed that highest proportion (39 percent) of the respondents had large farm sized compared to 24 percent having low and 37 percent medium sized farms i.e. more than three-fourth (76 percent) of the farmers had medium and large farm size.

4.1.6 Annual family income

Annual family income of a respondent is determined by adding his income from agriculture, service, business and other sources during last year. The minimum income score of a farmer was found to be 13.00 and the maximum was 430.00 thousand taka with an average of 182.29 and standard deviation of 121.58. On the basis of annual family income, the respondents were divided into three categories as shown in Table 4.7.

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

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Low annual income	(upto 100) '000' Tk.	33	32
Medium annual income	(>100-300) '000' Tk.	49	47
High annual income	(>300) '000' Tk.	22	21
Total		104	100.00

Data presented in Table 4.7 show that the highest proportion (47percent) of the farmers had medium annual family income compared to 32 and 21 percent had low and high annual family income respectively. Almost similar findings were also reported by Hossain (1981) and Haque (1984).

4.1.7 Sugarcane cultivation knowledge

Sugarcane cultivation knowledge scores of the respondents could range from 14 to 40 against the possible score 0 to 40. The average and standard deviation were 30.36 and 7.16 respectively. Based on these scores, the respondents were classified into three categories shown in Table 4.8.

Table 4.8. Distribution of the Farmers According to their Sugarcane cultivation knowledge

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Low knowledge	<23 Score	18	17
Medium knowledge	24-36 Score	71	68
High knowledge	>37 Score	15	15
Total		104	100.00

Data contained in Table 4.8 show that the highest proportion (68 percent) of the farmers had medium sugarcane cultivation knowledge compared to 17 percent had low sugarcane cultivation knowledge and 15 percent high

sugarcane cultivation knowledge. Ali (1993) also found almost similar findings.

4.1.8 Credit Received

Credit received scores of the farmers ranged from 0 to 240 thousand taka with an average of 22.97 with a standard deviation of 26.73. Based on the credit received, the respondents were classified into four categories as shown in Table 4.9.

Table 4.9. Distribution of the Farmers According to their Credit Received

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
No credit received	(0) '000' Tk.	5	5
Low credit received	(upto 10) '000' Tk.	26	25
Medium credit received	(>10-40) '000' Tk.	59	57
High credit received	(>40) '000' Tk.	14	13
Total		104	100.00

Data presented in Table 4.9 show that more than half (57 percent) of the farmers received medium credit compared to 13 percent high, 25 percent low. Five percent of the respondent did not receive any credit. This finding is very much in agreement with the findings of Haque (1984).

4.1.9 Extension contact

The extension contact scores of the farmers ranged from 11 to 42 against the possible range of 0 to 52. The average extension contact score was 23.92 and the standard deviation of 7.48. Based on the extension contact scores, the respondents were classified into three categories as shown in Table 4.10.

Table 4.10. Distribution of the Farmers According to their Extension Contact

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
Low extension contact	<17 Score	23	22
Medium extension contact	18-34 Score	74	71
High extension contact	>34 Score	7	7
Total		104	100.00

It was evident from Table 4.10 that the highest proportion (71 percent) of the respondents had medium extension contact compared to 22 percent low and only 7 percent had high extension contact. The findings indicated that most (93 percent) of the farmers had low to medium extension contact. Hossain (1981) found that the highest proportion (42 percent) of the jute growers felt in the medium extension contact category compared to 35 percent low extension contact category and 23 percent in the high extension contact category.

4.1.10 Training exposure

The observed training exposure score of the respondents ranged from 0 to 7 with an average of 2.16 and a standard deviation of 1.82. The category wise 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	Range with Measuring unit	Farmers	
		Number	Percentage
No training exposure	0 days	25	24
Low training exposure	1-3 days	66	63
Medium training exposure	> 3 days	13	13
Total		104	100.00

Data contained in Table 4.11 show that 63 percent of the farmers had low training exposure compared to 24 and 13 percent having no and medium training exposure respectively.

4.1.11 Organizational participation

Organizational participation of the respondents were operationalized by computing scores on the basis of the nature of their participation in different organizations. The computed organizational participation scores of the respondents ranged from 0 to 9 with the average score being 2.16 and a standard deviation of 2.34. Based on the computed organizational participation scores, the farmers were classified into four categories as shown in Table 4.12.

Table 4.12. Distribution of the Farmers According to their Organizational Participation

Categories	Range with Measuring unit	Farmers	
		Number	Percentage
No org. participation	0 Score	40	38
Low org. participation	1-3 Score	45	43
Medium org. participation	4-6 Score	13	13
High org. participation	> 6 Score	6	6
Total		104	100.00

Data as shown in Table 4.12 revealed that highest proportion (43 percent) of the respondents had low organizational participation compared to 38 percent had no organizational participation, whereas 13 percent of respondents had medium and 6 percent had high organizational participation. Muhammad (1974) also found similar findings in his study. The respondents having high organizational participation might have high awareness for adoption of intercropping in sugarcane.

4.2 Adoption of Intercropping in Sugarcane

The adoption of intercropping in sugarcane by the farmers ranged from 0 to 100 against the possible range of 0-100. The average adoption was 45 with a standard deviation of 33. Based on the adoption scores, the respondents were classified into three categories (Table 4.13).

Table 4.13. Distribution of the Farmers According to their Adoption of Intercropping in Sugarcane

Categories	Range with Measuring unit	Farmers		Mean	Standard Deviation
		Number	Percentage		
Low adoption	<33 Score	36	35	45	33
Medium adoption	34-67 Score	44	42		
High adoption	68-100 Score	24	23		
Total		104	100.00		

Data presented in Table 4.13 revealed that highest proportion (42 percent) of the respondents had medium adoption of intercropping in sugarcane compared to 35 percent had low and 23 percent had high adoption of intercropping in sugarcane. It was also revealed that more than three-fourth (77 percent) of the respondent had low to medium adoption of intercropping in sugarcane.

4.3 Relationships of Selected Characteristics of the Sugarcane Farmers with their Adoption of Intercropping in Sugarcane

Pearson product moment correlation coefficient "r" was determined in order to explore the relationships between the selected characteristics of the farmers and their adoption of intercropping in sugarcane. The result of the relationship between the selected characteristics of the farmers and their adoption of intercropping has been shown in Table 4.14 and described in the following sub sections:

Table 4.14. Relationships between the Selected Characteristics of the Farmers and their Adoption of Intercropping in Sugarcane

Predictive Variable	Selected Characteristics of the farmers	Value of "r"	Probability	
			5%	1%
Adoption of Intercropping in Sugarcane	1. Age (X ₁)	0.227*	0.195	0.252
	2. Education (X ₂)	0.263**		
	3. Family size (X ₃)	0.103 ^{NS}		
	4. Family labour (X ₄)	0.095 ^{NS}		
	5. Farm size (X ₅)	0.339**		
	6. Annual family income (X ₆)	0.320**		
	7. Sugarcane cultivation knowledge (X ₇)	0.385**		
	8. Credit received (X ₈)	0.059 ^{NS}		
	9. Extension contact (X ₉)	0.105 ^{NS}		
	10. Training exposure (X ₁₀)	0.437**		
	11. Organizational participation (X ₁₁)	0.236*		

^{NS} Not Significant

* Significant at 5% level with 102 df

** Significant at 1% level with 102 df

4.3.1 Relationship between age of the farmers and their adoption of intercropping in sugarcane

The relationship between age of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis: "There is no relationship between age of the farmers and their adoption of intercropping in sugarcane."

Computed value of the co-efficient of correlation between the age of the farmers and their adoption of intercropping in sugarcane was found to be 0.227 as shown in table 4.14. The following observations are recorded regarding the relationship between the two concerned variables on the basis of the co-efficient of correlation.

Firstly, the relationship showed a tendency in the positive direction between the concerned variables. Secondly, the computed value of 'r' (0.227) was found to be greater than the table value ($r = 0.195$) with 102 degrees of freedom at 0.05 level of probability. Thirdly, significant relationship was found to exist between the two variables.

Based on the above finding the null hypothesis could not be accepted and hence the researcher concluded that the age of the farmers had significant positive relationship with their adoption of intercropping in sugarcane. It might be due to that old aged farmer possessed more experience, so that they usually do not hesitate to adopt any improved technology compared to young aged farmer.

Most of the diffusion researchers, however, observed the similar significant relationship of age with adoption of improved farm practices.

4.3.2 Relationship between education of the farmers and their adoption of intercropping in sugarcane

The relationship between education of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis: "There is no relationship between education of the farmers and their adoption of intercropping in sugarcane."

The co-efficient of correlation between the concerned variables was found to be 0.263 as shown in Table 4.14. This led to the following observations regarding the relationship between the two variables under consideration:

Firstly, the relationship had shown a positive trend. Secondly, the computed value of "r" (0.263) was larger than the table value ($r = 0.252$) with 102 degrees of freedom at 0.01 level of probability. Hence the relationship was statistically significant at 0.01 level of probability. Thirdly, the relationship was found to exist between the concerned variables.

Based on the findings, the null hypothesis was, therefore, rejected. Hence, the researcher concluded that education of the farmers had significant positive relationship with their adoption of intercropping in sugarcane.

Most diffusion researchers in their studies showed significant positive relation between farmers' education and their adoption of improved crop production practices (Marsh and Coleman, 1955; Dimit, 1957; Rahim, 1961; Bose and Saxena, 1965; Chaudhary and *et al.* 1968; Reddy and Kivlin, 1968; Hossain, 1971; Rao, 1976; Halim, 1982; Haque, 1984; Ali *et al.* 1986).

For successful adoption of cultivation of sugarcane with intercrop, the farmers need to be aware of suitable sugarcane intercrops and the methods of their cultivation. Education helps the farmers to know the method of cultivation of sugarcane with intercrops by reading leaflets, books and other printing materials. Education may also bring individuals in such contacts which is helpful to know about the different aspects of intercropping in sugarcane.

4.3.3 Relationship between family size of the farmers and their adoption of intercropping in sugarcane

Relationship between family size and their adoption of intercropping in sugarcane was examined by testing the null hypothesis: "There is no relationship between family size of the farmers and their adoption of intercropping in sugarcane."

Computed value of the co-efficient of correlation between family size of the farmers and their adoption of intercropping in sugarcane was found to be 0.103 as shown in Table 4.14. The following observations were recorded regarding the relationship between the two variables on the basis of co-efficient of correlation:

Firstly, the relationship showed a tendency in the positive direction between the concerned variables. Secondly, the computed value of r (0.103) was found to be smaller than the table value ($r = 0.195$) with 102 degrees of freedom at 0.05 level of probability. Thirdly, no significant relationship was found to exist between the two variables.

Based on the above findings, the null hypothesis could not be rejected and hence the researcher concluded that the family size of the farmers had no significant relationship with their adoption of intercropping in sugarcane.

Researcher evidence on relation of family size and adoption of improved practices could not be traced much. However, Mustafi et al. (1987) and Ali (1993) did not find any significant relationship between family size and adoption of improved practices.

4.3.4 Relationship between family labour of the farmers and their adoption of intercropping in sugarcane

Relationship between family labour of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis: "There is no relationship between family labour of the farmers and their adoption of intercropping in sugarcane."

Computed value of co-efficient of correlation between family labour of the farmers and their adoption of intercropping in sugarcane was found to be 0.095 as shown in Table 4.14. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

Firstly, the relationship showed a positive direction between the concerned variables. Secondly, the computed value of 'r' (0.095) was found to be smaller than the table value ($r = 0.195$) with 102 degrees of freedom at 0.05 level of probability. Thirdly, the relationship was not statistically significant between the concerned variables.

Based on the above findings the null hypothesis was therefore, could not be rejected and hence, the researcher concluded that the family labour of the farmers had not significant relationship with their adoption of intercropping in sugarcane.

4.3.5 Relationship between farm size of the farmers and their adoption of intercropping in sugarcane

The relationship between farm size of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis:

“There is no relationship between farm size of the farmers and their adoption of intercropping in sugarcane.”

Computed value of the co-efficient of correlation between farm size of the farmers and their adoption of intercropping in sugarcane was found to be 0.339. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

Firstly, the relationship showed a tendency in the positive direction between the concerned variables. Secondly, the computed value of ‘r’ (0.339) was found to be greater than the table value ($r = 0.252$) with 102 degrees of freedom at 0.01 level of significant. Thirdly, significant relationship was found to exist between the two variables.

Based on the above findings the null hypothesis could not be accepted and hence the researcher concluded that the farm size of the farmers had significant positive relationship with their adoption of intercropping in sugarcane. It is quite logical that large farmers could adopt large amount of intercropping in sugarcane.

4.3.6 Relationship between annual family income of the farmers and their adoption of intercropping in sugarcane

The relationship between annual family income of the farmers and their adoption of intercropping in sugarcane was measured by testing the null hypothesis: “There is no relationship between annual family income of the farmers and their adoption of intercropping in sugarcane.”

Computed value of the co-efficient of correlation between the annual family income of the farmers and their adoption of intercropping in sugarcane was

found to be 0.320 as shown in table 4.14. The following observations were recorded regarding the relationship between the two variables on the basis of co-efficient of correlation:

Firstly, the relationship showed a tendency in the positive direction between the concerned variables. Secondly, the computed value of 'r' (0.320) was found to be greater than the table value ($r = 0.252$) with 102 degrees of freedom at 0.01 level of probability. Thirdly, a significant relationship was found to exist between the two variables.

Based on the above findings the null hypothesis could not be accepted and hence, the researcher concluded that the annual family income of the farmers had significant relationship with their adoption of intercropping in sugarcane. Possibly intercropping needs large inputs, which required large capital. That might be the reason for the above findings.

4.3.7 Relationship between sugarcane cultivation knowledge of the farmers and their adoption of intercropping in sugarcane

Relationship between sugarcane cultivation knowledge of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis: "There is no relationship between sugarcane cultivation knowledge of the farmers their adoption of intercropping in sugarcane."

The co-efficient of correlation between the concerned variables were found to be 0.385 as shown in Table 4.14. This led to the following observations regarding the relationship between the two variables under consideration:

Firstly, the relationship showed a positive trend. Secondly, the computed value of "r" (0.385) was larger than the table value ($r = 0.252$) with 102

degree of freedom at 0.01 level of probability. Thirdly, the relationship was statistically significant at 0.01 level of probability between the concerned variables.

Based on the findings, the null hypothesis was, therefore, rejected. Hence, the researcher concluded that the sugarcane cultivation knowledge of the farmers had significant positive relationship with their adoption of intercropping in sugarcane. Knowledge is considered as an important function of adoption of improved practices (Rogers, 1983). Therefore it is quite logical that knowledgeable farmers had high adoption of intercropping in sugarcane.

Most of the researchers also found significant positive relationship between farmers' knowledge on a particular technology and its adoption (Hoffer and Slangland, 1958; Moulik *et al.*, 1966; Ernest, 1973; Ramachandram, 1974; Somasundaram and Singh, 1978; Bezborra, 1980; Grewal, 1980; Ali and Chowdhury, 1983; Ali *et al.*, 1986; Reddy *et al.*, 1987 and Ali, 1993).

4.3.8 Relationship between credit received of the farmers and their adoption of intercropping in sugarcane

The relationship between credit received of the farmers and their adoption of intercropping in sugarcane was measured by testing the null hypothesis: "There is no relationship between credit received of farmers and their adoption of intercropping in sugarcane."

Computed value of the co-efficient of correlation between the credit received of the farmers and their adoption of intercropping in sugarcane was found 0.059 as shown in table 4.14. The following observations were recorded regarding the relationship between the two variables on the basis of co-efficient of correlation:

Firstly, the relationship showed a tendency in the positive direction between the concerned variables. Secondly, the computed value of 'r' (0.059) was found to be smaller than the table value ($r = 0.195$) with 102 degrees of freedom at 0.05 level of probability. Thirdly, the relationship was not statistically significant between the two variables.

Based on the above findings, the null hypothesis could be accepted and hence, the researcher concluded that the credit received of the farmers had no significant relationship with their adoption of intercropping in sugarcane.

4.3.9 Relationship between extension contact of the farmers and their adoption of intercropping in sugarcane

Relationship between extension contact of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis:

“There is no relationship between extension contact of the farmers and their adoption of intercropping in sugarcane.”

The co-efficient of correlation between the concerned variables was found to be 0.105 as shown in table 4.14. This led to the following observations regarding the relationship between the two variables under consideration:

Firstly, the relationship showed a positive trend. Secondly, the computed value of 'r' (0.105) was smaller than the table value ($r = 0.195$) with 102 degrees of freedom at 0.05 level of probability. Thirdly, the relationship was not statistically significant at 0.05 level of probability between the concerned variables.

Based on the findings the null hypothesis was therefore, accepted. Hence, the researcher concluded that the farmers had no significant relationship between extension contact and their adoption of intercropping in sugarcane.

4.3.10 Relationship between training exposure of the farmers and their adoption of intercropping in sugarcane

The relationship between training exposure of the farmers and their adoption of intercropping in sugarcane was measured by testing the null hypothesis: "There is no relationship between training exposure of the farmers and their adoption of intercropping in sugarcane."

Computed value of the co-efficient of correlation between the training exposure of the farmers and their adoption of intercropping in sugarcane was found to be 0.437 as shown in table 4.14. The following observations were recorded regarding the relationship between the two variables on the basis of co-efficient of correlation:

Firstly, the relationship showed a tendency in the positive direction between the concerned variables. Secondly, the computed value of 'r' (0.437) was found to be greater than the table value ($r = 0.252$) with 102 degrees of freedom at 0.01 level of probability. Thirdly, a significant relationship was found to exist between the two variables.

Based on the above findings, the null hypothesis could not be accepted and hence, the researcher concluded that the training exposure of the farmers had significant relationship with their adoption of intercropping in sugarcane. Trained farmers could perform better in their farming activities. This might be the reasons that highly trained farmers had high adoption of intercropping in sugarcane.

4.3.11 Relationship between organizational participation of the farmers and their adoption of intercropping in sugarcane

The relationship between organizational participation of the farmers and their adoption of intercropping in sugarcane was examined by testing the null hypothesis: "There is no relationship between organization participation of the farmers and their adoption of intercropping in sugarcane."

The co-efficient of correlation between the concerned variables was found to be 0.236 as shown in table 4.14. This led to the following observations regarding the relationship between the two variables under consideration:

Firstly, the relationship showed a positive trend. Secondly, the computed value of 'r' (0.236) was larger than the table value ($r = 0.195$) with 102 degrees of freedom at 0.05 level of probability. Thirdly, a significant relationship was found to exist between the concerned variables.

Based on the findings, the null hypothesis was therefore, rejected. Hence, the researcher concluded that organizational participation of the farmers had significant positive relationship with their adoption of intercropping in sugarcane.

Through participation in organization, an individual comes in contact with other persons, new ideas and new things. It exercises such influence on the individuals which favorably dispose them towards acceptance of new ideas. Easy access to different organization would be helpful for greater adoption of intercropping. As a result, the respondents having higher organizational participation had the higher adoption of intercropping in sugarcane.

Some other researchers also obtained significant relationship between organizational participation and adoption of improved farm practices (Marsh and Coleman, 1955; Rahim, 1961; Reddy and Kivlin, 1968; Mannan, 1972; Karim, 1973; Haque, 1984).

Chapter 5

Summary, Conclusions & Recommendations



CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

5.1.1 Introduction

Intercropping is an old practice in Bangladesh. Growing of inter crops is very much helpful for the farmers with some specific reasons like risk avoidance, better and efficient utilization of time, space, water, nutrition and solar energy. In a country, like Bangladesh, where horizontal expansion of land is not possible intercropping is considered as a tool for increasing agricultural productivity.

Intercropping in sugarcane with pulses, oilseed and vegetable is a popular practice in Bangladesh and else where. The temporary vacant space in between two rows before development of canopy makes room for rising in additional short-duration winter crop at the early stage of cane growth. It has been reported that intercropping potato with sugarcane increase substantial can yield compared to pure stand sugarcane due to some of its synergistic effect of sugarcane.

Intercropping in sugarcane is very much helpful to the farmers. Sugarcane is a long duration crop and the farmers have to wait at least 12-16 months for getting return. Most of the farmers of Bangladesh are small and mainly by investing about Tk. 25000 per hectare. Under such condition poor farmers are compelled to think about short duration crop like cereals and others. To solve this problem intercropping with sugarcane gives some additional income and

an intermediate return during this period. Scientists have succeeded to generate technologies for raising two successive intercrops and thus creating almost similar number of crops within the same period.

Though intercropping is very much important to generate cash and to increase productivity, in most cases these are not often being practiced scientifically. For scientific intercropping 1) early planting, 2) choosing a suitable compatible intercrop, 3) irrigating intercrops, 4) applying additional fertilizers, 5) line sowing of intercrops, 6) non-branching type of intercrops, 7) sugarcane varieties having slow early growth etc. are very important considerations.

Intercropping demands sufficient knowledge and skills in agriculture. Adoption of intercropping in sugarcane by the farmers is a special type of behavior. Some farmers do it and others do not. Some do it very effectively and scientifically, others cannot do it in that way. Factors that are expected to exert influence on fluctuation of intercropping behavior of sugarcane farmers need to be identified. This is why the present research felt necessity to conduct the research entitled "Adoption of Intercropping in Sugarcane by the Farmers."

5.1.2 Specific Objectives:

Considering the above mentioned problem the following specific objectives were selected in order to give proper direction to the study.

1. To determine and describe the selected characteristics of farmers.
2. To determine and describe the extent of adoption of intercropping in sugarcane by the farmers.
3. To explore the relationships of selected individual characteristics of farmers with their extent of adoption of intercropping in sugarcane.

5.1.3 Methodology

Five hundred and twenty sugarcane growers of the four sub-zones namely Badarganj, Millgate, Nagerhat and Sukurerhat under Shampur Sugar Mills constituted the population of this study. A samples of 104 sugarcane growers by taking 20% of the population were selected randomly from the list of population. However, a reserve list of 20 farmers was also prepared.

An interview schedule was prepared in Bengali for this purpose. The questions and statements contained in the schedule were simple, direct and easily understandable by the respondent without giving rise to any doubt and misunderstanding in their minds. Collection of data was started on 5th September, 2006 and completed on 15th October, 2006. The schedule was pre-tested in actual field situations. The investigator personally conducted a door to door survey by himself to collect data. Advance information was given to the respondents before going to them for interview. The collection data were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Qualitative data were converted into quantitative data by means of suitable scoring wherever necessary.

5.1.4 Findings

5.1.4.1 Selected characteristics of the farmers

Age: The highest proportions (52 percent) of the farmers were in the middle-aged category compared to 24 percent and 24 percent under young and old categories respectively.

Education: A large proportion (44 percent) of the farmers had secondary education compared to 9 percent with no education, 19 percent could sign their name only, 7 percent had primary education and to 21 percent had above secondary education.

Family size: Most (91%) of the respondents had small to medium family size.

Family labour: The highest proportion (51 percent) of the respondents had low family labour compared to 38 percent having medium family labour and 11 percent having high family labour.

Farm Size: More than three-fourth (76 percent) of the farmers had medium and large farm size.

Annual family income: The highest proportion (47percent) of the farmers had medium annual family income compared to 32 and 21 percent had low and high annual family income respectively.

Sugarcane cultivation knowledge: The highest proportion (68 percent) of the farmers had medium sugarcane cultivation knowledge compared to 17 percent had low sugarcane cultivation knowledge and 15 percent high sugarcane cultivation knowledge.

Extension Contact: Most (93 percent) of the farmers had low to medium extension contact.

Training exposure: About 63 percent of the farmers had low training exposure compared to 24 and 13 percent having no and medium training exposure respectively.

Organizational Participation: The highest proportion (43 percent) of the respondents had low organizational participation compared to 38 percent had no organizational participation, whereas 13 percent of respondents had medium and 6 percent had high organizational participation.

5.1.4.2 Adoption of intercropping in sugarcane

More than three-fourth (77 percent) of the respondent had low to medium adoption of intercropping in sugarcane.

5.1.4.3 Relationships of the selected characteristics of the farmers with their adoption of intercropping in Sugarcane.

Out of eleven characteristics of the farmers, seven namely age, education, farm size, annual family income, sugarcane cultivation knowledge, training exposure and organizational participation had positive significant relationship with adoption of intercropping in sugarcane. Other four characteristics namely family size, family labour, credit received and extension contact had no significant relationship with adoption of intercropping in sugarcane.

5.2 Conclusions

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

1. Findings revealed that three-fourth of the respondents had low to medium adoption of intercropping in sugarcane. Therefore, it may be concluded that there is a need to increase the adoption of intercropping in sugarcane by the farmers.
2. Age of the farmers had significant positive relationship with their adoption of intercropping in sugarcane. Therefore, adoption of intercropping in sugarcane of the younger farmers had to be increased.

3. Findings of the study showed that education, sugarcane cultivation knowledge and training exposure of the respondents had significant relationship with the adoption of intercropping in sugarcane. This fact leads to the conclusion that any attempt to raise the educational level as well as sugarcane cultivation knowledge of the farmers by proper training and motivational programme greatly help in adopting intercropping in sugarcane by the sugarcane growers.
4. Farm size of the farmers had found significant relationship with their adoption of intercropping in sugarcane. It was because that with the increase of farm size increased the adoption of intercropping in sugarcane.
5. Annual family income of the farmers showed significant relationship with their adoption of intercropping in sugarcane. Higher income of farmer could increase the ability of purchasing input for intercropping in sugarcane. As a result they could adopt at higher rate of intercropping in sugarcane.
6. Organizational participation of the respondents had significant positive relationship with their adoption of intercropping in sugarcane. In the light of the above findings, it may be concluded that necessary steps should be taken to promote organizations in the rural areas and that would have a favorable effect on the adoption of intercropping in sugarcane.

5.3 Recommendations

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

1. Findings revealed that three-fourth of the respondents had low to medium adoption of intercropping in sugarcane. Therefore necessary steps should be taken by the concerned authorities to increase the adoption of intercropping in sugarcane.
2. Motivational programmes should be taken by the concern authorities to increase the adoption of intercropping in sugarcane for all types of farmers specially for the younger farmers.
3. Education, sugarcane cultivation knowledge and training exposure of the respondents had significant positive relationship with their adoption of intercropping in sugarcane. Therefore it may be recommended that arrangements should be made by the concerned authorities for increasing the education and sugarcane cultivation knowledge level of the sugarcane growers by proper training and motivational programme. Education may be increased the establishing night schools for the adult farmers.
4. Necessary steps should be taken by the concerned authorities so that the farmer could increase their farm size and income which ultimately would increase their adoption of intercropping in sugarcane.

5. Organizational participation had significant positive relationship with their adoption of intercropping in sugarcane. Therefore, the authorities concerned should take steps to organize the respondents in different organizations, so that they could increase their adoption of intercropping in sugarcane.

5.4 Recommendations for further research

A small piece of study cannot provide all information for the proper understanding of the adoption of intercropping in sugarcane at macro level. Therefore, the following suggestions are made for the further study.

1. The relationships of only eleven important characteristics of the farmers with their adoption of intercropping in sugarcane have been investigated in this study. But besides these eleven characteristics of the farmers there might be other factors. Therefore, further research should be conducted to explore the relationships of such other characteristics of the farmers with their adoption of intercropping in sugarcane.
2. The present study was concerned with the extent of adoption of intercropping in sugarcane by the farmers. It is therefore, suggested that future studies should include characteristics of innovations, rate of adoption, adoption stages, adopter categories and use of information sources in relation to adoption stages and adopter categories.
3. It is recommended that researches should be undertaken to determine the performance of the farmers for intercropping sugarcane.

4. A positive trend of relationship was obtained between extension contact of the farmers and their adoption of intercropping in sugarcane but the relationship was not statistically significant. Generally a significant relationship is expected to be observed between extension contact of the farmers and their adoption of intercropping. Hence, further studies are necessary to find out the relationship between the concerned variables.

5. This is a micro-level study which was conducted only among 104 farmers in four sub-zones of Shampur Sugar Mills. Similar research may be replicated in other parts of the country.

Chapter 6

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APPENDIX-A

Correlation Matrix of the dependent and independent variables (N = 104)

Variable	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂
X ₁	1.000	-	-	-	-	-	-	-	-	-	-	-
X ₂	-0.111	1.000										
X ₃	0.419**	-0.018	1.000									
X ₄	0.533**	-0.079**	0.872**	1.000								
X ₅	0.470**	0.070	0.422**	0.366**	1.000							
X ₆	0.429**	0.007	0.253**	0.236*	0.721**	1.000						
X ₇	0.144	0.221*	-0.035	-0.009	0.168	0.293**	1.000					
X ₈	0.295**	0.026	0.497**	0.387**	0.700**	0.505**	-0.045	1.000				
X ₉	0.317**	-0.002	0.116	0.170	0.183	0.340**	0.057	0.084	1.000			
X ₁₀	0.357**	0.183	0.255**	0.231*	0.302**	0.273**	0.180	0.134	0.364**	1.000		
X ₁₁	0.078	0.166	0.165	0.114	0.344**	0.262**	0.182	0.186	0.056	0.130	1.000	
X ₁₂	0.227*	0.263**	0.103	0.095	0.339**	0.320**	0.385**	0.059	0.105	0.437**	0.236*	1.000

* = Correlation is significant at 0.05 level of probability

** = Correlation is significant at 0.01 level of probability

- X₁ = Age
- X₂ = Education
- X₃ = Family size
- X₄ = Farm labour
- X₅ = Farm size
- X₆ = Annual family income

- X₇ = Sugarcane cultivation knowledge
- X₈ = Credit received
- X₉ = Extension contact
- X₁₀ = Training exposure
- X₁₁ = Organizational participation
- X₁₂ = Adoption of intercropping

Appendix – B

AN ENGLISH VERSION OF INTERVIEW SCHEDULE

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

Sl. No. -----

AN INTERVIEW SCHEDULE FOR COLLECTION OF DATA FROM THE
SUGARCANE GROWERS FOR A STUDY
ON
“ADOPTION OF INTERCROPPING IN SUGARCANE BY THE
FARMERS”

Address of the respondents

Name of the Respondent Farmer :

Father /Husband's Name :

Address :

Village :

Upazilla :

Centre :

Sub-zone :

District :

(Please answer the following questions, provided information will be kept confidentially)

1. Age:

How old are you :----- Years

2. Educational Qualification :

Please mention your educational qualification.

- a) Don't read and write ()
- b) Can sign only ()
- c) ----- Class passed
- d) Do not read in school/Madrasha, but level of education is equal to class -----.

3. Family Size :

Mention the number of your family member -----

4. Family labours :

- (a) No. of members below 12 years -----
- (b) No. of members from 12 to below 18 years -----
- (c) No. of members from 18 years or above -----

5. Farm size :

Land Description	Total Land	
	Local ()	Hectare
a) Homestead land		
b) Self cultivated owned land		
c) Land taken from others as lease		
d) Cultivated area taken as borga		
e) Cultivated area given to others as borga		
f) Others		
Total		

6. Annual family Income :

Please indicate your family annual income (in Taka).

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

7. Knowledge about sugarcane :

Please answer the following questions.

Sl. No.	Questions	Score	
		Full	Obtained
a.	What is the best soil of sugarcane ?	2	
b.	Name two improve varieties of sugarcane?	2	
c.	What are the procedures of preparing of sugarcane seed setts ?	2	
d.	What is the sett-testing materials ?	2	
e.	How the setts are tested ?	2	
f.	What is the proper age of sugarcane for using as seed ?	2	
g.	How are the settlings of sugarcane raised for spaced transplanting cane ?	2	

h.	What are the procedure of gap filling in sugarcane field ?	2	
i.	Mention two major insect pest of sugarcane.	2	
j.	What are advantages of early planting ?	2	
k.	Name the dose of fertilizer for basal application of sugarcane.	2	
l.	What is the easiest control measure of early shoot borer ?	2	
m.	What is the method of sugarcane plantation for intercropping ?	2	
n.	What are the time of earthing up for sugarcane ?	2	
o.	What are the time of sugarcane tying ?	2	
p.	What are the method of sugarcane tying ?	2	
q.	What is the best harvesting time of for rationing in sugarcane ?		
r.	Why Urea fertilizer is needed in fewer amounts in pulse crop?	2	
s.	Mention two names of disease of pulse crop.	2	
t.	Mention two names of green manure crop.	2	
Total		40	

8.(a) Had you required any credit for cane cultivation during last year ?

Yes -----

No -----

(b) If you received credit, indicate the sources and amount:

Sources of credit	Amount received (Tk.)
i. Sugar mills	
ii. Bank	
iii. Co-operative	
iv. Mahajan	
v. Businessman	
vi. Relatives	
vii. Others	
Total	

9. Extension Contact :

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

Type of Contact	Source of Contact	Nature of Contact				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Not at all (0)
Personal Contact	Model farmer	5 and more times/month ()	4 times/month ()	2-3 times/month ()	1 time/month ()	0 time/month ()
	CDA / CDI	3 and more times/month ()	3 times/month ()	2 times/month ()	1 times/month ()	0 times/month ()
	CDO / DCCD	3 and more times/year ()	3 times/Year ()	2 times/Year ()	1 times/Year ()	0 times/Year ()
	Sub Assistant Agricultural Officer	3 and more times/month ()	3 times/month ()	2 times/month ()	1 time/month ()	0 time/month ()
	Agriculture Extension Officer/UAO	3 and more times/year ()	3 times/year ()	2 times/year ()	1 time/year ()	0 time/year ()
Group Contact	Method Demonstration	2 and more times/year ()	1 time/year ()	1 time/2 year ()	1 time/4 year ()	0 time/year ()
	Group Meeting	5 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	3 and more times/week ()	3 times/week ()	2 times/week ()	1 time/week ()	0 time/week ()
	Watching TV programs on agriculture	3 and more times/month ()	3 times/month ()	2 times/month ()	1 time/month ()	0 time/month ()
	Reading agricultural news in newspapers	3 and more times/month ()	3 times/month ()	2 times/month ()	1 time/month ()	0 time/month ()
	Booklet/Leaflet/Krishi Kotha/Samprosa-ron Barta/Ikkhu Samachar	3 and more times/year ()	3 times/year ()	2 times/year ()	1 time/year ()	0 time/year ()
	Poster about sugarcane cultivation	2 and more times/year ()	1 time/year ()	1 time/2 year ()	1 time/4 year ()	0 time/year ()

10. Training Exposure :

Did you receive any training about sugarcane cultivation?

Yes

No

If answer is yes, mention the followings:

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

11. Organizational Participation :

Mention the level of participation with the following organizations:

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

12. Area Under Intercrops in Sugarcane (Hectare) :

Name of the Intercrops	2003-2004		2004-2005		2005-2006	
	Cultivable Land	Actual Land	Cultivable Land	Actual Land	Cultivable Land	Actual Land
Potato Garlic Chili Brinjal Onion Mustard Cabbage Lentil						

Date:

Signature of the interviewer