ADOPTION OF MAIZE PRODUCTION TECHNOLOGIES BY THE FARMERS

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Dedicated
to

MY DEPARTED FATHER
AND
BELOVED MOHTER

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THESIS ABSTRACT

The main objectives of the study was to find out the extent of the adoption of maize production technologies by the farmers, to describe the selected characteristics of the maize growers and also to explore the relationships between selected characteristics of the growers and their adoption of maize production technologies. The study was conducted in a village named Durgapur under Aditmari upazila of Lalmonirhat district. A total of 100 farmers were selected as sample for the study from a population of 251. Data were collected from the maize growers using personal interview schedule during the period 15 July to 15 August, 2005. Apart from descriptive statistical methods, Pearson's Product Moment Correlation Co-efficient analysis was used in order to analyze data to fulfill the objectives. Findings indicated that the majority (69 percent) of the growers had medium adoption of modern maize cultivation technologies while 30 percent had low adoption and only 1 percent high adoption. Out of ten selected characteristics of the growers, four namely education, area under maize cultivation, annual income, and extension contact had positive significant relationship and age had a negative significant relationship with their adoption of maize production technologies. The rest of the variables namely innovativeness, knowledge in maize cultivation, farm size, cosmopoliteness and agricultural training exposure did not show any significant relationships with their adoption of maize production technologies. Out of 12 problems faced by the farmers two problems in order of importance were: (i) non-availability of storage facilities at farmers' level and (ii) non-availability of hybrid seed.

HYV	High Yielding Variety
BARC	Bangladesh Agricultural Research Council
BRRI	Bangladesh Rice Research Institute
BBS	Bangladesh Bureau of Statistics
DAE	Department of Agricultural Extension
FAO	Food and Agricultural Organization
GO	Government Organization
NGO	Non Government Organization
CDP	Crop Diversification Program
MOA	Ministry of Agriculture
IMPP	Integrated Maize Promotion Project
UNDP	United Nation Development Program
USAID	United States Agency for International Development
BADC	Bangladesh Agricultural Development Corporation
CIMMYT	International Maize and Wheat Improvement Centre
IPM	Integrated Pest Management.
RDRS	Rangpur Dinajpur Rural Service.
BINA	Bangaladesh Institute of Nuclear Agriculture.

CHAPTER 1
INTRODUCTION

1.1 General Background.

Bangladesh is an agro-based country. Agriculture is the backbone of the economy. About 79.9 percent of its population lives in rural areas and 64.5 percent of the country's total labour force is engaged in agriculture (BBS 2000). The predominance of agriculture in the country's economic life becomes all the mire evident if one looks at the magnitude of its contribution

to Gross Domestic Product (GDP) of the country. According to BBS report, agricultural output at the current prices has been found to contribute 25.33 percent to the GDP in Which 14.32 percent comes from percent crops, 1.86 percent from forestry, 2.93 percent from livestock and 6,22 percent from fisheries (BBS 2000).

In order to face frequent food shortage and to save the heavy drainage of foreign currency required for importing of food grain, it is essential to increase agricultural production. Increasing agriculture production through expansion of cultivated area is no longer feasible, because practically all the available arable land is now being used in crop production. So the most logical way is to raise the yields by adopting cropping intensity. These can be possible by practicing crop diversification, modern technology, high yielding variety (HYV), short duration crops and taking benefit of huge extension network.

Maize is one of the important cereal crop in many developed and developing countries in the world. It is widely used in the developed countries as a major

source of carbohydrate for animal feed and as an industrial raw material for wet and dry milling (Swami Nathan *et al,* 1982). It is the third major cereal crop after rice and wheat in Bangladesh. Maize is grown all over Bangladesh

specially Lalmonirhat, Kurigram.Dinajpur, Rajshahi, Rangpur, Rangamati, Gaibandha, etc. Maize can grow throughout the year in the subtropical climate of Bangladesh. It is grown in three cropping seasons :(a) Rabi (Nov.. – Feb), (b) Pre-monsoon (March-June), (c) Monsoon (July-Oct.).

About 84% maize harvest is made in the Rabi season. Maize can be grown in fallow land as intercrop or mixed crop with potato, swea[t] potato, chili, groundnut, tomato, etc.

During last few years farmers have widely adopted cultivation of HYV maize in their farming system. It is now extensibly used as poultry and animal feed. Roasted and fried maize are also consume by the people. An enormously large number of small enterprises can be developed in maize growing regions to produce and sell this product and to create new opportunities of rural employment. Farmers of Bangladesh were not experienced in commercial cultivation of maize. Now a day they have been influencing of Govt.

Organization and private organization to adopt maize production technology. Maize can play an important role along with other cereals in meeting future need of growing population. It has also some other benefits such as low production cost, high farm return, increase employment opportunity supply poultry feed and industrial raw materials etc.

Maize has always been considered as a minor crop in Bangladesh. But realizing importance and potential of maize, the planning commission in 1990 recommended maize to be included in Crop Diversification Program (CDP).

As a result, MOA developed a project entitle "Integrated Maize Promotion Project (IMPP)" and was under taken in august, 1991. With the assistance of United Nation Development Program (UNDP) and United States Agency for International Development (USAID). Implementation of the project started in 124 Upazila of 21 district in September 1992,and will be completed in June,

1995, it was 1st phase] of IMPP. Priority and importance were also given to undertake IMPP project 2nd phase was started from July 1995 for

IMPP has promoting expansion of maize cultivation all over the country in successive phase. Now a days it has been operating in 200 Upazila's of 47 districts and the project period has been extended upto June 2005. North side of Bangladesh are the main maize producing zone.Ghorarghat and Birol Upazila in Dinajpur, Hatibandha and Patgram Upazilas in Lalmonirnat, Dhunat and Sherpur Upazilas in Bogra and the district of Chuadanga and Meherpur witnessed proliferation of maize cultivation (Ahmed, 2003)

Maize cultivation in Bangladesh has been increased through various intervention of the MOA. BARI, Crop Diversification Program, 1L-)-1AE-IMPP, BRAC.BADC and so many private organizations .At present various type of hybrid are available in Bangladesh such as Pacifir-.-1 1, Pacific –60, Kiron, Uttaron etc. cultivation of hybrid maize has gained extensive popularity resulting increase of area and production. Area of maize cultivation has

increased to about 30,047 hectare with annual production of 1,72,368 tons grain in 2001-02 from merely 2000 tons from 2,400 hectare in 1975-76. Table 1.1 indicates the increased area, production and yield of maize. However, it has been meeting only about 40 percent of the national demand. Much more need to be done to meet the total demand.

Table 1.1 Maize production trends of Bangladesh, 1975-2003

Year	Area (ha)	Production (Ton)	Yield (Kg/ha)
1975-76	2,400	2,000	833
1980-81	2,024	1,000	494
1985-86	3,239	3,000	926
1990-91	3,109	3,040	978
1995-96	10,125	32,000	3,175
2000-2001	25,978	149,244	5,745
2001-2002	30,047	172,368	5,737
2002-2003	35,000 (targeted)	200,000 (targeted)	-

Source: BBS, 2002.

Among the cereals grown in the country, maize is the important crop after rice and wheat. Maize productivity in the country seems to be highest in the Asian region with an average yield of 5.73 tons/ha. This is due to favorable growing conditions during the maize season (October to March) and the increased use of hybrid seeds coupled with a number of improves production practices by the growers (Gonzalezetal-2001).

The area and production is increasing with an exponential rate (Agarawal, 2002). Higher yield up to 8-10 tons/ha can easily be obtained using hybrid seeds, balanced fertilizers ano better management (Quayyan and, Hogue, 1975 and Iqbal, 2001).

In the year 1999-2000,rice production were 4,74,000 tons from 3,78,000 hectare area, wheat 1,25,000 tons from 1,23,000 ha area and maize 1,24,000 tons from 83,000 ha area and also in the year 2000-01 rice production were 5,16,000 tons from 3,84,000 ha of land, wheat 1,14,000 tons from 1,14,000 ha and maize production where 3,16,000 tons 1,30,030 ha area respectively (BBS 2001). We found the popularity of maize among the farmers of Bangladesh is sharply increased in day by day. Maize varietal improvement in Bangladesh is mainly carried out by BARI, so far if released 11 improved maize verities including three hybrid At present DAE, some NGOs and International organization like CIMMYT, FAO etc have taken strong interest to support the maize production activities in the country, Public sector procurement of maize has been introduced like rice and wheat in order to encourage farmers in maize cultivation. The efforts for increasing area and production of maize production technologies by the farmers.

1.2 Statement of the problem:

In view of the foregoing discussion, the investigator under took a piece of study entitled 'Adoption of maize production Technologies by the farmers". This research information are required which could be helpful to the policy maker, concerned bodies with the supply of inputs, technologies, knowledge and confronted with several problem having solution .

The study also aimed at finding out those factors which facilitated as well as those which caused barriers to the adoption of maize production technologies by the farmers.

The purpose of this study was to have answers to the following research questions:

I. What is the extent of adoption of maize production technologies?
II. What are the characteristics maize growers??
III. Is there any relationship between the farmers' selected characteristics and their adoption of maize production technologies?
IV. What are the problems of adoption of maize production technologies?
V. What are the influencing factors of the adoption of maize production technologies by the maize growers?

1.3 Specific objectives:

The following specific objectives were set forth in order to proper direction to the study:

1. To determine the extent of adoption behavior of maize production technologies by the farmers.
2. To describe some selected characteristics of the farmers The selected characteristics were'.

   (i) Age (II) Education (iii) Innovativeness (iv) Knowledge in maize cultivation (v) Firm size (vi) Area under maize cultivation (vii) Annual income (viii) Cosmopoliteness (ix) Agricultural Training exposure (x)

3. To explore the relationships between the selected characteristics of the farmers and their adoption of maize production technologies.
4. To describe the extent of problems faced by the farmers in adopting maize production technologies

1.4 Justification of the Study

Maize cultivation is getting popularity among the farmers of Bangladesh introduction of new hybrid varieties coupled with growing market demand as also poultry feed have opened a tremendous potentiality of maize. The government is also supporting this growth. Needless to say that research is necessary to determine pattern of diffusion of maize production technologies in order to formulate long-term strategy on maize production. As no research in the field diffusion-adoption of this technology has been identified so far, the researcher deemed it a timely necessity to undertake the present study entitled "Adoption of Maize production Technologies by the Farmers'."

1.5 Assumptions of the Study

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

1. The responses furnished by the respondents were reliable. They expressed the truth about their opinion and interest.
2. The researcher who acted as interviewer was adjusted to social and environmental conditions of the study area. Hence, the data collected by him from the respondents where free from bias.
3. The respondents included in the sample for this study were competent enough to furnish proper responses to the queries included in the interview schedule.
4. Views and options furnished by maize growers included in the sample selected those of the population of the study.

1.6 Scope of the Study

The main focus of the study was to determine adoption of maize production technologies. The findings of the study will be specifically applicable to Lalmohirhat district. However, the findings will also have implications for other areas of the country having relevance to the socio-cultural context of the study area.

The investigator believes that the findings of the study will reveal the phenomenon related to diffusion of innovation. These will be of special interest to the policy makers and planners in formulating and redesigning the extension programmes specially for maize cultivation. The findings are expected to be helpful to the field workers of different faction building department and organizations to develop appropriate extension strategies for effective working with the rural people.

1.7 Limitations of the Study

Considering the time, money and other necessary resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as noted below-

1. Population for the present study were kept confined within the heads of the maize growing farm families as because they were the major decision makers in the adoption of maize production technologies.
2. Characteristics of maize growers are many and varied but only ten were selected for investigation in this study as stated in the objectives. This was done to complete the study within limited resources.
3. The study was confined mainly to adoption of maize production technologies by the farmers'.

4- Facts and figures were collected by the investigator applied to the present situation in the selected area.

1.8 Definition of Terms

Adoption: Adoption is the implementation of a decision to continue the use of an innovation. According to Rogers (1995) "Adoption is a decision to make full use of an innovation as the best course of action available" When an individual takes up a new idea as the best course of action and practices it the phenomenon is known as adoption (Ray, 1991). In this study, adoption was defined as the phenomenon of taking up a new idea (maize) and put **it** into practices by the farmers of Aditmari upazila.

Age: age of the respondent was defined as the period of time in actual years from his birth up to the time of interviewing.

knowledge in maize cultivation: It referred to awareness of the rural farmers of land preparation, sowing time, method, fertilizer-irrigation management pest control harvesting method ,storage method, etc.

Area under maize cultivation: It referred to the total area in hectare of maize cultivation by the farmers in particular seasons (two proceeding seasons of data collection).

Cosmopoliteness: The term cosmopoliteness referred to the rural farmers' mobility from their own village to another village, upazila and district.

Education: Education referred to the development of desirable knowledge, skill and attitude in the individual through reading, writing and other related activities. It was measured in terms of actual grades or class passed by a respondent.

Extension media contact: It referred to an individual's exposure to or contact with different communication media and sources and personalities being used for dissemination of new technologies among the farmers.

Annual income: It referred to the annual earning of the entire family member from agriculture and other non-agriculture sources (like services, business and day labour etc.) during a year. It expressed in taka.

Innovativeness: It is degree to which an individual is relatively earlier in adopting innovations than other members of his social system (Rogers, 1983). This was comprehended by the quickness of accepting innovations by an individual in relation to others.

Farm size: It referred to the total area on which a farmers' family carries on farming operation. The area is estimated in terms of full benefit to the farmers' family.

Technology: The combination of all the management practices used for producing and otherwise managing a given crop, crop mixture, livestock and other farm activities. In this study, technology was defined as the combination of five practices (i.e. variety, intercropping, wowing method, use of shelter and recommended dose of urea) used for producing of maize.

Training exposure: It referred to the total number of days that a respondent received training in his entire life from different organization under different training programmmes.

CHAPTER 2

REVIEW OF LITERATURE

The researcher made and elaborated search of available literature for this research. But no study could be found to be specially undertaken **in** in this direction. Therefore, attempt has been made in the present chapter to review some interlinked literature on this aspect from home and aboard. The interlinked reviews conveniently presented on the major objectives of the study as far as possible. This chapter is divided into three major sections. The first section deals with review of relevant literature regarding adoption of maize production technologies by the farmers. The second section deals with past research findings relating to the relationship of farmers' adoption behavior with their selected characteristics. The conceptual framework of the study is presented in the third section.

2.1 Review of relevant literature :

Hussen (2001) conducted investigation on adoption of modern sugarcane cultivation practices by the farmers of Daweangonj Upazila in Jamalpur district. The study revealed that about cent percent (91 percent) of the farmers had medium adoption compared to 7 percent having low adoption and only 2 percent having high adoption of modern sugarcane cultivation practices.

Rahman (2001) conducted an investigation on knowledge attitude and adoption of Alok-6201 hybrid rice by the farmers of sadar upazila in Mymenshingh district. The study revealed that the majority (75 percent) of the farmers had medium adoption while 18 percent and 7 percent had high and low adoption in Alok –6201 hybrid rice cultivation respectively.

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. The study revealed that 69 percent of the farmers had medium adoption while 13 percent had low adoption and 18 percent had high adoption of modern agricultural technologies.

Podder (1999) concluded a research study on the adoption of Mehersagar Banana by the farmers. He found 47 percent of the respondents had medium adoption compared to 14 percent having low and 39 percent high adoption.

Rahman (1999) conducted an investigation on adoption of balanced fertilizer by the farmers of Ishargonj . upazila in Mymenshingh district. The study revealed that the majority (71 percent) of the respondents had medium adoption compared to 29 percent having below optimum level.

Chowdhury (1997) conducted an investigation on adoption of selected BINA technologies by the farmers of Boura union in Mymensingh district. The study revealed that the majority (58 percent) of the respondents had no adoption of BINA technologies and 42 percent were adopted BINA technologies.

Sarker (1997) studied the extent of adoption of improved potato cultivation practices by the farmers in Comilla district. The study revealed that more than half (55 percent) of the respondents had medium adoption compared to 23 percent having low adoption and 22 percent high adoption of improved potato cultivation practices.

Akanda (1995) studied the adoption of recommended dose of fertilizer and found that36.64 percent respondents used recommended dose of urea, 6.93 percent used recommended dose of MP, 11.88 percent used T.S.P and only 2 respondents used gypsum in their potato cultivation.

Muttaleb (1995) studied the extent of the adoption of improved technologies of potato cultivation by the farmers in Haibatpur unicn under sadar thana of Jessore district. The study revealed that 8 percent of the potato growers had high adoption of improved technologies, 43 percent has medium and 49 percent had low adoption.

Hoque (1993) conducted an investigation on the adoption of improved practices of sugarcane cultivation in Sreepur upazila of Gazipur district. The study revealed that 31 percent of the cane growers had high adoption while 37 percent had medium and 32 percent had low adoption of improved practices in sugarcane cultivation.

Nikhade et al. (1993) observed on adoption of improved practices of soybean cultivation that cent percent adopted improved varieties. More than 82 percent had adoption of package practices like line sowing, spacing and intercultural operations. Partial adoption was observed in majority of the soybean growers (74.6 percent) with regard to recommended seed rate.

Hossain (1991) studied the extent of adoption behavior of contact wheat growers in sadar upazila of Jamalpur district. He found that more than half (52 percent) of the growers had medium adoption of improved farm practices compared to 34 percent having low adoption and only 14 percent high adoption.

Bembridge and Willams (1990) studied the personal, sociological, socio-psychological and communication characteristics that influence the adoption of maize practice in Farmer Support Programme in South Africa. The study revealed less than 50% of the farmers who adopted practices were implementing them according to recommendations and many did not have a clear concept that the practices were interrelated.

KariuKa (1990) studied the economic impact of the adoption of hybrid maize in Swaziland. The study revealed the sensitivity of hybrid maize adoption to different farming systems and the limited usefulness of a partial analysis in evaluating the impact of innovations. A macro level cost-benefit analysis was used in a ex-post appraisal if impact of maize research, complemented by an ex-ante projection of the potential benefits and costs of its component maize breeding programme. Moderate increase in production cost would not effect the area of land devoted to maize, farm families are unlikely to produce beyond subsistence requirements without a considerable increase in output prices.

Rai, Grover and Gangwa[y] (1989) conducted a study on identifying factors responsible for acreage substitution and low yield of maize. This study showed a general downward trend in area and productivity of maize in Haryana, India. It argued that maize acreage in given year was influenced by size of irrigated area, lag year maize acreage and lag year relative income.

2.2 Review of the Studies Concerning the Relationship between Farmers' Characteristics and their Adoption.

Age and adoption

Islam (2002) conducted a Study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that age of the farmers was not related to their adoption of modern agricultural technologies.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a significant negative relationship between age and adoption of integrated homestead farming technologies.

Sardar (2002) conducted a study on adoption of PM practices by the farmers under PETRRA project of RDRS. He found that age of the farmers had a negatively significant relationship with their adoption ()f IPM practices.

Rahman (2001) observed that there was no significant relationship between age and adoption of Aalok-6201 hybrid rice cultivation practices. Podder (1999) and Hossain (1999) are found similar results in their respective studies.

Hussen (2001) conducted a study which concluded that age of the sugarcane growers had a significant negative relationship with their adoption of modern sugarcane cultivation practices. Rahman (1999) also found similar result in this study.

Chowdhury (1997) observed that the age of the farmers had no significant relationship with their adoption of selected BINA technologies.

Sarkar (1997) observed that there was no significant relationship between age of the farmers and their adoption of improved potato cultivation practices. Similar findings were observed by Karim and Mahaboob (1986), Singh (1989) and Kher (1992) in their respective studies.

Hamid (1995) conducted a study on adoption of recommended sugarcane cultivation practices by the farmers. He found that age had a significant negative relationship with the adoption of recommended sugarcane cultivation practices.

Education and adoption

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

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He found that education of the farmers had a positive significant relationship with their adoption of IPM practices.

Aurangozeb (2002) conducted a study on adoption of integrated farming technologies by the rural women in RDRS. He found that there was a positive relationship between education and their adoption on integrated farming technologies.

Hussen (2001) conducted a study on farmers' knowledge and adoption of modern sugarcane cultivation practices. He found that education of the growers had a positive significant relationship with their adoption of modern sugarcane cultivation practices.

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok-6201 hybrid rice in sadar upazila in Mymensingh district. He found that academic qualification of the farmers had a significant positive relationship with their adoption regarding Aalok-6201 hybrid rice.

Chowdhury (1997) found a positive significant relationship between the education of the farmers and their adoption of selected BINA technologies. Similar results were found by Barkatullah (1985), Ali *et al.* (1986), Hoque (1993), Bashar (1993) Khan (1993), Pal (1995) and Sarkar (1997) in their respective studies.

Krishna (1969) conducted a research study on the adoption of hybrid maize in Karimnagar, India. He found significant negative relationship between the education of the respondents and their adoption of hybrid maize.

Innovativeness and adoption behavior:

Rahman (2003) revealed that the highest proportion (63 percent) at the farmers had low innovations as compared to 22 percent medium innovativeness and 15 percent very low innovativeness.

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

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

Hossain (1999) found a positive significant relationship between innovativeness of the farmers and their adoption of fertilizer and also observed no relationship with adoption of pesticides.

Rahman (1973) found a positive relationship between modernism and adoption of farm practices. He defined modernism and leading for new experience or opener to innovation. So, modernism as used by him is synonymous with the innovativeness of the present study.

Agricultural knowledge and adoption

Sarkar (1997) found that potato production knowledge of potato growers had a positive and significant relationship with their adoption of improved potato cultivation practices. Ali *et al.* (1986), Muttaleb (1995) and Rahman (1995)

observed similar results in their respective studies.

Farm size and adoption

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

Sarkar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He found that farm size of the farmers had a positive significant relationship with their adoption of IPM practices.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there had no relationship between homestead area and their adoption of integrated homestead farming technologies.

Rahman (2001) conducted an investigation on knowledge, attitude and adoption of Aalok-6201 hybrid rice by the farmers of sakar upazial in Mymenshigh district. He observed that there was a significant positive relationship between farm size of the farmers and their adoption of Aalok-6201 hybrid rice.

Hussen (2001) conducted an investigation on adoption of modern sugarcane cultivation practices by the farmers' o Dewangonj upazial in Jamalpur district. He observed that there was a significant positive relationship between farm size of the farmers and their adoption of modern sugarcane cultivation practices.

Chowdhury (1997) conducted a research on adoption of selected BINA technologies by the farmers. He indicated that farm size of the farmers had a strongly positive significant relationship with their adoption of selected BINA technologies. Rahman (1986), Okoro *et al.* (1992), Khan (1993), Hoque (1993) and Sarkar (1997) observed similar results in their respective studies.

Area under maize cultivation and adoption

Sangha a Dhammu (1989) conducted on the study on adoption of package of practices of winter maize in Punjab. They found a majority (63.04%) of farmers sown up to 5 acres under winter maize, 23.91 percent sown 5 to 10 acre and 13.05 percent sown 10 acres and above.

Annual income and adoption

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He found that the annual income of the farmers had no relationship with their adoption of IPM practices.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a positive significant relationship between annual income of the respondents and their adoption of integrated homestead farming technologies.

Rahman (2001) conducted an investigation on knowledge, attitude and adoption of Aalok-6201 hybrid rice by the farmers of sadar upazila in Mymensingh district. He observed that there was a significant positive relationship between annual income of the farmers and their adoption of Aalok-6201 hybrid rice.

Hussen (2001) conducted an investigation on adoption of modern sugarcane cultivation practices by the farmers of Dewangonj upazila in Jamalpur district. He observed that there was a significant positive relationship between annual income of the farmers and their adoption of modern sugarcane cultivation practices.

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. He observed that the annual income of the farmers had no relationship with their adoption of modern agricultural technologies.

Chowdhury (1997) found a significant and positive relationship between annual income and adoption of selected BINA technologies. Rahman (1986), Okoro et *al.* (1992), Islam (1993), Khan (1993), Sarker (1997) observed similar result in their respective studies.

Kunzra *et al.* (1989) studies on Adoption of green fodder production as related to some characteristics of livestock owners. They revealed that adoption of green fodder production was positively and significantly correlated with the annual income of livestock owners.

Tolawar and Hirevenkaragouder (1989) studied on factors of adoption of poultry management practices. They revealed that the farmers having high income tend to own bigger size of poultry unit and possess more knowledge of improved practices leading to higher level of adoption.

cosmopoliteness and adoption

Rahman (2001) conducted an investigation on knowledge, attitude and adoption of Aalok-6201 hybrid rice by the farmers of sadar upazila in Mymenshigh district. He observed that there was a significant positive relationship between cosmopoliteness of the farmers and their adoption of Aalok-6201 hybrid rice.

Hussen (2001) conducted an investigation on adoption of modern sugarcane cultivation practices by the farmers of Dewangonj upazila in Jamalpur district. He observed that there was a significant positive relationship between cosmopoliteness of the farmers and their adoption of modern sugarcane cultivation practices.

Aurangozed (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that cosmopoliteness of the respondents had a significant positive relationship with their adoption of integrated homestead farming technologies.

Hossain (1999) found a positive significant relationship between cosmopoliteness of the farmers and their adoption of fertilizer. Pal (1995), Haque (1993), Khan (1993), Islam (1986) and Halim (1985) observed similar results.

Chowdhury (1997) found that there was no significant relationship between the farmers' cosmopoliteness and their adoption of selected BINA technologies. Similar results were observed by Hossain (1991) and Islam (1996) in their respective studies.

Training and adoption

Rahman (2001) observed in study that training received of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Islam (2002) conducted a study on farmers' knowledge and adoption of ecological agricultural practices under the supervision of Proshika. He found that agricultural training exposure of the farmers had no significant relationship with their adoption of ecological agricultural practices.

Extension contact and adoption

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwsip. He found that extension media contact of the farmers had no significant relationship with their adoption of modern agricultural technologies.

Aurangozed (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in RDRS. He found that there was a positive significant relationship between contact with extension media of the respondents and their adoption of integrated homestead farming technologies.

Rahman (2001) conducted an investigation on knowledge, attitude and adoption of Aalok-6201 hybrid rice by the farmers of sadar uazila in Mymensingh district. He observed that there was a significant positive relationship between extension contact of the farmers and their adoption of Aalok-6201 hybrid rice.

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He observed that contact with RDRS personnel of the farmers had a positive significant relationship with their adoption of IPM practices.

Hussen (2001) conducted an investigation on adoption of modern sugarcane cultivation practices by the farmers of Dewangonj upazial in Jamalpur district. He observed that there was a positive significant relationship between extension contact of the farmers and their adoption of modern sugarcane cultivation practices.

Sarker (1997) observed a positive and significant relationship between extension contact and adoption of improved potMo cultivation practices. Kashem *et al.* (1990), Kher (1992), Pal (1995), Islam (1993), Haque (1984) also found the similar results in their respective studies.

Nahar (1996) found that there was a significant positive relationship in agricultural knowledge on farm women in homestead farming and their level of contact with information sources.

Heong (1990) observed that the lack of adoption of IPM technologies in rice was frequently attributed to lack of sufficient extension.

2.3 The Conceptual Framework of the Study

Adoption is a decision to make full use of innovation as the best course of action available (Ray, 1991). When an individual takes up a new idea as the best course of action and practices, this phenomenon is known as adoption. The present study tried to focus two concepts: first adoption of maize production technologies by the farmers and the second their selected characteristics. A dependent variable may be influenced and affected through interacting forces of many characteristics in his surrounding. It is impossible to deal with all characteristics in a single study.

The conceptual framework of Rosenberg and Hovland (1960) was kept in mind while framing the structural arrangement for the dependent and independent variables.

This study expected that farmers' adoption of modern maize cultivation technologies as dependent variable which was influenced by selected characteristics of the farmers as independent variables viz. age, education, innovativeness, knowledge in maize cultivation, farm size, area under maize cultivation, cosmopoliteness, annual income, training exposure and extension contact.

The conceptual model of the study has been presented in Figure 2.1.

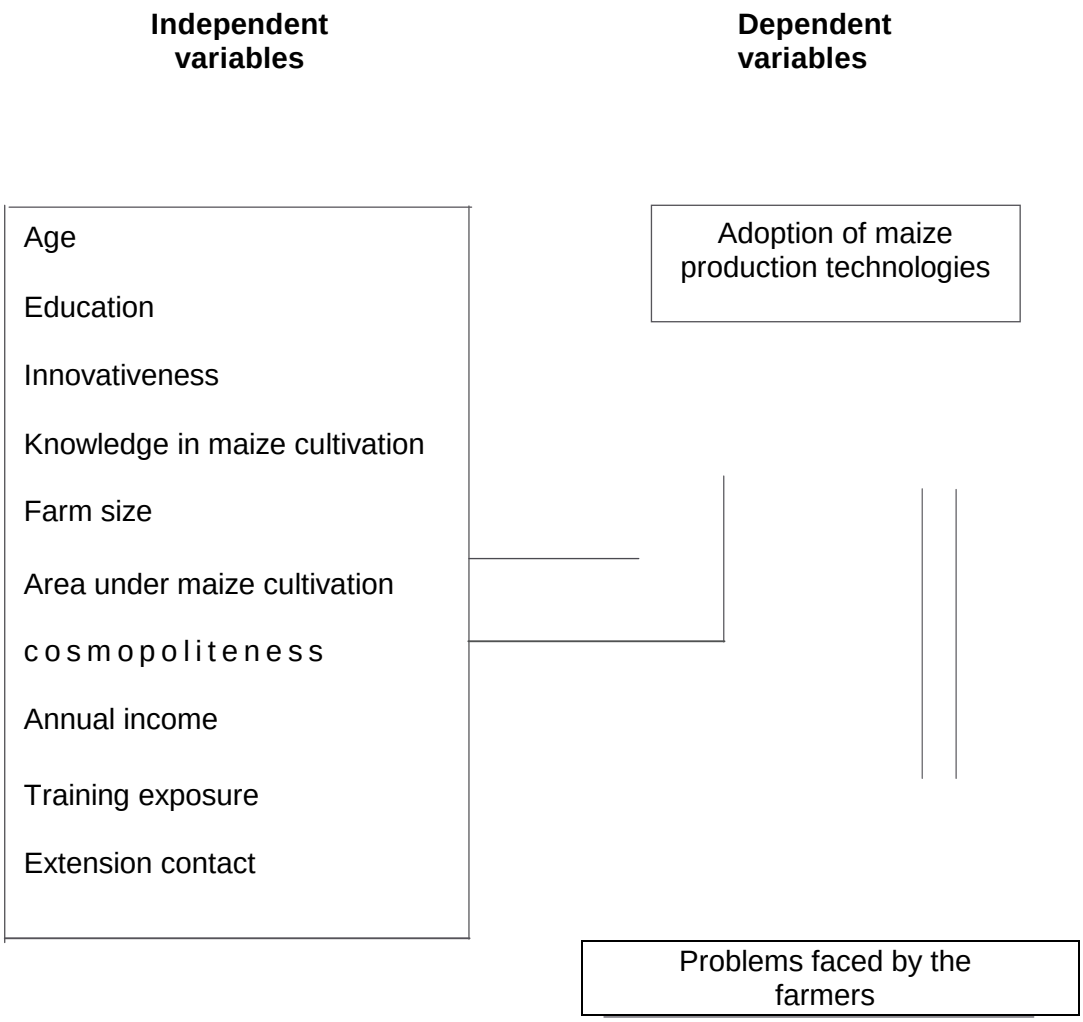

Fig. 2.1 The conceptual model of the study

C H A P T E R - 3

METHODOLOGY

Importance of methodology for conducting any research can hardly be over emphasized. Keeping this point in view, the researcher took great care for using appropriate methods in all aspects of this investigation. Methods and procedure followed in this study have been discussed in this chapter.

3.1 The Locale of the Study:

A village named Durgapur in Aditmari Upazila under Lalmonirhat district was the locale of the study. This Upazila is situated at 8 km west of Lalmonirhat town and according to the guidance of the research supervisory committee one village with maize as the more cultivated crop were to be the study area of the present research. The selected village is about 12km from the Aditmari Upazila Head Quarter. A map of Lalmonirhat district showing the study area has been presented in fig. 3.1

3.2 Population and Sampling Design:

All the maize growers of the selected village was the population of the study. A list of the farmers of this village was prepared with the help of Md. Mijanur Rahman, Sub Assistant Agriculture Officer, Upazilla Agricultural office; Aditmari, Lalmonirhat. The total number of maize -growers in this village were found 251. Out of them 40% of the population were selected following random sampling method. So, 100 maize growers were the sample of the study. If any one included in the original sample were unavailable during data collection, the next farmer regarding that list were considered turn by turn for collecting data. Therefore no reserve list was needed.

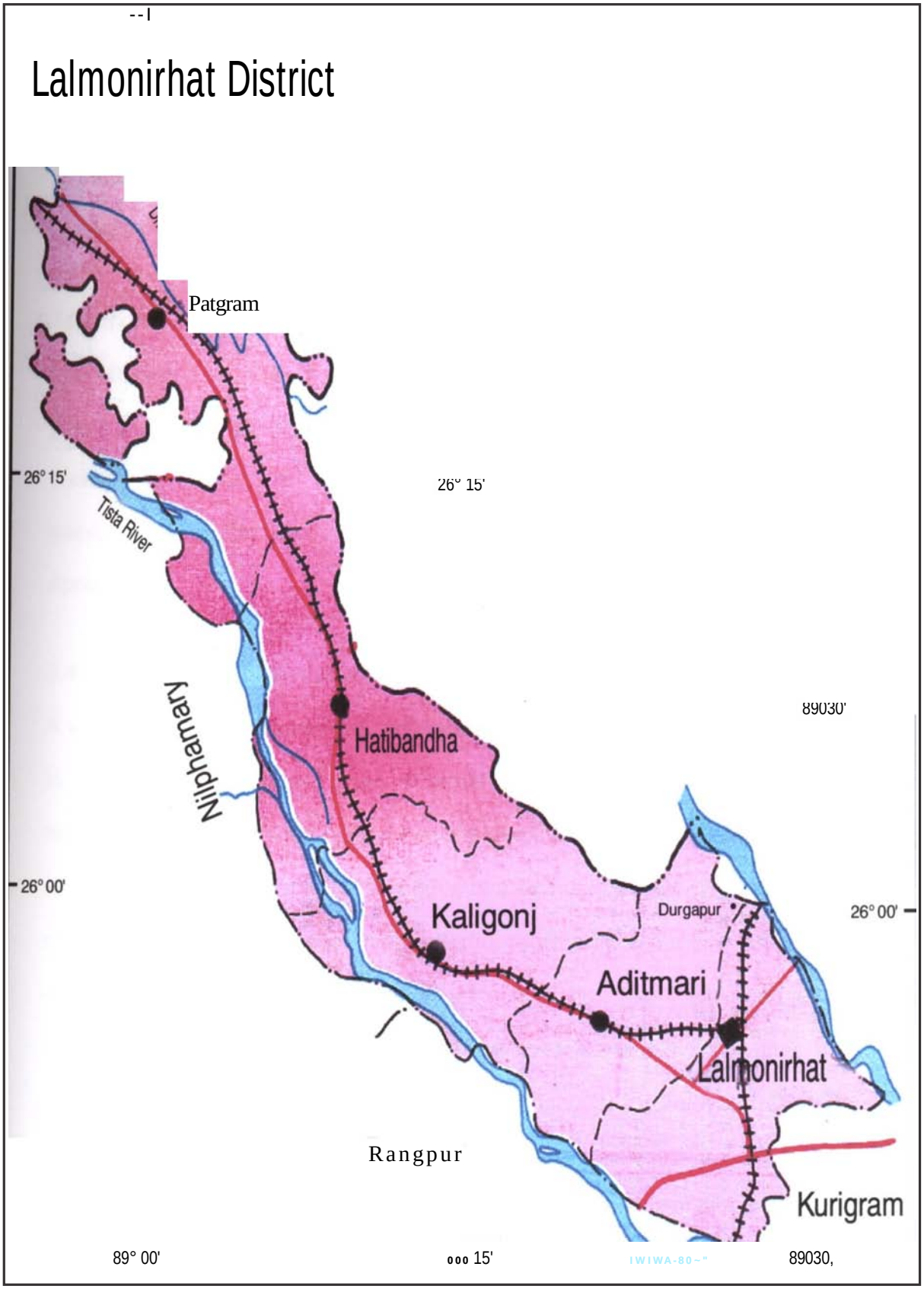

Figure-3.1: Lalmonirhat District Map

3.3 Instrument for Data Collection:

In order to collect reliable and valid information from the maize growers, an interview schedule was prepared carefully keeping the objectives of the study in mind. The interview schedule contained both open and closed form questions.

Appropriate schedule was also developed to operationalize the selected characteristics of the maize growers. The draft interview schedule was prepared in English version and was pre-tested with 12 maize growers. This pre-test facilitated the researcher to examine the suitability of different questions and statements in general. The interview schedule may be seen at Appendix-A.

3.4 Measurement of Variables:

A variable is any characteristic, which can assume varying, or different values in successive individual cases (Ezekiel and Fox, 1959). An organized research usually contains at least two important variables, viz an independent and a dependent variable. An independent variable is that factor which is maintained by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953). According to the relevant research area, the researcher selected ten characteristics of the maize growers as the independent variable and adoption of maize production technologies as the dependent variable.

3.4.1 Measurement of independent variable:

The independent variables of the study were 10 selected characteristics of the maize growers. These were age, education, innovativeness, knowledge in maize cultivation, farm size, area under maize cultivation, annual income, cosmopolite ness, training experience and extension contact. The procedures followed in measuring the independent variables are briefly discussed below:

Age:

The age of a respondent was measured in terms of actual years from his birth to the time of interview on the basis of his response. A score of one (1) was assigned for each year of age. This variable appears in item no. 1 in the interview schedule as presented in *Appendix-A.*

Education:

Education was measured in terms of one is year of schooling. One (1) score was given for passing each level in the educational institution. For example, if a respondent passed the class viii, his education score was given as 8. If a respondent did not know how to read and write his educational score was given as '0'. This variable appears in item no. 2 in the interview schedule as presented in *Appendix-A.*

Innovativeness:

Innovativeness of maize grower was measured by computing an innovativeness score one the basis of his adoption of '10 selected agricultural technologies. Score was assigned on the basis of time dimension. Since the exact data of introduction of the sleeted technologies in the study area was

not specifically known, the relative earliness of the adoption of a particular technology by a respondent was ascertained by considering how long before he first adopted that technology prior to the data of interview. The higher the length of time of his first adoption, the more earlier he was adopting the technology than other members of his social system. A score of one (1) was assigned for each year of adoption of a particular technology prior to the date of interview subject to a minimum of 10 for adopting the technology for 10 years or more prior to the date of interview. Th^{y} scores for all the 10 technologies were added together to constitute the innovativeness score of a respondent. This score, thus, could rage from 0 to 100, Zero (0) indicating no innovativeness at all and 100, highest degree of innovativeness. This variable appears in item no. 3 in the interview schedule as presented in *Appendix-A.*

Knowledge in maize cultivation:

Knowledge in maize cultivation was measured by using 20 questions as shown in the question no. 4 of the interview schedule as presented in Appendix-A. Each question had predetermined assigned score was two (2) A respondent obtained full score for right answer and 0 (zero) for wrong answer in respect of each question. He could also obtain a partial score for partial correct answer. Thus score of all the 20 questions were summed up to get total knowledge score of a respondent. The possible score of a respondent could be 0 to 40, where 0 indicated no knowledge and 40 indicated highest level of knowledge an maize cultivation. This variable(_- appears in item no. 4 in the interview schedule as presented in *Appendix-A.*

Farm Size:

The farm size of a maize grower referred to the total area of land, on which his family carried out farming operations, the being in terms of full benefit to his family.

The farm size was measured in hectares for each maize grower using the following formula:

FS=A,+A2+'/2 (A3+A4)+A5

Where, FS= Farm Size

A,= Homestead

A2= Own land under own cultivation

A3= Land taken from or/and given to others on lease

A4= Land taken from or/and given to there on borga

A5= Others (Pond, Fruit garden etc.)

The data were first recorded in term of local unit i.e. bigha and then converted to hectare. This variable appears in item no. 5 in the interview schedule as presented in *Appendix-A.*

Area under maize cultivation:

Area under maize cultivation of a respondent was measured in terms of percentage of one's total land. Area covered by maize cultivation in the season of collecting data was identified at first. It was then converted as the percent of total cultivated land. This variable appears in item no. 6 in the interview schedule as presented in *Appendix-A.*

Annual Income:

Annual income of a respondent was measured in taka on the basis of his total yearly earning from different sources (e.g. service, farming, business and others) in last year. A score of one (1) was assigned for each thousand taka. This variable appears in item no. 7 in the interview schedule as presented in *Appendix-A.*

Cosmopoliteness:

Cosmopoliteness of a respondent was measured by computing a cosmpoliteness score based on his/her frequency of visit to selected six (6) different places outside his/her own social environment. Each respondent was asked to indicate the member of times he/she visited to each of the six different places. Scores were assigned to his/her response in the following ways.

place of visit	**Nature of visit**	**Weightage**
Out side of own village	Not even once a week	0
	Once a weak	1
	2-3 times a week	2
	4-5 times a week	3
To own upazila headquarter	Not even once in 3 months	0
	One time/3 months	1
	2-3 times/3 months	2
	4-5 times/3 months	3
To other upzila(s)	Not even once in 3 months	0
	One time/3 months	1
	2-3 times/3 months	2
	4-5 times/3 months	3
To own district	Not even once in 6 months	0
	One time/6 months	1
	2-3 times/6 months	2
	4-5 times/6 months	3
To other district (S)	Not even once a year	0
	One time/year	1
	2-3 times/year	2
	4-5 times/year	3
Capital city	Not even once a year	0
	One time/year	1
	2-3 times/year	2
	4-5 times/year	3

The above mentioned weightage obtained from visit to each of the above categories of places were added together to get the cosmopolitness score of a respondent. Thus the score of a respondent could range from 0 to 18, where 0 indicating no cosmopoliteness and 18 highest cosmopoliteness. This variable appears in item no. 8 in the interview schedule as presented in *Appendix-A.*

Agricultural Training Exposure

Training experience of a respondent was measured by the total member of day he/she attended different training programs in his life. A score of one (1) was assigned for each day of training attended. Data obtained in response to item no 9 of the interview schedule as presented in Appendix-A.

Extension Contact

Extension contact was computed on the basis of the extent of contact of a respondent in 14 selected information sources. Score were assigned for extent of contact of a respondent an information source in the following manner

Name of information sources	**Nature of contact/use**	**Score**
Any officer of DAE (UAO, AAO, AEO)	Not even once a year	0
	1-5 times/year	1
	At least 1 time/2 months	2
	1-2 time/months	3
Going to upazila agriculture office	Not even once a year	0
	1-5 times/year	1
	1-2 time/month	2
	3-4 times/month	3
Officer of other extension agencies (ULO, UFO, VAS)	Not even once a year	0
	1-5 times/year	1
	1-2 time/month	2
	3-4 times/month	3
Deputy Assistant Agriculture Officer	Not even once a year	0
	At least once a year	1
	1-2 time/month	2
	3-4 times/month	3

Name of information sources	Nature of contact/use	Score
Other extension agents (e.g. Health worker)	Not even once a year At least once a year 1-2 time/month 3-4 times/month	0 1 2 3
NGO Worker	Not even once a year At least once a year 1-2 time/month 3-4 times/month	0 1 2 3
Input dealers	Not even once a year At least once a year 1-2 time/month 3 times a year or more	0 1 2 3
Participation in group meeting	Not even once a year At least once a year 1-2 time/month 3 times a year or more	0 1 2 3
Participation in demonstration (method and result)	Not even once a year At least once a year 1-2 time/month 3 times a year or more	0 1 2 3
Attending at agricultural fair, exhibition, farmers rally etc.	Not even once a year At least once a year 1-2 time/month 3 times a year or more	0 1 2 3
Hearing agricultural programmes at radio	Not even once a year 1-3 days/month 1-3 days/week 4-7 days/week	0 1 2 3
Watching agricultural programmes at television	Not even once *a* year 1-5 days/year 2-3 days/week 1-2 days/week	0 1 2 3
Reading printed materials like leaflet, bulletin, magazines etc	Not even once a year 1-2 pieces/year 3-5 pieces/year 1 piece/month	0 1 2 3
Watching agricultural posters, flip charts, advertisement (in newspaper) etc.	Not even once a year 1-2 pieces/year 3-5 pieces/year 1 piece/month	0 1 2 3

Extension contact of a respondent was measured by adding the scores of 14 selected information sources. The extension contact score could range from 0 to 42, where 0 indicated no extension contact and 42 indicated maximum extension contact. This variable appears in the question no. 10 in the interview schedule as presented in *Appendix-A.*

3.4.2 Measurement of the depend variable

Adoption of maize production technologies was the dependent variable of this study. It was measured on the basis of the extent of adoption of maize production technologies by the farmer for a period of two (2) years (2002-2003) and (2003-2004). Adoption has been measured in a number of ways in India (Ray, 1991). Bose and Saxena (1965) developed an adoption index by asking farmers as how many improved technologies recommended by the extension service they had adopted and for how many years. The summation of the number of years and the selected technologies will make the index.

A more vigorous and widely used method of measuring adoption by the formula of adoption quotient which was developed by Chattapadhyay (1963), According to him the adoption quotient is the ratio scale designed to quantify the adoption behavior of an individual. The method of adoption quotient is more accurate as it involved all the related concepts like potentiality, extent, time consistency and weightage.

However, the Adoption Index (AI) for modern maize cultivation technologies in this study was computed by using the following formula of Chattapadhyay (1963):

$$\text{Adoption Index (AI)} = \frac{\sum e/p}{Ps} X\ 100$$

Where,
∑= Summation of e/p
e = Extents (i.e. actual adoption) of adoption of modern cultivation technologies in a particular land in particular year(2003 and -2004).
p = Potentiality (i.e. possible adoption) of maize production technologies
Ps = no. of practice period under study. In this study it was of two years i.e. 2002-2003 and 2003-2004.

Adoption of maize production technologies were measured in four selected aspects. The aspects where (i) use of modern variety (ii) intercropping (iii) use of power shelter (iv) use of recommended dose of urea. A respondent's adoption score in any of four of the mentioned aspects was computed by adding adoption score on two years and then dividing by number of years.

Total adoption score of a respondent was found by adding one's adoption scores on four aspects of adoption and then dividing by number of aspects.

The Al was expressed in percentage. Hence, the Al of a maize grower could range form 0 to 100, where 0 indicate no adoption and 100 indicate highest adoption.

3.5 Problems faced by the farmer in adopting maize production technologies;

It was measured by using a four point rating scale. A list of 12 probable problems that farmers could face in different aspects were listed and asked to indicate the extent of their problem confrontation. For each problem score of 3,2,1 and 0 were assigned to indicate extent of problems as high, moderate, little and not at all respectively. The problem confrontation score was computed for each respondent by adding his scores for all 12 problems. The possible range of problem scores thus could be 0 and 36. A total score of indicated no problem in respect of maize cultivation while a score of 36 highest problems.

To ascertain the comparison among the problems a Problem Faced Index (PFI) was computed using the following formula:

PFI=P, x 3 + P, x 2 + P, x 1 + P, x 0

Where,
PFI= Problem Faced Index
P,= Percent of maize growers having high problem
P_r,= Percent of maize growers having moderate problem
P, = Percent of maize growers having little problem
P, = Percent of maize growers having not any problem at all

Thus, PFI of a item could range from 0 to 300, where 0 indicated no problem all and 300 indicated high problem in maize cultivation.

3.6 Statement of the Hypothesis:

As defined by Goode and Halt (1952) "A hypothesis is a proposition, which can be put to a test to determine its validity. It may see contrary to, or in accord with commonsense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test." In studying the relationship between variables, research hypothesis are formulated which state the anticipated relationship between variables. However, for statistical test it becomes necessary to formulate null hypothesis. A null hypothesis states that "there is no relationship between adoption of maize production technologies by the farmers and these selected characteristics." The selected characteristics were age, education innovativeness, knowledge in maize cultivation, farm size, area under maize cultivation, annual income, cosmopolitans, agricultural training exposure and extension contact.

3.7 Collection of Data:

Data were collected personally by the researcher himself through face to face interview from selected respondents. But familiarize researcher with the study area and for getting local support and establishing rapport during conduction the interview with the maize growers. Interviews were usually conducted with the respondents in their homes. While starting interview with any respondent the researcher took all possible care to establish rapport with him so that he did not hesitate to furnish proper responses to the question and statement in the schedule. However, if any respondent failed to understand any question the researcher took care to explain the issue. The researcher did not face any major problem in collecting data. Excellent co-operation and co-ordination were extended by the respondents and other concerned persons at that time of data collection.

The entire process of collecting data took place during 15 July-15 August 2005.

3.8 Data Processing and Analysis:

After completion of field survey all the data were processed according to the objectives of the study. Local units were converted into standard unit. All the individual responses to questions of the interview schedule were transferred to master sheet to facilitate tabulation, categorization and organization. Incase, of qualitative data, appropriate scoring technique was followed to convert the data into quantitative form. SPSS computer package was used for data processing and analysis.

The statistical measures such as range, mean, standard deviation, percentage were used for describing both the independent and dependent variables. Tables were also used in presenting data for clarity of understanding. To find out the relationship of selected characteristics of the respondents and their adoption of maize production technologies. Pearson's product moment correlation cc efficient (r) was computed.

Five percent (0.05) level of probability was used for rejecting a null hypothesis. Co-efficient values signification at 0.05 levels is indicated by on asterisk (*) and that at 0.01 levels by two asterisks (**)

CHAPTER 4
RESULT AND DISCUSSION

In this chapter the findings of the study and its interpretation are presented in four sections according to the objectives of the study. The first section deals with the selected characteristics for the maize growers, while the second section deals with' adoption of maize production technologies by the farmers. The third section deals with the relationships between the selected characteristics of the maize growers and their adoption of maize production technologies and last section deals with farmers' problem in adopting maize production

4.1 Selected Characteristics of the Maize Growers

In this section the results of the maize growers selected characteristics have been discussed. The salient feature of the respondents with their ten selected characteristics has been presented in Table 4.1.

4.1.1 Age

The age score of the maize growers range from 20 to 72 with and average of 42.39 and a standard deviation of 12.30. Table 4.1 indicate that the majority (51 percent) of the respondents fell into the middle-aged category while 26 percent and 23 percent were found young and old categories respectively. The mean value (42.39) rightly indicates the reality. This findings also moderated that decision making relating to maize cultivation in the study area would be considerably influenced by relatively middle-aged, because the middle-aged respondents can take risk to receive the modern technology. Basher (1993) and Hussen (2001) also found the similar results in their studies.

Table 4.1 Salient feature of the respondents with their characteristics

Characteristics	Scoring system	Range		Category	Respondents		Mean	SD
		Possible	Observed		Number (N=100)	Percent		
Age	Years		20-72	Young (upto 35)	26	26	42.39	12.30
				Middle aged d (36-50)	51	51		
				Old >50	23	23		
Educ ation	Level of schooling		0-16	Illiterate	16	16	6.48	3.90
				Primary Level (1-5)	24	24		
				Secondary Level (6-10)	47	47		
				Higher Level >10	13	13		
Innovativen ess	Scale Score	0-100	4-35	Very Low	78	78	15.47	7.31
				Low Innovativeness	22	22		
Knowledge	Scale Score	0-40	11-37	Low (0-15)	10	10	23.47	6.35
				Medium (16-30)	74	74		
				High >30	16	16		
Farm size	Hectare		.34-12.75	Small (upto .99)	15	15	2.54	1.78
				Medium (1-2.99)	53	53		
				Large >3	32	32		
'Area under Maize Cultivation	Percent of total area	0-100	15.56-96.55	up to 25%	4	4	58.25	18.86
				26% 50% i	29	29		
				51%-75%	47	47		
				>75%-1 00%	20	20		
iAnnual Income	Unit Score		59-425	Low (upto 60)	1	1	112.27	46.84
				Medium (61-120)	66	66		
				High > 120	33	33		
Cosmopoliteness	Scale Score	0-18	5-14	Low (upto 6)	5	5	9.80	1.99
				Medium (7-12)	86	86		
				High >12	9	9		
Agricultural Training Exposure	Days		0-5	No Training (0)	49	49	1.44	1.67
				Low Training (1-3)	39	39		
				Medium Training (>4)	12	12		
Extension Media ,Aact	Scale Sco re	0-42	12-31	Low (upto 14)	12	12	20.97	5.24
				Medium (15-28)	77	77		
				High >28	11	11		

4.1.2 Education

The education scores of the maize growers range from 0-16 with an average of 6.48 and standard deviation 3.90. Data present in Table 4.1(page-41) indicate that the majority (47 percent) of the respondents had secondary level education. A little less than one-third (24 percent) of the respondents were found primary level while 16 percent and only 13 percent had illiterate and higher education. The findings indicate that 84 percent respondents had educated that varied from primary to higher levels. The literacy rate of the country is 65.5 percent (Anonymous, 2003). Thus the findings revealed that the literacy rate in the study area seems to be higher than the national average Basher (1993) and Hussen (2001) also found the similar results in their studies.

4.1.3 Innovativeness

The maximum innovativeness scores of the Maize growers was 35 and the minimum was 4 against the possible range of 0 to 100. However, the average was 15.47 and standard deviation, 7.31. Based on their innovativeness scores, the Maize growers were classified into two categories: "very low innovativeness" (4-22) and "low innovativeness" (above 22). The distribution of the Maize growers according to their innovativeness is shown in Table.4.1 (page-41).

Most of the Maize growers were "very low" in terms of their innovativeness, while the rest 22 percent were low. This means that there is a quite lack of proneness among the Maize growers to adopt agricultural innovations.

4.1.4 Knowledge in maize cultivation

The knowledge scores of the maize growers range from 11-37 with an average of 23.47 and standard deviation 6.35. Data presented in Table 4.1 (page-41) indicate that the majority (74 percent) of the respondents had medium knowledge while 16 percent had high knowledge on maize cultivation. 10 percent of the respondents were found having low knowledge.

4.1.5 Farm Size

The farm size scores of the maize growers range from .34 to 12.75 ha with an average of 2.54 and standard deviation 1.78. Table 4.1(page-41) indicate that the highest proportion (53 percent) of the respondents had medium farm while 32 percent and 15 percent of them had large and small farm size respectively. The findings indicate that the majority (85 percent) of the farmers under the study area had medium and large farm size. The land holding plays a major role in determining the income of the farmers Hossain (1981) and Sarkar (1997) also found the similar findings in their studies.

4.1.6 Area under maize cultivation

The area under maize cultivation scores of the maize growers range from 15.58 to 96.55 with an average of 58.25 and standard deviation 18.86. Table 4.1 (page-41) indicate that the highest proportion (47 percent) of the respondents had 51%-75% land under maize cultivation while 29 percent had 26%-50% land. Only 20% and 4% respondents had 76%-100% and upto 25% respectively. The results indicate that about 100% respondents were interested for maize cultivation.

4.1.7 Annual Income

The annual income scores of the maize growers range from 59 to 425 with an average of 112.27 and standard deviation 46.84. Data present in Table 4.1 (page-41) indicate that the highest proportion (66 percent) of the respondents had medium income while 33 percent of the respondents had high income and only 1 percent had low income. The findings indicate that an overwhelming majority (99 percent) of the respondents had high and medium income. The annual income influenced the farmers to adopt modern technologies. Basher (1993) and Haque (1984) also found the similar findings in their studies.

4.1.8 Cosmopoliteness

The cosmopoliteness scores of the maize growers range from 5-14 with an average of 9.80 and standard deviation 1.99. Data present in Table 4.1(page-41) indicate that the overwhelming majority (86 percent) of the respondents fell into medium cosmopoliteness category while only 9 percent and 5 percent had high and low cosmopoliteness categories respectively. Chowdhury (1997) also found the similar results in his study.

4.1.9 Agricultural Training exposure

The agricultural training exposure scores of the maize growers range from 0-5 with an average of 1.44 and standard deviation 1.67. Data present in Table 4.1 indicate that the majority proportion (49 percent) of the respondents had no training exposure while 39 percent had low training and only 12 percent had medium training exposure. Training exposure play an important role in motivating the farmers in adoption of modern technologies. But the fact is that overwhelming majority 88% of maize growers did not receive any training or low training who needs attention of the authorities by extension services (GOs & NGOs) in the country.

4.1.10 Extension Contact

The extension contact scores of the maize growers ranged from 12-31 with an average of 20.97 and standard deviation 5.24. Data present in Table 4.1(page-41) indicate that the overwhelming majority (77 percent) of the respondents had medium extension contact while only 12 percent had low and 11 percent had high extension contact respectively. Findings indicate that the respondents under the study area had generally extension contact with the different information sources. Extension contact help the farmers for better understanding and to get recent information regarding improve technologies. Sarkar (1997) and Plodder (1999) found the similar results. However, Bashar and Pal observed that the highest proportion of the growers had low extension contact in their respective studies.

4.2 Adoption of Modern Maize Cultivation Technologies

In order to make a threadbare discussion adoption of maize production technologies by the farmers were divided into four different aspects. These aspects were adoption of modern maize variety, adoption of intercrop with maize, adoption of maize Sheller and adoption of recommended urea fertilizer dose. These four different aspects of adoption have been discussed in this section. However, scores of adoption of maize production technologies by the farmers regarding four aspects and total adoption has been presented in Table 4.2(page-46).

4.2.1 Adoption of modern variety

The adoption of modern variety scores of the maize growers ranged from 15-56 to 96.55 with an average of 58.25 and standard deviation 18.86. Data in Table 4.2 reveal that the highest proportion (44 percent) of the respondents fell into medium adopter category and 42 percent had high adopter category regarding adoption of modern variety of maize. Only 14 percent fell into low

adoption category. The mean value (58.25) clearly indicates respondents' tend to highly adoption of the modern varieties of maize.

One point should be taken into consideration. The adoption score was computed in terms of area covered by modern varieties and also in terms of years. It was found that all farmers of the study area adopted modern hybrid varieties of maize.

However, majority of the farmers were found adopting modern varieties in maize cultivable areas and it is a good signal for maize production promoting programme.

Table 4.2 Distribution of the respondents according to their adoption

Technologies	Scoring system	Range			Respondents		Mean	SD
		Possible	Observed	Category	Number (N=100)	Percent		
Adoption of modern variety	Scale score	0-100	15.56-96.55	Low (upto 33)	14	14	58.25	18.86
				Medium (34-67)	44	44		
				High (>67)	42	42		
Adoption of intercropping	Scale Score	0-100	0-25.57	No (0)	59	59	3.47	5.53
				Low (1 -33)	41	41		
				Medium (34-67)	0	0		
				High (>67)	0	0		
Adoption of Sheller	Scale score	0-100	15.56-96.55	Low (upto 33)	14	14	58.25	18.86
				Medium (34-67)	44	44		
				High (>67)	42	42		
Adoption of urea	Scale score	0-100	14-86.90	Low (upto 33)	20	20	52.42	16.97
				Medium (34-67)	57	57		
				High (>67)	23	23		
Total Adoption	Scale score	0-100	11.28-70	Low (upto 33)	30	30	43.10	14.02
				Medium (34-67)	69	69		
				High (>67)				

4.2.2 Adoption of intercropping with maize

The adoption of intercropping scores of the maize growers ranged from 0-25.57 with an average of 3.47 and standard deviation 5.53. Data in Table 4.2 reveal that the highest proportion (59 percent) of the respondents did not adopt intercropping while 41 percent fell in low adoption category. No farmer were in high and medium adoption categories. The results indicate that the farmers avoided the intercropping.

The above findings indicate that majority of the respondents perhaps were not well aware about the advantages and techniques of intercropping. Although it was a modern approach of crop cultivation but they only satisfied by cultivating modern variety of maize because of their limitation of knowledge about intercropping in maize field.

4.2.3 Adoption of maize Sheller

The adoption of maize shelter scores of the maize growers ranged from 15.55 to 96.55 with an average of 58.25 and standard deviation 18.86. Data in Table 4.2 reveal that the highest proportion (44 percent) of the respondents fell into medium adoption category and 42 percent had high adoption category regarding adopting of maize Sheller. Only 14 percent of the respondents fell into low adoption category. The mean value (58.25) clearly indicates respondents' tend to high adoption of maize Sheller. The majority (86 percent) of the respondents had medium and high adoption category. Based on the findings that in large maize growing area, Sheller was begging used by the farmers due to shelling capacity is high and shell in a short time and labour cost is less.

4.2.4 Adoption of recommended urea fertilizer

The adoption of recommended urea fertilizer scores of the maize growers range from 14 to 86.90 with an average of 52.42 and standard deviation 16.97. Data in Table 4.2 reveal that the majority (57 percent) of the respondents fell into medium adoption category while 23 percent and 20 percent fell into high and low adoption category respectively regarding adoption of recommended urea fertilizer dose. The mean value 2.42 indicates respondents tend to moderately adoption of use of urea fertilizer.

4.2.5 Adoption of maize production technologies

Total adoption score of a respondent was found by adding one's adoption scores on four aspects of adoption and then dividing by number of aspects (i.e., four aspects). The adoption score ranged from 11.28 to 70 against the possible range of 0 to 100. The average adoption score was 43.10.

Data presented in Table 4.2 indicate that the majority (69 percent) of the respondents fell into medium adoption category while 30 percent and 1 percent fell into low and high adoption category respectively. In Bangladesh, majority of the farmers are illiterate and always practices farming with a number of socio-economic problems and limited resources bases. Nevertheless, the average adoption score 43.10 indicates that farmers were trying to adopt maize production technologies. DAE and other extension organizations, especially the NGOs who are trying to popularize maize production among the farmers of the study area, should provide more technological supports to the farmers. In such cases, it is expected that farmers will be able to adopt modern maize cultivation technologies with better performance.

4.3 Relationship between the Selected Characteristics of the Maize Growers and their Adoption of Maize Production Technologies

Coefficient of correlation was computed in order to explore the relationship between the sleeted characteristics of the maize growers and their adoption of modern maize cultivation technologies. Table 4.3 was used for descriptive interpretation of meaning of Y.

Table 4.3 The meaning for Y value

`r' value	Meaning
0.00 to 0.19	A very low correlation
0.20 to 0.39	A low correlation
0.40 to 0.69	**A moderate correlation**
0.70 to 0.89	A high correlation
0.90 to 1.00	A very high correlation

Source: Cohen and Holliday, 1982

Pearson's Product Moment Co-efficient of Correlation was used to test the null hypotheses concerning the relationships between two variables. Five percent level of significance was used as the basis for acceptance or rejection of the null hypothesis. The computed value of correlation co-efficient (r) were compared against relevant table value.

Co-efficient of correlation Y between the selected characteristics of the maize growers and their adoption of maize production technologies have been presented in Table 4.4. However, the interrelationships among the different variables have also been computed by using Pearson's Product Moment Correlation co-efficient. The correlation matrix has been presented in Appendix-B.

Table 4.4. Coefficient of correlation (r) between the respondents' selected characteristics and their adoption (N=100)

	Farmers' selected characteristics	Value of `r' with 108 df	Tabulated value of Y	
			0.05 level	0.01 level
Adoption of maize production technologies	**Age**	**-0.258****	0.195	0.254
	Education	.264**		
	Innovativeness	-.005 NS		
	Knowledge in maize cultivation	.051 NS		
	Farm size	.048 NS		
	Area under maize cultivation	.995**		
	Annual income	.201-		
	Cosmopoliteness	.055 NS		
	Agricultural training exposure	.105 "s		
	Extension contact	.380**		

*Significant at 0.05 level of probability **
Significant at 0.01 level of probability Ns
Not significant

4.3.1 Age and adoption of maize production technologies

The relationship between age of the respondents and their adoption of maize production technologies was examined by testing the null hypothesis: "There is no cultivation technologies between age of the maize growers and their adoption of maize production technologies." The computed value of 'r' was found -0.258 as shown in Table 4.4 which was greater than that of the tabulated value of 'r' (0.254.) with 98 degrees of freedom at 0.01 level of probability. Hence, the concern null hypothesis was rejected. Therefore, it could be concluded that age of the maize growers had a significant negative relationship with their adoption of maize production technologies. The

relationship between concerned variables was low. This findings indicates that the less is the age of the farmers the more was their adoption of a maize production technologies. Thus it could be said that young farmers had favorable tendency to adopt maize production technologies.

4.3.2 Education and adoption of maize production technologies

The relationship between the farmers' education and their adoption of maize production technologies were examined by testing the null hypothesis: "There is no relationship between education of the farmers and their adoption of maize production technologies." The computed value for Y was found 0.265** as shown in table 4.4 which was greater than that of the tabulated value of 'r' (0.254) with 98 degrees of freedom at 0.01 level of probability. Hence, the concerned null hypothesis was rejected. It was concluded that there had a significant positive relationship between education of the respondent and their adoption of maize production technologies. The relationship between concerned variables was low. The finding indicates that the farmers who had higher education also had higher adoption of selected technologies. Education enables individuals to gain knowledge and thus increases their power of understandings. Thus, adoption of modern technologies by the farmers was higher among those farmers who had higher education.

4.3.3 Innovativeness and adoption of maize production technologies

The relationship between innovativeness of the respondents and their adoption of maize production technologies were examined by testing the null hypothesis. "There is no relationship between innovativeness of the maize growers and their adoption of maize production technologies." The calculated value of Y was found -0.005 as shown in table 4.4. Which was less than that

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of the tabulated value of 'r' (0.195) with 98 degrees of freedom at 0.05 level of probability. Hence, the concerned null hypothesis was accepted and therefore, it could be concluded that innovativeness of the respondents has no relationship with their adoption of maize production technologies. Thus it might be said that innovativeness of the farmers were not an important factor in adopting maize production. The relationship between the concerned variables was negligible.

4.3.4 Knowledge in maize cultivation and adoption of maize production cultivation technologies

The relationship between knowledge in maize cultivation of the respondents and their adoption of maize production technologies were examined by testing the null hypothesis. "There is no relationship between knowledge in maize cultivation of farmers and their adoption of maize production technologies." The calculated value of 'r' was found 0.051 as presented in table 4.4 which was less than that of the tabulated value of 'r' (0.195) with 98 degrees of freedom with at 0.05 level of probability. Hence, the concerned null hypothesis was accepted and therefore, it could be concluded that knowledge in maize cultivation of the farmers had no relationship with their adoption of maize production technologies. The relationship between the concerned variables was negligible because farmers had a lot of knowledge about various type of crops like rice, white, tobacco, sugarcane, etc.

4.2.5 Farm size and adoption of maize production technologies

The relationship between farm size of the respondents and their adoption of maize production technologies were examined by testing the null hypothesis: "There is no relationship between farm size of the maize growers and their

adoption of maize production technologies." The calculated value of 'r' was found 0.048 was presented in Table 4.4. Which **was** less than that of the tabulated value of 'r' (0.195) with 98 degrees of freedom at 0.05 level of probability. Hence, the concerned null hypothesis was accepted and therefore, it could be concluded that farm size of the maize growers had no relationship with their adoption of maize production technologies, because adoption of maize production influenced by extension contact, neighbors, friends, income, etc. The relationship between the concerned variables was negligible.

4.3.6 Area under maize cultivation and adoption of maize production technologies

The relationship between farmers' area under maize cultivation and their adoption of the maize cultivation technologies were examined by testing the null hypothesis: "There is no relationship between farmers' area under maize cultivation and their adoption of maize production technologies." The calculated value of Y was found 0.995 as presented in Table 4.4 which was greater than that of the tabulated value of 'r' (0.254) with 98 degrees of freedom at 0.01 level of probability. Hence, the concerned null hypothesis was rejected and therefore, it could be concluded that are under maize cultivation of the farmers had a significant positive relationship with their adoption of modern maize cultivation technologies. . The relationship between concerned variables was very high. The conclusion implies that the more percentage of area under maize cultivation the farmers had, the more was their adoption of maize production technologies.

4.3.7 Annual income and adoption of maize production technologies

The relationship between annual income of the respondents and their adoption of maize production technologies were examined by testing the null hypothesis:" There is no relationship between annual income of the maize growers and their adoption of maize production technologies." The calculated value of 'r' 0.201 as presented in Table 4.4. Which was greater than that of the tabulated value of 'r' (0.195) with 98 degrees of freedom at 0.05 level of probability. Hence, the concern null hypothesis was rejected and therefore, it could be concluded that annual income of the maize growers had a significant positive relationship with their adoption of maize production technologies. The finding are quite logical, because the farmers who earn more and adopt such kind of crops.

4.3.8 Cosmopoliteness and adoption of maize production technologies

The relationship between cosmopoliteness of the respondents and their adoption of maize production technologies were examined by testing the null hypothesis: "There is no relationship between cosmopolites of the maize growers and their adoption of maize production ethnologies." The calculated value of 'r' was found 0.055 as presented in Table 4.4 which was less than that of the tabulated value of 'r' (0.195) with 98 degrees of freedom at 0.05 level of probability. Hence, the concerned null hypothesis was accepted and therefore, it would be concluded that cosmopoliteness of the farmers had no relationship with their adoption of maize production technologies because farmers got more information by radio, TV, friends, etc in adopting maize production. So the relationship between concerned variable was negligible.

4.3.9 Agricultural training exposure and adoption of maize production technologies

The relationship between training exposure of the respondents and their adoption of maize production technologies were examined by testing the null hypothesis: "There is no relationship between training exposure of the maize growers and their adoption of maize production technologies." The calculated value of 'r' was found 0.105 as presented in Table 4.4 which was less than that of the tabulated value of 'r' (0.195) with 98 degrees of freedom at 0.05 level of probability. Hence, the concerned null hypothesis was accepted and therefore, it could be concluded that training exposure of farmers had a no relationship with their adoption of maize production technologies. The relationship between concerned variable was negligible. Only 12% farmers got medium training but majority of the farmers were not trained. Farmers influenced by high interest, extension contact, mass media, etc in adopting maize production.

4.3.10 Extension contact and adoption of maize production technologies

The relationship between extension contact of the respondent and their adoption of maize production technologies were examined by testing null hypothesis. "There is no relationship between extension contact of the farmers and their adoption of maize production technologies." The calculated value of 'r' was found 0.388 as presented in Table 4.4 which was greater than that of the tabulated value of 'r' (0.254) with 908 degrees of freedom at 0.01 level of probability. Hence, the concerned null hypothesis was rejected and therefore, it could be concluded that extension contact of the farmers had a significant positive relationship with their adoption of maize production technologies. The relationship between the concerned variables was low. The conclusion implies that the more extension contact the farmers had, the more was their adoption of maize production technologies. The finding is also reasonable because farmer with large extension contact received more information regarding the modern technologies.

4.4 Problems Faced by the Farmers in Maize Production Cultivation

Problems of maize growers were measured through 12 items scale. The problems score ranged from 13 to 24 against the possible range of 0-36. The average was 17.79 and standard deviation was 3.00 respectively.

Table 4.5 Distribution of maize growers according to their problem confrontation in maize production

Category	Respondents		Mean	SD
	Number (N=100)	Percent		
Low problem (0-12)	0	0	17.79	3.00
Medium problem (13-25)	100	100		
High problem (26-36)	0	0		

Data presented in Table 4.5 indicate that all respondents in the study area faced medium problems. There was no respondents who faced high and low problem.

The extent of problems in maize production along with their Problem Facing Index (PFI) are presented in Table 4.6, The Table 4.6 indicates that the problem which ranked first on the basis of PFI was "non-availability of storage facilities at farmers level due to high moisture content" with a PFI of 216. The farmers mentioned that maize grain absorb high moisture and it is very sensitive to fungal attack. As a result maize grain become damaged.

Table: 4.6 Extent of problem in maize cultivation

SI No	Statement on problems	Extent of Problems				Computed score	Rank order
		Very much	**Moderate**	Little	**Not at** all		
1	Non-availability of storage facility at farmers level	108	80	18	0	216	1
2	Non-availability of hybrid seed	105	72	24	0	201	2
3	No seed production in farmers level	108	70	21	0	199	3
4	Low scope for consuming as food	93	72	27	0	192	4
5	Non-availability of credit	90	58	39	0	187	5
6	Low market price of maize	69	74	29	0	172	6
7	Non-availability of land for maize cultivation	66	70	32	0	168	7
8	Low scope of marketing	60	72	32	0	164	8
9	Less irrigation facilities	87	46	27	0	160	9
10	High input cost	63	70	23	0	156	10
11	Lack of technical information	39	80	26	0	145	11
12	Threshing problem	21	42	35	0	98	12

"Non-availability hybrid seed" was ranked second on the basis of PFI (201). Non-available hybrid seed in due time was also a serious problem to the growers.

"No seed production in farmers level" was ranked third on the basis of PFI (199). Farmers want to produce seed but they can not produce hybrid seed normally.

"Low scope for consuming as food" was ranked fourth on the basis of PFI (192). Farmers do not know the recipes of food made from maize.

"No-availability of credit" was ranked fifth on the basis of PFI (187). Non-availability of credit in due time was also a problem to the farmers. Farmers are deprived due to strong rules and regulation of Bank.

"Low market price of maize" was ranked sixth on the basis of PFI (172). Farmers mentioned that sometime smuggled maize grain come into the country from India, which create problem of low price of local maize.

"No-availability of land" for maize cultivation was ranked seventh on the basis of PFI (168). No-availability of land for maize cultivation due to low land was a problem to the farmers.

"Low scope of marketing" was ranked eighth on the basis of PFI (164). Farmers mentioned that Bepari (media) purchase maize and sell it to wholesalers who sell to the feed industry. Thus it is long term process.

"Less irrigation facilities" was ranked ninth on the basis PFI (160). There was no sufficient deep tube well in order to supply irrigation water to the maize field.

"High input cost" was ranked tenth on the basis of PFI (156). Sometime input dealers and agency cheat the farmers by taking high price of inputs. So the grower can not afford to cultivate.

"Lack of technical information" was ranked eleventh on the basis of PFI (145). Lack of technical information in due time was a problem to farmers because of extension worker do not communicate with farmers.

"Threshing problem" was ranked twelfth on the basis of PFI (98). Farmers mentioned that power Sheller, its cost is high.

C H A P T E R 5

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

"Adoption of Maize Production Technologies by the Farmers." The study titled was undertaken with the objective: (i) to determine farmers' adoption behavior of modern technologies in maize cultivation, (ii) to explore the relationship between selected characteristics of the farmers and their adoption of maize production technologies while the selected characteristics were age, education, innovativeness, knowledge in maize cultivation, farm size, area under maize cultivation, annual income, cosmopoliteness, agricultural training exposure and extension contact and (iii) to determine the extent of problem faced by the farmers in adopting maize production technologies. Durgapur village of Aditmari upazila under Lalmonirhat district, was the locale of the study. The sample of 100 farmers were drawn from a population of 251. Data were collected during July-August, 2005 using a pre-tested interview schedule.

The major findings of the study:

5.1.1 Individual Characteristics of the Farmers

Age: Age of the respondents ranged from 20 to 72 years with an average of 42.38 years. Majority of the respondents (51 percent) were middle aged followed by 26 percent and 23 percent young and old-aged respectively.

Education- Education score of the respondents ranged from 0 to 16 with an average of 6.48. Majority of the respondents (47 percent) had secondary level education followed by 24 percent and 13 percent had primary level and higher-level education respectively. 16 percent respondents were illiterate.

Innovativeness: Innovativeness score of the maize growers range from 4 to 35 with and average 15.47. Majority of the respondents (78 percent) had very low innovativeness while only 22 percent respondents had low innovativeness.

Knowledge in maize cultivation: Knowledge in maize cultivation score of the respondents ranged from 11 to 37 with an average of 23.47. Majority of the respondents (74 percent) had medium knowledge followed by 10 percent and 16 percent had low and high knowledge respectively.

Farm size: Farm size of the respondents ranged from 0.34 to 12.75 with an average of 2.54. Majority of the respondents (53 percent) had medium farm followed by 15 percent and 32 percent small and high farm size respectively.

Area under maize cultivation: Area under maize cultivation score of the respondents ranged from 15.56 percent to 96.55 percent with an average of 58.25 percent. Majority of the respondents (47 percent) had 51-75 percent land under maize followed by 4 percent, 29 percent and 20 percent upto 25 percent, 26-50 percent and >75-100 percent respectively.

Annual income: Annual income score of the respondents ranged from 59 to 425 with an average of 112.27. Majority of the respondents (66 percent) had medium income followed by 1 percent and 33 percent low and high income respectively.

Cosmopoliteness: Cosmopoliteness score of the respondents ranged from 5 to 14 with an average of 9.8. Majority of the respondents (86 percent) had medium Cosmopoliteness followed by 5 percent and 9 percent low and high cosmplolitiness respectively.

Agricultural training exposure: Agricultural training exposure score of the respondents ranged from 0 to 5 with an average of 1.44. Majority of the respondents (49 percent) had no training exposure followed by 39 percent and 12 percent had low training and medium training exposure respectively.

Extension contact: Extension contact score of the respondents ranged from 12 to 31 with an average of 20.97. Majority of the respondents (77 percent) had medium contact followed by 12 percent had low and 11 percent had high extension contact respectively.

5.1.2 Adoption of maize production technologies

Adoption of maize production technologies by the farmers was divided into four aspects such as variety, intercropping, use of Sheller and use of recommended dose of urea.

Adoption of modern variety: Farmers' adoption of modern variety score ranged form 15.56 to 96.55 with an average of 58.25. Majority of the respondents (44 percent) had medium adoption foil-)wed by 14 percent and 42 percent low and high adoption respectively.

Adoption of intercropping: Farmers' adoption of intercropping score ranged form 0 to 25.57 with an average of 3.47. Majority of the respondents (59 percent) had no adoption followed by 41 percent had low adoption respectively. No farmer was found having medium and high adoption of intercropping.

Adoption of Sheller: Farmers' adoption of power Sheller score ranged form 15.56 to 96.55 with an average of 58.25. Majority of the respondents (44 percent) had medium adoption followed by 14 percent and 42 percent low and high adoption respectively.

Adoption of Urea: Farmers' adoption of recommended urea fertilizer use range from 14 to 86.90 with an average of 52.42. Majority of the respondents (57 percent) had medium adoption followed by 20 percent and 23 percent had low and high adoption respectively.

Total Adoption: Adoption of maize production technologies by the farmers' ranged from 11.28 to 70 with an average of 43.10. Majority of the respondents (69 percent) had medium adoption followed by 30 percent and 1 percent low and high adoption respectively.

5.1.3 Result of the hypothesis testing

In order to determine relationship between farmers' adopting of maize production technologies and their selected characteristics, Parsons' Product Moment Correlation Coefficient (r) was calculated.

Among ten characteristics of the farmers, five were found having significant relationship with their adoption of maize production technologies. Farmers' education, area under maize cultivation, annual income and extension contact showed positive relationship with adoption while age showed a negative relationship. The rest of characteristics viz. innovativeness, farm size, knowledge in maize cultivation, agricultural training exposure and cosmopoliteness of the farmers did not show any significant relationship with their adoption of maize production technologies.

5.1.4 Problems faced by the farmers

All the respondents faced medium problems and the rank order of 12 problems in descending order were: Non availability of storage facilities at farmers level due to high moisture content, non-availability of hybrid seed, no seed production in farmers' level, low scope for consuming as food, non-availability of credit, low market price of maize, non-availability of land for maize cultivation, low scope of marketing, less irrigation facilities, high input cost, lack of technical information, threshing problems.

5.2 Conclusion

Findings of the present study and the logical interpretation of other relevant facts, prompted the researcher to draw the following conclusions-.

1. Adoption of maize production technologies by the farmers according to four aspects was investigated in this study. Overall adoption of the four aspects was medium among 69 percent of the farmers, high among 1 percent and low among 30 percent. It could be concluded that this adoption rate is not discouraging in case of a new crop like maize.
2. It was found that farmer had greater adoption in modern variety and use of Sheller and recommended dose of urea. But the farmers' adoption of intercropping was low. In view of this fact, it may be concluded that the maize growers did not have clear knowledge about the advantages of intercropping although they had moderate overall adoption in maize cultivation.

3. Introduction of maize in the farming system in a planned way has been a recent phenomenon. The negative significant relationship between age and adoption leads to a conclusion that relatively younger farmers are more innovative than the older farmers.
4. Area under maize cultivation of the farmers showed a significant positive relationship with their adoption of maize production technologies. It was found that farmers having larger area under maize cultivation and farmers that Integrated Maize Developing Programme will be effective if this reality is kept in mind of extension personnel's and to the programmed planners.
5. About 100 percent of maize growers had medium to high income indicating that of comparatively suitable economic standing. High income enhance the capabilities to purchase the required inputs hire laborers and meet other production costs involved in their cultivation of a modern varieties. Thus, it may be concluded that it income level of maize growers could be raised to an appreciable extent to bring comparatively more area of their potential land under maize.
6. Education of the farmers having positive relationship with their adoption of maize production technologies, one may conclude that maize production can be improved if educational levels of the growers could be upgraded.
7. Extension contact had significant positive relationship with farmers' adoption of maize production technologies. It helps farmers of be experienced, modernized and become effective motivator for adopting modern technologies in maize cultivation. Thus it can be concluded that extension contact of the growers can be used to increase adoption of modern technologies.

8. As many as 12 problems in connection with adoption of technologies in maize production by the farmers were faced by the concerned maize growers. Cent percent of the growers faced medium problem. It was also found that the growers faced greater problem in Non availability of storage facilities at farmers level due to high moisture content, non-availability of hybrid seed, no seed production in farmers' level, low scope for consuming as food, non-availability of credit, low market price of maize, non-availability of land for maize cultivation, low scope of marketing, less irrigation facilities, high input cost, lack of technical information, threshing problems. In view of this fact it may be concluded that all the respondents faced problem more or less. Therefore, the above problem should be addressed by the concern authority to increase maize production.

5.3 Recommendations

5.3.1 Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommendations are presented below:

1. Massive and relevant training programmes should be undertaken for the maize growers to upgrade their awareness and understandings of the use of different production technologies, particularly intercropping use. The various GOs and NGOs should be involved in the conduction of training programmes.
2. Steps should be taken so that farmers can easily get necessary production inputs (i.e. seed, fertilizer, pesticide etc) in fair price. Government should continue to provide support price for maize grain for encourager maize production.

3. Department of Agricultural Extension and other concerned organizations should come forward to solving the existing problems of the maize farmers.
4. Extension services should provide improved farm management practices to all categories of farmers in order raise this production our enhance farm income.

5.3.2 Recommendations for further study

1. The study was conducted on the farmers of only one selected area of Aditmari upazila. Finding of the study need verification by similar research in other areas of the country including areas where maize cultivation is yet to get popularity.
2. Relationships of ten characteristics of farmers with their adoption of maize production technologies have been investigated in this study. Further research should be conducted to explore relationships of the other personal characteristics of the farmers with their adoption of modern technologies.
3. Innovativeness, knowledge in maize cultivation, farm size, cosmopolitensess and agricultural training exposure were not significantly related with their adoption of maize production technologies. So further investigation may be taken to verify the result.
4. Research should also be undertaken to identify the other factors causing hindrance to high adoption of maize production technologies.

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Appendix-A

Department of Agricultural Extension & Information System

Sher-e-Bangla Agricultural University

Dhaka - 1207

Interview schedule on the research study entitled "Adoption of Maize Production Technologies by the Farmers"

Sample No .....

Village: .....

Upazila: .....

District: .....

Please provide information on the following aspects:

1. Age:

What is your age? years

3. Education:

What is your level of education?

i) I don't know how to read and write

ii) I studied up to class

or I passed examination

iv) I did not got to school but know reading and writing-, the level of my education would be equivalent to class

3. Innovativeness

Please furnish information about the first year of adoption and subsequent continuation of the following innovations

Sl. No.	Innovation	Do not use	First year of adoption
1.	Cultivation of BR-29 variety		
2.	Use of Power tiller		
3.	Use of IPM in your field		
4.	Use of granular urea fertilizer		
5.	Use of compost fertilizer		
6.	Rice-cum-fish culture		
7.	Use of rice threshing machine		
8.	Use of deep tube well for irrigation		
9.	Use of weedicides		
10.	Use of light trap		

4. Knowledge in maize cultivations:

Please reply the following question.

Sl. No.	Questions	Weighted	Obtained
1	Mention two modern varieties of maize?	2	
2.	What is the proper time of sowing of maize seed?	2	
3.	Which type of land is suitable for maize cultivation?	2	
4	How can you control cutworm in maize field ?	2	
5.	What is the proper time of maize harvesting?	2	
6.	What is the improved method of maize shelling?	2	
7.	What is the ideal seed rate (kg/bigha) for modern maize varieties?	2	
8.	Mention the rate of fertilizers per bigha are needed in maize cultivation	2	
9.	What is the number of seed per hill for sowing of maize?	2	

S1. No.	Questions	Weighted	Obtained
10.	How many irrigation are required for cultivating maize in rabi season?	2	
11.	After how many days of sowing the 1 st irrigation is required?	2	
12.	What is the ideal plant spacing for modern maize?	2	
13.	Mention two important crops which can be used in intercropping with maize	2	
14.	Mention the name of a pesticide for maize seed	2	
15.	What is the best method for seed storing?	2	
16.	What can you test optimal moisture content of maize for seed storage?	2	
17.	After how many days of sowing you should complete gap filling or thinning out?	2	
18.	What is the suitable time of harvesting of maize cob?	2	
19.	What are the importance of applying balanced fertilizer in maize?	2	
20.	Mention to disease of maize?	2	
	Total	**40**	

5. Farm size:

Mention the area of your land according to tenure and use.

Type of land	**Land Area**
Homestead	**Local unit** **Hectare**
Own land under own cultivation	
Land taken from or/and given to others on lease	
Land taken from or/and given to others on borga	
Others/pond/garden	
Total	

6. Area under maize cultivation (hectare):

Item	2002-2003	2003-2004
Land under maize cultivation		
Total land under cultivation		

7. Annual income:

Give particulars about your income from different source from the last one year.

i. Service and other profession
taka

ii. From crops (vegetable, fruits, field crops)
taka

iii. From animal, poultry and fish
taka

.....

Total income =

8. Cosmopoliteness:

Please indicate the number of time you visit the following places within special period.

Sl. No.	Place of visit	Extent of visit			
		Frequently	Occasionally	Rarely	Not at all
1	Visit to houses of friends, relatives and other known persons outside own village	4-5 times a week	2-3 times a week	Once a week	0
2.	To own upazila head quarter	4-5 times/3 months	2-3 times/3 months	One time/3 months	0
3.	To other upazila	**4-5** times/3 months	**2-3** times/3 months	One time/3 months	0
4.	To own district town	4-5 times/6 months	2-3 time/6 months	One time/6 months	0
5.	To other district town	4-5 times/year	2-3 time/year	One time/year	0
6.	Capital city	4-5 times/year	2-3 times/year	One time/year	0

9. Agricultural training exposure:

Do you participate to agricultural training programme? If yes, furnish the following information: Yes ☐ No ☐

Sl. No.	**Name of the training course**	**Organization**	**Day** (s)
1.			
2.			
3			
4.			

10. Extension contact:

Please indicate the extent of your contact with the following sources.

Sl. No.	**Extension personnel/programme**	**Extent of contact**			
		Frequently	**Occasionally**	**Rarely**	**Not at all**
1.	Any officer of DAE (UAO, AAO, AEO)	1-2 times a week	At least 1 time/2 month	1-5 times/year	0
2.	Going to upazila agriculture office	3-4 time/month	1-2 time/month	1-5 time/year	0
3.	Officer of other extension agencies (ULO, UFO, VAS)	3-4 times/month	1-2 times/month	1-5 times/year	0
4.	Deputy Asst. Agriculture officer	3-4 times/month	1-2 times/month	At least once a year	0
5.	Other extension agents (e.g. health worker)	3-4 time/month	1-2 times/month	At least once a year	0
6.	NGO worker	3-4 time/month	1-2 times/month	At least once a year	0

S1. No.	Extension personnel/programme	Extent of contact			
		Frequently	Occasionally	Rarely	Not at all
7.	Input dealers	3 time a year or more	1-2 times/month	At least once a year	0
8.	Participation in group meeting	3 time a year or more	1-2 times/month	At least once a year	0
9.	Participation in demonstration (method and result)	3 time a year or more	1-2 times/month	At least once a year	0
10.	Attending at agricultural fair, exhibition, farmers rally etc.	3 time a year or more	1-2 times/month	At least once a year	0
11.	Hearing agricultural programmes at radio.	4-7 days/week	1-2 times/month	At least once a year	0
12.	Watching agricultural programmes at television	1-2 days/week	1-2 times/month	At least once a year	0
13.	Reading printed materials like leaflet, bulletin, magazines etc.	1 piece/ month	3-5 pieces/ year	At least once a year	0
14.	Watching agricultural posters, flip charts, advertisement (in newspaper) etc.	1 pieces/ month	3-5 times/ mooth	At least once a year	0

11. Adoption of maize production technologies:

Technologies	2002-2003 Cultivated area (ha)	2002-2003 Potential area (ha)	2003-2004 Cultivated area (ha	2003-2004 Potential area (ha)
Use of modern variety Maize based intercropping (patato, mustard, pulse) Use of shelter Use of recommended dose of urea (3 times)				

13. Problem confrontation in maize cultivation/production:

SI. No.	Problems	Extent of problem			
		High	Moderate	Little	Not at all
1.	Non-availability of hybrid seed				
2.	Lack of technical information				
I	Non-availability of credit				
4.	No seed production in farmers' level				
5.	**Less** irrigation facilities				
6.	Low market price of maize				
7.	Low scope of marketing				
8.	High input cost (seed, fertilizer, pesticide)				
9.	Low scope for consuming as food				
10.	Threshing problem				
11.	Non-availability of land for maize cultivation				
12.	No-availability of storage facility at farmers' level due to high moisture content				

Thank you for your kind co-operation.

Signature of the interviewer

Date:

Appendix-C: Correlation Matrix showing interrelations among all of the variables (N=110)

Variables	X1	**X2**	**X3**	**X4**	X5	**X6**	X7	**X8**	**X9**	X10	Y1
X1	1										
X2	-.153	1									
X3	-.081	.121	1								
X4	-.239*	.271	.584**	1							
X5	.113	-.112	-.182	-.014	1						
X6	-.253*	.268**	.013	.066	.040	1					
X7	-.023	-.028	-.131	.020	.805**	.190	1				
X8	-.067	.156	-.240*	.050	.139	.038	.148	1			
X9	-.160	.167	.378**	.672**	-.093	.105	-.028	.055	1		
X10	.030	.287**	.046	.129	.069	.389**	.133	.211	.003	1	
Y1	-.258**	.264**	.005	.051	.048	.995**	.201*	.055	.105	.380	1

Correlation is significant at 0.05 level of probability (Table value = 0.195)
** Correlation is significant at 0.01 level of probability (Table value = 0.254)

X1 =Age
X2 = Education
X3 = Innovativeness
X4 = Knowledge in maize cultivation
X5 = Farm size
X6 = Area under maize cultivation
X7 = Annual income
X8 = Cosmopoliteness
X9 = Agricultural training exposure
X10 = Extension contact
Y1 = Adoption of maize production technologies by the farmers