

FARMERS' ADOPTION OF MODERN MAIZE CULTIVATION

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DHAKA-1207**

DECEMBER, 2007

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CULTIVATION**

BY

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A Thesis

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

MASTER OF SCIENCE (M.S.)


IN

AGRICULTURAL EXTENSION AND INFORMATION SYSTEM SEMESTER: JULY-

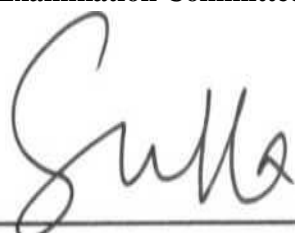
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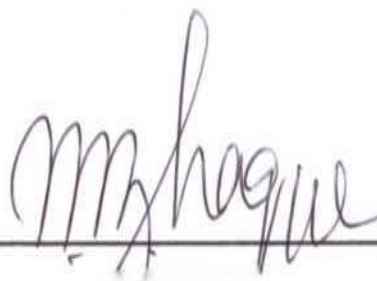
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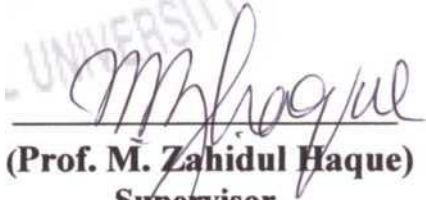
CERTIFICATE

This is to certify that the thesis entitled, *FARMERS ADOPTION OF MODERN MAIZE CULTIVATION*” submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE in AGRICULTURAL EXTENSION AND INFORMATION SYSTEM embodies the result of a piece of *bona fide* research work carried out by Registration No.27582/00738 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

Dhaka, Bangladesh


(Prof. M. Zahidul Haque)
Supervisor



**DEDICATED TO
MY
BELOVED PARENTS**

LIST OF ABBREVIATIONS AND ACRONYMS

BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BINA	Bangladesh Institute of Nuclear Agriculture
BRRI	Bangladesh Rice Research Institute
CDP	Crop Diversification Program
DAE	Department of Agricultural Extension
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GO	Government Organization
HYV	High Yielding Variety
IPM	Integrated Pest Management
CIMMYT	International Maize and Wheat Improvement Centre
IMPP	International Maize Promotion Project
MS	Master of Science
MOA	Ministry of Agriculture
NGO	Non Government Organization
No.	Number
'r'	Co-efficient of Correlation
RDRS	Rangpur Dinajpur Rural Service
SD	Standard Deviation
UNDP	United Nations Development Program
USAID	United States Agency for International Development
“OOO”TK.	Thousand Taka

ACKNOWLEDGEMENT

All praises and appreciations are due to the almighty Allah for His endless mercy with whose blessings the author has been able to complete this work.

The author likes to express his deepest sense of gratitude, sincere appreciation and immense indebtedness to his thesis Supervisor Professor M. Zahidul Haque, Depart, of Agricultural Extension and Information System, SAU, Dhaka, for his scholastic/nobel guidance, valuable suggestions, sincere interest and continuous encouragement and all kind of support and help throughout the period of research work and also the preparation of manuscript.

The author also expresses his appreciation, gratitude and heartfelt thanks to his Co-Supervisor Prof. Md. Shadat Ulla, Department of Agricultural Extension and Information System, SAU, Dhaka, for his valuable suggestions, kind cooperation and encouragements for completion of the research work. His contribution and inspiration into every phase of the research work are never forgettable by the researcher.

The researcher expresses his cordial thanks and sincere appreciation to Professor Mohammad Hossen Buyan, Department of Agricultural Extension and Information System, SAU, Dhaka and other respected teachers for their valuable instructions and encouragement throughout the whole course of the research work.

Appreciation is extended to all of the respondents of the study area who cooperated with the author in providing necessary information during collection of data. Special thanks to Mr. Abdul Hanan and Mohammad Mazharul Islam for their help.

Thanks are due to Librarians and other officers of the library of SAU, Dhaka, for their help while reviewing or searching related literature.

December, 2007 Dhaka,

The Author

Bangladesh

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FARMERS' ADOPTION OF MODERN MAIZE CULTIVATION

By

Md. Alinur Masud

ABSTRACT

The main objective of the study was to find out the extent of adoption of modern maize cultivation by the farmers, to describe the selected characteristics of the maize growers and also to explore the relationships between the selected characteristics of the growers and their adoption of modern maize cultivation. The study was conducted in a union named Sundalpur under Daudkandi upazila of Comilla district. A total of 100 farmers were selected as sample for the study from a population of 496. Data were collected from the maize growers by using personal interview schedule during the period from first January to 15 January, 2008. Apart from descriptive statistical methods, Pearson's Product Moment Correlation Co-efficient analysis was used in order to analyze the data. Findings indicated that the majority (65 percent) of the growers had medium to high adoption of modern maize cultivation while 35 percent had low adoption. Out of nine selected characteristics of the growers, three, namely education, farm size and extension contact, had positive significant relationship. The rest of the variables namely: age, innovativeness, knowledge in maize cultivation, annual income, cosmopolitanism and agricultural training exposure did not show any significant relationships with their adoption of modern maize cultivation. Out of 12 problems faced by the farmers, two problems in order of importance were: (i) non-availability of hybrid seed and (ii) non-availability of storage facilities at farmer's level.

CHAPTER 1

INTRODUCTION

1.1 General Background:

Bangladesh is a developing country with an area of 1,47,570 sq. kilometres. The major portion of the population lives in the rural areas and two-third of her labour forces (68.6 percent) is engaged in agriculture (BBS, 2001). The economy of the country is predominantly agrarian accounting for 21.91 percent of GDP (BBS-2005). So, Agriculture plays a vital role in employment, poverty alleviation, food security, standard of living and increase of earnings.

The population of Bangladesh is 137 million with a growing rate of 1.48 percent per annum and 76.61 percent of the population live in the rural areas and its population density is 928 per sq. kilometres (BBS, 2005). It is Asia's 5th and world's 7th most populous country. The per capita income is about \$ 520 and its people have a life expectancy of 64.9 years (BBS, 2005).

In order to face frequent food shortage and to save the heavy drainage of foreign currency required for importing of food grains, it is essential to increase agricultural production. It is not feasible to increase the agricultural production through expansion of cultivated area, 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 crops 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 in Lalmonirhat, Kurigram, Dinajpur, Rajshahi, Rangpur, Rangamati, Gaibandha, etc. Maize can grow throughout the year in the subtropical climate of Bangladesh. It is grows in three cropping seasons :(a) Rabi (Nov. - Feb), (b) Kharif-1 (March-June)and (c)Kharif-2 (July-Oct).

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

During last few years farmers have widely adopted cultivation of HYV maize in their farming system, it is now extensively used as poultry and animal feed. The people also consume roasted and fried maize. 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 maize cultivation. Now-a-days they have been influencing by the Govt. Organization and private organization to adopt modern maize cultivation 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 districts in

September 1992, and it was 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 implementation in 150 Upazila of 33 districts for maize for production.

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 up to June 2005. Northern area of Bangladesh is the main maize-producing zones. Ghorarghat and Birol Upazila in Dinajpur, Hatibandha and Patgram Upazila in Laimonirhat, Dhunat and Sherpur Upazlia 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 interventions of the MOA, BARI, and Crop Diversification Program.DAE-IMPP, BRAC, BADC and so many private organizations. At present various type of hybrid varieties are available in Bangladesh such as Pacific-11, 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 50,050 hectare with annual production of 2, 41,460 m. tons grain in 2003-04 from merely 4,075 m. tons from 3,161 hectare in 1999-00. Table 1.1 indicates the increased area, production and yield of maize. However, it has been meeting only about 45 percent of the national demand. Much more need to be done to meet the total demand.

Table 1.1 Maize production trends in Bangladesh

Year	Area (ha)	Production (m. Ton)	Yield (ton/ha)
1999-00	3161	4075	1289
2000-01	4910	10350	2107
2001-02	19979	64335	3220
2002-03	29070	117255	4033
2003-04	50050	241460	4824

Source: BBS. >4.

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 40,75,000 tons from 3161 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 1035000 tons 4910 ha area respectively (BBS 2001). We found the popularity of maize among the farmers of Bangladesh is sharply increasing day by day. Maize varietals improvement in Bangladesh is mainly carried out by BARI, so far if released 11 improved maize varieties including three hybrids. 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 modern maize cultivation by the farmers.

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 improved production practices by the growers (Gonzalez, 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 and better management (Quayyum and Hoque, 1995 and Iqbal, 2001).

1.2 Statement of the problem:

In view of the foregoing discussion, the investigator undertook a piece of study entitled "Farmers' adoption of modern maize cultivation technologies" This research information is required which could be helpful to the policy maker, concerned bodies with the supply of inputs, technologies, knowledge and confronted with several problems 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 cultivation by the farmers.

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

1. What is the adoption behavior of modern maize cultivation by the farmer?
2. What are the characteristics of maize growers?
3. Is there any relationship between the farmers' selected characteristics and their adoption of modern maize cultivation?
4. What are the problems of adoption of modern maize cultivation?

1.3 Specific objectives:

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

1. To identify and describe some selected characteristics of maize growers. The selected characteristics were:
 - (i) Age (ii) Education (iii) Innovativeness (iv) Knowledge in maize cultivation (v) Firm size (vi) Annual income (vii) Cosmopolitaness (viii) Agricultural Training exposure (ix) Extension contacts.
2. To explore the relationships between the selected characteristics of the farmers and their adoption of modern maize cultivation.

3. To describe the extent of problems faced by the farmers in adopting modern maize cultivation.
4. To determine the influencing factors of the adoption of modern maize cultivation by the farmers.

1.4 Justification of the Study:

Maize cultivation is getting popularity among the farmers of Bangladesh by the introduction of new hybrid varieties coupled with growing market demand as well as 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 modern maize cultivation in order to formulate long-term strategy on maize production. As no research in the field of diffusion-adoption of this technology has been identified so far, the researcher deemed it a timely necessity to undertake the present study entitled “Farmer's Adoption of Modern Maize Cultivation”

1.5 Assumptions of the Study

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

The responses furnished by the respondents were reliable. They expressed the truth about their opinion and interest.

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 were free from bias.

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

Views and opinions 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 modern maize cultivation. The findings of the study will be specifically applicable to Comilla 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 especially for maize cultivation. The findings are expected to be helpful to the field workers of different nation building departments 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 modern maize cultivation.
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 farmers' adoption modern maize cultivation technologies.
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 practice 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 Daudkandi 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, sowing method, fertilizer and irrigation management, pest control, harvesting method, storage method, etc.

Cosmopolitaness: The term cosmopolitaness referred to the maize growers 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 total 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 farmer's family.

Technology: The combination of all the management practices used for producing and otherwise managing of a given crop, crop mixture, livestock and other farm activities.

Maize production technologies: Maize production technologies referred to the different kind of technologies which were used for maize cultivation. In this study, technology was defined as the combination of four practices (i.e. variety, intercropping, recommended dose of urea and use of Sheller) used for maize cultivation.

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 programmes.

Problem faced: The term "Problem faced" refers to different problems faced by the farmers during maize cultivation.

Modern Maize Cultivation: Modern maize cultivation referred as the cultivation of maize with the use of method or technique viz. sowing method, application of fertilizer, use of variety, etc.

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 this direction. Therefore, attempt has been made in the present chapter to review some interlinked literature on this aspect from home and abroad. 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 modern maize cultivation 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 ninety one 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 Aalok-6201 hybrid rice by the farmers of sadar upazila in Mymensingh 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 Aalok-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 Mymensingh 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 (53 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 that 36.64 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 union 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 sugarcane 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 Williams (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 percent 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 an ex-post appraisal of 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 Gangwar (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 IPM practices by the farmers under PETRRA project of RDRS. He found that age of the farmers had a negatively significant relationship with their adoption of 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 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 (2001) 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.

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.

ices 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.

Ranman (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 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' of Dewangonj upazila 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.

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 Alok-6201 hybrid rice fry the farmers of sadar upaziia in Mymensingh district. He observed that there was a significant positive relationship between annual income of the farmers and their adoption of Alok-6201 hybrid rice.

Hussen (2001) conducted an investigation on adoption of modem 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 modem sugarcane cultivation practices.

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

Cosmopolitanism 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 cosmopolitanism 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 cosmopolitanism of the farmers and their adoption of modern sugarcane cultivation practices.

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

Hossain (1999) found a positive significant relationship between cosmopolitanism 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' cosmopolitanism and their adoption of selected BINA technologies. Similar results were observed by Hossain (1991) and Islam (1986) 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 Sandwip. He found that extension media, contact of the farmers had no significant relationship with 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 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 upazila 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 upazila 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 potato 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 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, Annual income, cosmopolitaness, training exposure and extension contact. The conceptual model of the study has been presented in figure 2.1

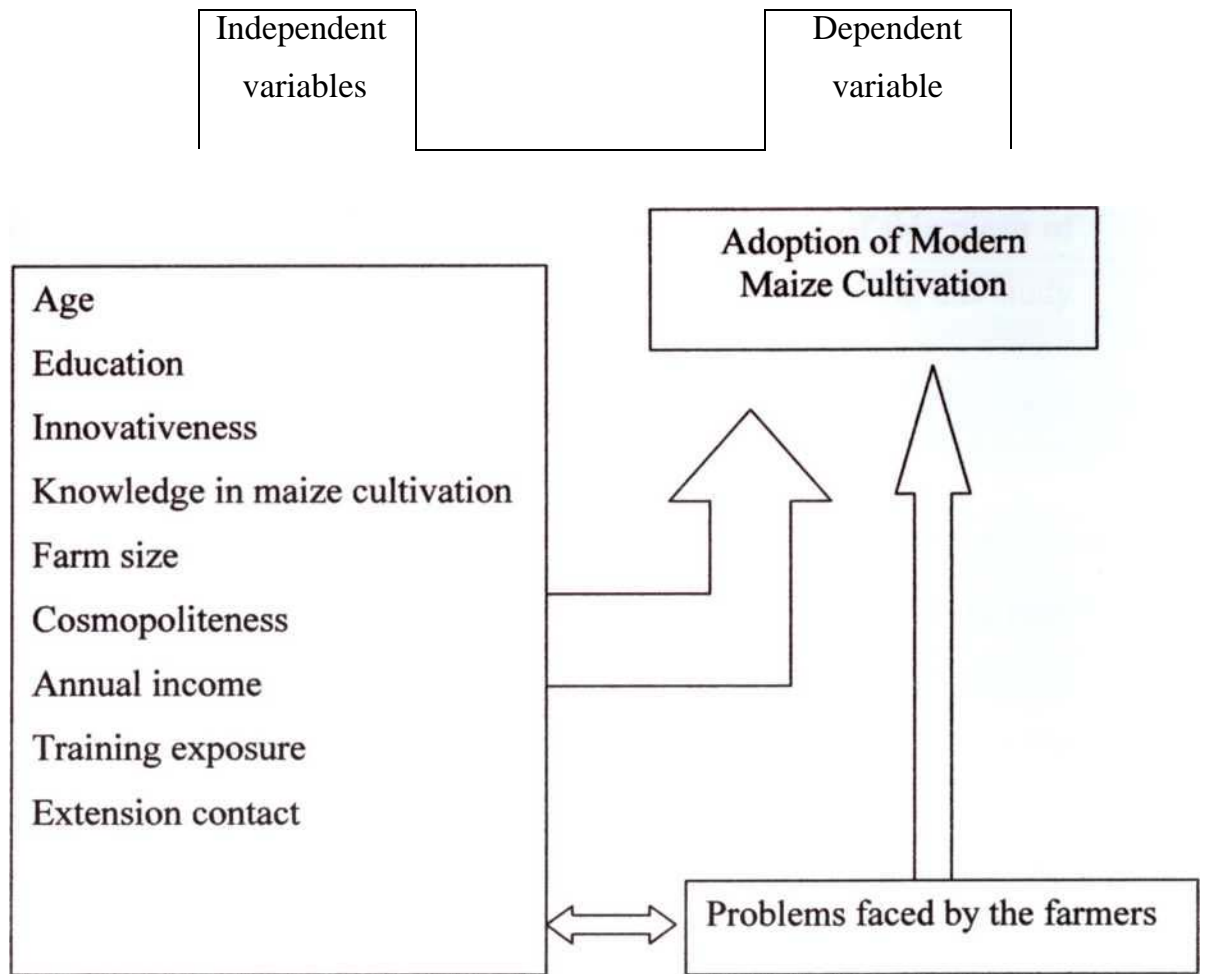


Fig. 2.1 The conceptual model of the study

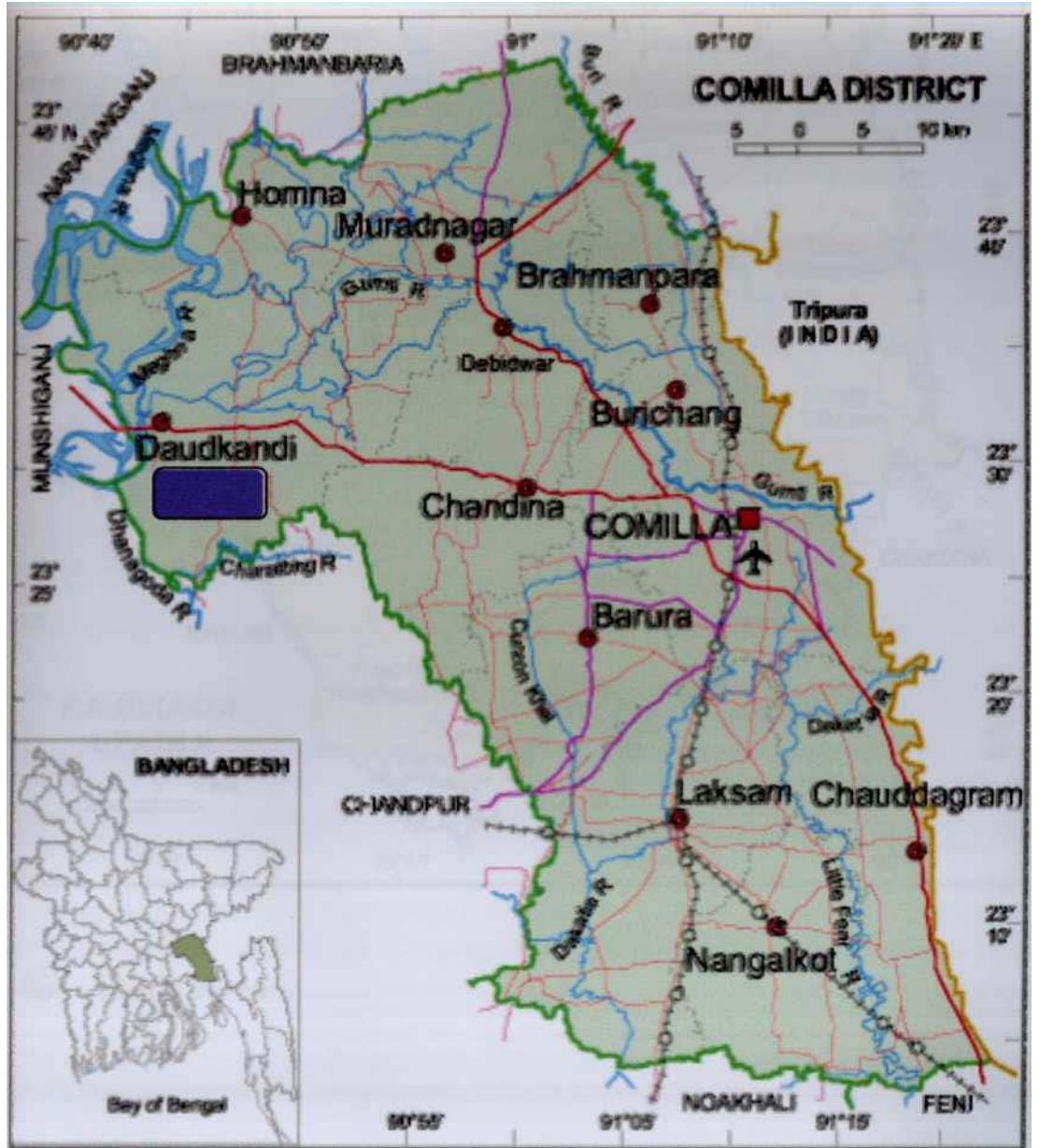
CHAPTER-3

METHODOLOGY

Methodology deserves a very careful consideration in conducting scientific research. Importance of methodology in conducting any research cannot be undermined. Methodology enables the researcher to collect valid and reliable information and to analyze them properly to arrive at correct decisions. Keeping this point in view, the researcher took utmost care for using proper methods in all the aspects of this piece of research work. Methods and procedures followed in conducting this study has been described in this chapter.

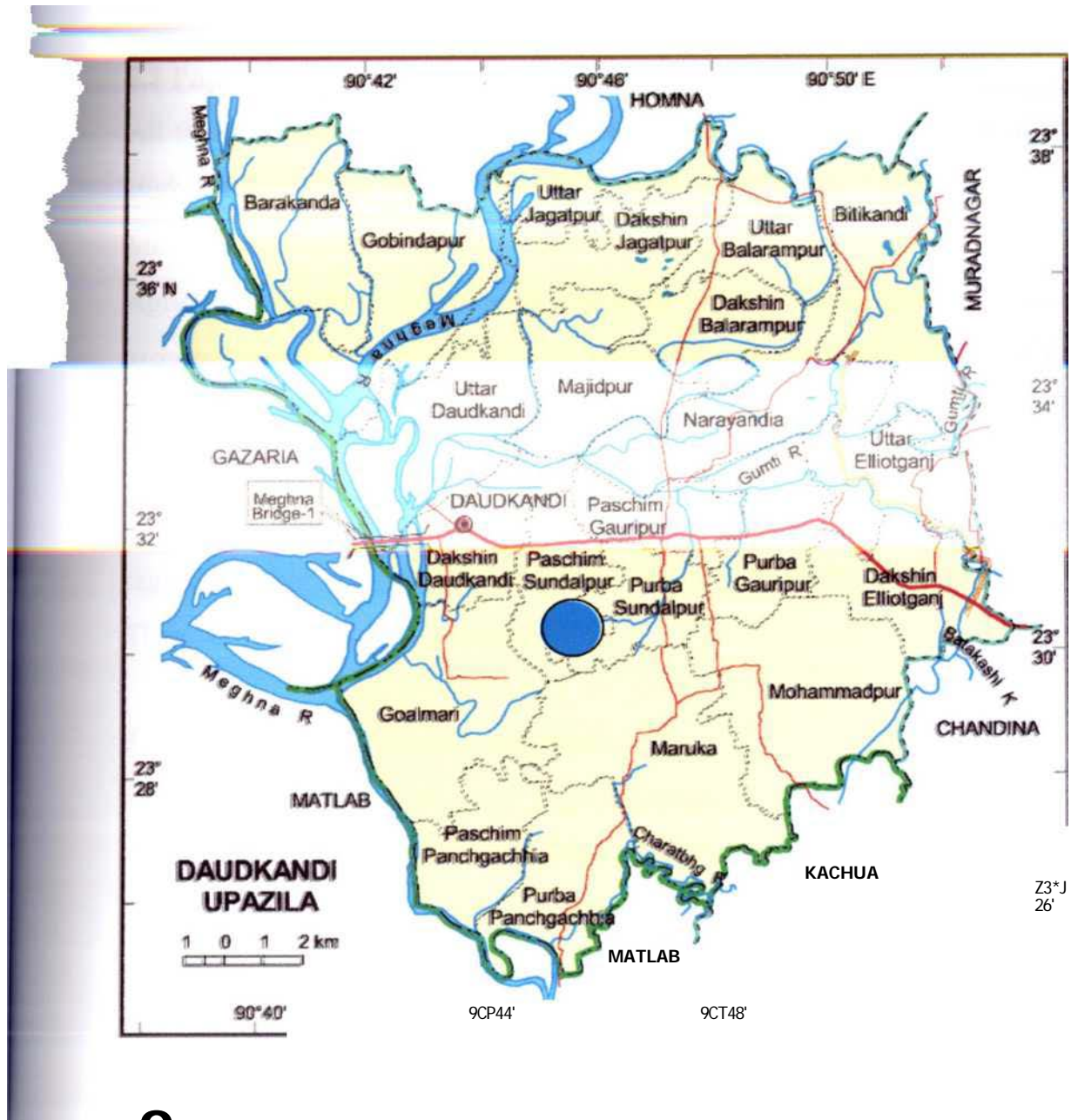
3.1 The Locale of the Study:

A Union named Sundalpur in Daudkandi Upazilla under comilla district was purposefully selected due to easy communication as well as easy contact with the maize growers' of the study area. This Upazilla is situated at about 35 Km west of Comilla town and according to the guidance of the research supervisory committee one Union with maize as the more cultivated crop were to be the study area of the present research. The selected Union is about 4km from the Daudkandi Upazilla head quarter. A map of Comilla district and the study area has been presented in fig 3.1 and 3.2 respectively.



B Comilla District ■ Daudkandi Upazila

Fig: 3.1 A map of Comilla district showing Daudkandi Upazilla



O Study Area

Fig: 3.2 A map of Daudkandi Upazilla showing Sundalpur Union

3.2 Populations and Sampling Design:

All the maize growers of the selected Union were the population of the study. A list

of the farmers of this Union was prepared with the help of Md. Monoar Hossen, Sub Assistant Agriculture Officer, Upazilla Agricultural office; Daudkandi, Comilla. The total numbers of maize growers in this Union were around 496. Out of them 20 per cent of the population were selected following random sampling method. So, 100 maize growers were the sample of the study. If anyone included in the original sample were unavailable during data collection, the next farmers regarding that list were considered turn by turn for collecting data. Therefore no reserve list was needed.

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 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 nine characteristics of the maize growers as the independent variable and adoption of modern maize cultivation as the dependent

variable.

3.4.1 Measurement of independent variables:

The independent variables of the study were nine selected characteristics of the maize growers. These were age, education, innovativeness, knowledge in maize cultivation, farm size, annual income, cosmopolitaness, 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 successful years of schooling. One (1) score was given for passing each level in the educational institution. For example, if a respondent passed 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 on the basis of his adoption of 10 selected agricultural innovations. Score was assigned on the basis of time dimension. Since the exact date of introduction of the selected innovations in the study area was not specifically known, the relative earliness of the adoption of a particular innovation by a respondent was ascertained by considering how long before he first adopted that innovation prior to the date of interview. The

higher the length of time of his first adoption, the earlier he was adopting the innovation than other members of his social system. A score of one (1) was assigned for each year of adoption of a particular innovation prior to the date of interview subject to a minimum of 10 for adopting the innovation for 10 years or more prior to the date of interview. The scores for all the 10 innovations were added together to constitute the innovativeness score of a respondent. This score, thus, could range from 0 to 100. Zero (0) indicating no innovativeness at all and 100, the 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 presented in Appendix-A. Each question was assigned score two (2). A respondent obtained full that is 2 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 in 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, in terms of full benefit to his family.

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

$FS = A + B + C + \frac{1}{2}(E + F) + G$ Where,

FS= Farm Size A= Homestead

B= Own land under own cultivation C= Land

taken from others on Lease E=Land taken from
others on barga F=Land given to others on
barga G=Others (Pond/ 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 Appendtx-A.

Annual Income:

Annual income of a respondent was measured in taka on the basis of his total yearly earnings from different sources (eg. service, farming, business and others) in previous year. A score of one (1) was assigned for each thousand taka. This variable appears in item no. 6 in the interview schedule as presented in Appendix-A.

Cosmopolitaness:

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

Place of visit	Nature of visit	Weight age
Outside of own village	Not even once a week	0
	Once a week	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 upazila(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 weight age obtained from visit to each of the above categories of places were added together to get the cosmopolitanism score of a respondent. Thus the score of a respondent could range from 0 to 18, where 0 indicating no cosmopolitanism and 18 highest cosmopolitanism. This variable appears in item no. 7 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 in 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. 8 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 extension information sources. Score were assigned on the basis of extent of contact by a respondent with 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 -5times/year	1
	At least 1 time/2 months	2
	1-2 time/ month	3
Going to upazila agriculture office	Not even once a year	0
	1-5times/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
	1-5times/year	1
	1 -2 time/month	2
	3-4 times/ month	3
Sub 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
Other extension agents (e.g. Health worker)	Not even once a year	0
	At least once a year	1
	1-2 time/month	2
	3-4 times/ month	3
NGO Worker	Not even once a year	0
	At least once a year	1
	1 -2 time/month	2
	3-4 times/ month	3
Input dealers	Not even once a year	0
	At least once a year	1
	1 -2 time/month	2
	3 times a year or more	3

Name of information sources	Nature of contact/use	Score
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 A 1 At least once a year 1-2 time/month 3 times a year or more	0 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, magazine etc.	Not even once a year 1 -2 piece/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 piece/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. 9 in the interview schedule as presented in Appendix-A.

3.4.2 Measurement of dependent variable

The procedure followed in measuring the dependent variable is presented below:

Adoption of modern maize cultivation

Adoption of modern maize cultivation was measured by computing adoption quotient. It was calculated by asking farmers how many maize technologies they adopted for how many years in how much land. The land area used for certain technology is considered to be the extent of adoption (EA), whereas the area that could be used for the technology is considered to be Potentiality of Adoption (PA). The Extent of adoption (EA) was divided by Potentiality of Adoption (PA) against each of the technologies. The result is called Adoption Quotient (AQ). The adoption quotient of each technology for each year was summated. The total score was then divided by the years of use of adopted practices. This is called Mean Adoption Quotient (MAQ).

The following formula was used to calculate MAQ.

$$\text{MAQ} = \frac{(\sum E/P)/N}{Y} \times 100$$

Where,

E = Extent of adoption

P = Potentiality of adoption

N = No. of practice

Y=Years of use of adopted practices

Using above formula, MAQ was computed against each technology for individual farmers. (Bhuiyan, 2005).

The MAQ of all individual technology was summated, divided by the number of practices and multiplied by 100. The obtained result is the total Adoption Score (AS) of an individual farmer.

For example,

Mr. Abdul Latif is a maize grower. He used modem variety 2004, 2005, 2006 and 2007 in the land area of 10ha, 10ha, 1.25ha and 1.25ha respectively.

He used intercropping in maize field during the same period in the land area of 1.5ha, 1.5.ha, 1.5ha and 1.5ha respectively.

He used of recommended dose urea 2006 and 2007 in maize field of 12ha and 0.18ha.

= 70%

He also adopted use of Sheller for the same period in the land area of 72ha, 1.25ha, and 1.25ha respectively. The adoption of technologies in the following way the adoption score was calculated.

SI. No	Name of technology	Year wise adoption in hectare				(IE/P)/N
		2004	2005	2006	2007	
1	Potentiality of adoption (P)	1.5	1.5	1.5	1.5	0.749
	Extent of adoption of modern variety (E)	1.0	1.0	1.25	1.25	
	E/P	0.666	0.666	0.833	0.833	
2	Potentiality of adoption (P)	1.5	1.5	1.5	1.5	0.749
	Extent of adoption of inter cropping with maize (E)	1.0	1.0	1.25	1.25	
	E/P	0.666	0.666	0.833	0.833	
3	Potentiality of adoption (P)			0.3	0.3	0.5
	Extent of adoption of recommended dose of fertilizer (E)			0.12	0.18	
	E/P			0.4	.06	
4	Potentiality of adoption (P)		0.97	1.5	1.5	0.802
	Extent of adoption of use sheller (E)		0.72	1.25	1.25	
	E/P		0.742	0.833	0.833	

So

$$MAQ = \frac{0.749+0.749+0.5+0.802}{4} \times 100$$

4

Adoption of maize production technologies were measured in four selected aspects. The aspects where (i) use of modem variety (ii) intercropping (iii) use of recommended dose of urea (iv) use of sheller. 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 ones adoption scores on four aspects of adoption and then dividing by number of aspects. The MAQ was expressed in percentage. Hence the MAQ of a maize grower could range from 0 to 100, where 0 indicate no adoption and 100 indicate highest adoption.

3.5 Problems faced by the farmer in adopting modern maize cultivation:

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 36 indicated highest problem in respect of modern maize cultivation while a score of 0 indicated no problem problems.

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

$$PFI = P_h * 3 + P_m * 2 + P_i * 1 + P_n * 0$$

Where,

PFI = Problem Faced Index

P_h = Percent of maize growers having high problem P_m = Percent of maize growers having moderate problem P_i = Percent of maize growers having little problem P_n = Percent of maize growers having not any problem at all

Thus, PFI is an item which could range from 0 to 300, where 0 indicated no problem at all and 300 indicated high problem in modern maize cultivation.

3.6 Statement of the Hypothesis:

As defined by Goode and Hatt (1952) “A hypothesis is a proposition, which can be put to a test to determine its validity. It may seem contrary to, or in accord with 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 hypotheses 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 modern maize cultivation by the farmers and these selected characteristics”. The selected characteristics were age, education, innovativeness, knowledge in maize cultivation, farm size, annual income, cosmopolitaness, agricultural training exposure and extension contact.

3.7 Collection of Data:

The researcher himself through face-to-face interview collected data personally from selected respondents. Before starting collection of data, the researcher met the respective Upazila Agriculture Officer, Agriculture Extension Officer and Sub Assistant Agriculture Officers. 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 during data collection.

The entire process of collecting data took place during January 2007.

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. In case 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, and 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 modern maize cultivation. Pearson's product moment correlation co-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 level is indicated by one asterisk (*) and that at 0.01 level 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 modern maize cultivation by the farmers. The third section deals with the relationships between the selected characteristics of the maize growers and their adoption of modern maize cultivation and last section deals with farmer's problem in adopting modern maize cultivation.

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 nine selected characteristics has been presented in Table 4.1 (page 48).

4.1.1 Age

The age score of the maize growers ranged from 29 to 65 with an average of 44.62 and a standard deviation of 8.26. Table 4.1 (page 48) indicates that the majority (62 percent) of the respondents fell into the middle-aged category while 15 percent and 23 percent were found young and old categories respectively. The mean value (44.62) 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	Rang		Category	R		Mean	SD
		Possible	Observed		N	P		
Age	Years	-	29-65	Young (up to 35)	15	15	44.62	8.26
				Middle (36-50)	62	62		
				Old (Above50)	23	23		
Education	Year of schooling	-	0-16	Illiterate	5	5	7.07	3.72
				Can sign only (0.5)	6	6		
				Primary level d-5)	22	22		
				Secondary level (6-10)	52	52		
				High level (Above 10)	15	15		
Innovativeness	Scale score	0-40	10-35	Low (up to 23)	43	43	25.09	3.93
				Medium (24-27)	28	28		
				High (Above 27)	29	29		
Knowledge in maize cultivation	Scale score	0-40	20-36	Low (up to 24)	45	45	25.74	3.77
				Medium (25-28)	35	35		
				High (Above28)	20	20		
Farm size	Hectare	-	0.42-6.13	Small (up to 0.02-0.99)	9	9	2.11	1.18
				Medium (1-2.5)	67	67		
				Large (Above2.5)	24	24		
Annual income	Unit score	-	75-503	Low (up to 170)	33	23	206.01	72.24
				Medium (171-242)	44	44		
				High (Above 242)	23	23		
I Cosmopoliteness	Scale score	0-18	5-16	Low (up to 9)	52	52	10.38	3.04
				Medium (10-12)	18	18		
				High (Above 12)	30	30		
Agricultural training exposure	Days	-	0-21	Low (up to 5)	44	44	6.79	4.85
				Medium (6-9)	27	27		
				High (Above 9)	29	29		
Extension media contact	Scale score	0-42	21-34	Low (up to 25)	42	42	26.51	3.42
				Medium (26-28)	25	25		
				High (Above28)	33	33		

NB: R=Respondents, N=Number (100), P=Percent

4.1.2 Education

The education scores of the maize growers' ranged from 0-16 with an average of 7.07 and standard deviation 3.72. Data presented in Table 4.1 (page-48) indicate that the majority (52 percent) of the respondents had secondary level education. A little more than one-fifth (22 percent) of the respondents were found at primary level while 5 percent, 6 percent and 15 percent belonged to illiterate, can sign only and higher education categories respectively. The findings indicate that 89 percent respondents had education 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 were 35 and the minimum was 10 against the possible range of 0 to 40. However, the average was 25.09 and standard deviation 3.93. Table 4.1 (page-48) indicates that 43 percent fell into the low innovativeness while 28 percent and 29 percent were found medium and high innovativeness.

4.1.4 Knowledge in maize cultivation

The knowledge scores of the maize growers ranged from 20-36 with an average of 25.74 and standard deviation 3.77. Data presented in Table 4.1 (page-48) indicate that the majority (45 percent) of the respondents had low knowledge while 35 percent and 20 percent had medium and high knowledge on maize cultivation.

4.1.5 Farm Size

The farm size scores of the maize growers ranged from 0.42 to 6.13 ha with an average of 2.11 and standard deviation 1.18. Data presented in Table 4.1 (page-48) indicate that the highest proportion (67 percent) of the respondents had medium farm while 24 percent and 9 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 to large farm size. The land holding plays a major role in determining the income of the farmers. Hossain (1931) and Sarkar (1997) also found the similar findings in their studies.

4.1.6 Annual Income

The annual income scores of the maize growers ranged from 75 to 503 with an average of 206.01 and standard deviation 72.25. Data presented in Table 4.1 (page-48) indicate that the highest proportion (44 percent) of the respondents had medium income while 23 percent of the respondents had high income and 33 percent had low income. The findings further indicate that two-third (67 percent) of the respondents had medium income to high income. The annual income influenced the farmers to adopt modern technologies. Basher (1993) and Haque (1984) also found the similar findings in their studies.

4.1.7 Cosmopolitaness

The cosmopolitaness scores of the maize growers ranged from 5-16 with an average of 10.38 and standard deviation 3.04. Data presented in Table 4.1 (page-48) indicate that that one half (52 percent) of the respondents fell into low cosmopolitaness category while only 18 percent and 30 percent belonge to medium and high cosmopolitaness categories respectively. Chowdhury (1997) also found the similar results in his study.

4.1.8 Agricultural Training Exposure

The agricultural training exposure score of the maize growers ranged from 0-21 with an average of 6.79 and standard deviation 4.86. Data presented in Table 4.1 (page-48) indicate that the majority proportion (44 percent) of the respondents had no training exposure while 27 percent had low training and 29 percent had medium training exposure. Training exposure play an important role in motivating the farmers in adoption of modem cultivation. But the fact is that overwhelming majority 71 percent of maize growers did not receive any training or had low training who needs attention of the authorities by extension services (GOs & NGOs) in the country.

4.1.9 Extension Contact

The extension contact scores of the maize growers ranged from 21-34 with an average of 26.51 and standard deviation 3.42. Data presented in Table 4.1 (page-48) indicate that a little more than two-fifth of the respondents had low extension contact while 25 percent had medium and 33 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 helps the farmers for better understanding and to get recent information regarding improved technologies. Sarkar (1997) and Podder (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

In order to make a threadbare discussion about adoption of modem maize cultivation by the farmers four different aspects of cultivation technology were identified. These aspects were adoption of modem maize variety, adoption of intercrop with maize, adoption of recommended urea fertilizer dose and adoption of maize sheller.

These four different aspects of adoption have been discussed in this section. However, scores of adoption of modern maize cultivation by the farmers regarding four aspects and total adoption has been presented in Table 4.2 (page-54).

4.2.1 Adoption of modern variety

The adoption of modern variety scores of the maize growers ranged from 46.25 to 86 with an average of 70.32 and standard deviation 9.7. Data in Table 4.2 reveal that the highest proportion 36 percent of the respondents fell into low adopter category and 28 percent had medium adopter category regarding adoption of modern variety of maize. 36 percent fell into high adoption category. The mean value (70.32) clearly indicates respondents tend to highly adoption of the modern varieties of maize.

One point should be taken into consideration. That 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 of maize in their cultivable areas and it is a good signal for maize cultivation promoting programme.

Table 4.2 Distribution of the respondents according to their adoption

Technologies	Scoring system	Range		Category	R		Mean	SD
		Possible	Observed		N	P		
Adoption of I modem variety	Scale score	0-100	46.25-86	Low (up to 65)	36	36	70.32	9.7
				Medium (65.01-75)	28	28		
				High (Above75)	36	36		
Adoption of intercropping	Scale Score	0-100	46.25-86	Low (up to 65)	34	34	70.15	9.74
				Medium (65.01-75)	30	30		
				High (Above75)	36	36		
Adoption of recommended dose of urea	Scale score	0-100	0-71.20	Low(up to 40)	72	72	17.84	24.91
				Medium (40.01-50)	14	14		
				High(Above50)	14	14		
Adoption of Sheller	Scale score	0-100	33.17-88.60	Low(upto63)	18	18	70.21	14.84
				Medium (63.01-77)	34	34		
				High (Above77)	48	48		
Total Adoption	Scale score	0-100	50.80-89.78	Low(upto70)	35	35	74.13	7.93
				Medium (70.01-78)	35	35		
				High (Above78)	30	30		

NB: R=Respondents, N=Number (100), P=Percent

4.2.2 Adoption of intercropping with maize

The adoption of intercropping scores of the maize growers ranged from 46.25-86 with an average of 70.15 and standard deviation 9.74. Data in Table 4.2 reveal that the highest proportion 36 percent of the respondents high adopt intercropping while 30 percent fell in medium adoption category and 34 percent farmers were in low adoption categories.

The mean value (70.15) clearly indicates that farmers tend to highly adoption of intercropping with maize.

4.2.3 Adoption of recommended dose of Urea fertilizer

The adoption of recommended dose of urea fertilizer scores of the maize growers ranged from 0 to 71.20 with an average of 17.84 and standard deviation 24.91. Data in Table 4.2 reveal that the majority 72 percent of the respondents fell into low adoption category while 14 percent fell into medium and 14 percent high adoption category respectively regarding adoption of recommended dose of urea fertilizer. The mean value 17.84 indicates respondents tend to low adoption of use of urea fertilizer.

4.2.4 Adoption of maize sheller

The adoption of maize sheller scores of the maize growers ranged from 33.17 to 88.60 with an average of 70.21 and standard deviation 14.85. Data in table 4.2 reveal that the highest proportion 48 percent of the respondents fell into high adoption category and 34 percent had medium adoption category regarding adopting of maize

sheller. Only 18 percent respondent's fell into low adoption category. The mean value (70.21) clearly indicates respondents' tend to high adoption of maize sheller. The majority (82 percent) of the respondents had medium and high adoption category. Based on the findings that in large maize growing area, sheller was being used by the farmers due to shelling capacity is high and shell in a short time and labour cost is less.

4.2.5 Adoption of modern maize cultivation

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 50.80 to 89.78 against the possible range of 0 to 100. The average adoption score was 74.13.

Data presented in Table 4.2 indicate that the majority (65 percent) of the respondents fell into medium to high adoption category while 35 percent fell into low adoption category respectively. In Bangladesh, majority of the farmers are illiterate and always practices farming with a number of socio-economic problems including limited resources. Nevertheless, the average adoption score 74.13 indicates that farmers were trying to adopt modern maize cultivation. DAE and other extension organizations, especially the NGOs who are trying to popularize maize cultivation 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 with better performance.

4.3 Relationship between the selected characteristics of the maize growers and their adoption of modern maize cultivation

Co-efficient of correlation was computed in order to explore the relationship between the selected characteristics of the maize growers and their adoption of modern maize cultivation. Table 4.3 was used for descriptive interpretation of meaning of 'r'

Table 4.3 The meaning for 'r' 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 coefficient (r) was compared against relevant table value.

Co-efficient of correlation ‘r’ between the selected characteristics of the maize growers and their adoption of modern maize cultivation 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 Co-efficient of correlation (r) between the respondents’ selected characteristics and their adoption (N=100)

Farmers’ selected Characteristics	Value of ‘r’ with 98 df	Tabulated value of ‘r ₁	
		0.05 level	0.01 level

1 Significant at 0.05 level of probability

Age and adoption of modern maize cultivation

The relationship between age of the respondents and their adoption of modern maize cultivation was examined by testing the null hypothesis: “There is no relationship between age of the maize growers and their adoption of modern maize cultivation”. The computed value of V was found to be 0.147 as shown in Table 4.4 which was lower than that of the tabulated value of ‘ r ’ (0.195) with 98 degrees of freedom at 0.05 levels of probability. Hence, the concerned null hypothesis was rejected. Therefore, it could be concluded that age of the maize growers had no relationship with their adoption of modern maize cultivation. Thus it might be said that age of the farmers was not an important factor in adopting modern maize cultivation. The relationship between the concerned variables was negligible. Farmers of any age young, middle or old are in favour of adoption of maize cultivation practices.

4.3.1 Education and adoption of modern maize cultivation

The relationship between the farmers’ education and their adoption of modern maize cultivation was examined by testing the null hypothesis: “There is no relationship between education of the farmers and their adoption of modern maize cultivation”. The computed value ‘ r ’ was found 0.198* as shown in table 4.4 which was greater than that of the tabulated value

0.195 with 98 degrees of freedom at 0.05 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 modern maize cultivation. 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 cultivation by the farmers was higher among those farmers who had higher education.

4.3.2 Innovativeness and adoption of modern maize cultivation

The relationship between innovativeness of the respondent and their adoption of modern maize cultivation were examined by testing the null hypothesis. “There is no relationship between innovativeness of the maize growers and their adoption of modern maize cultivation”. The calculated value of ‘r’ was found 0.030 as shown in table 4.4. which was less than that of the tabulated value 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 modern maize cultivation. Thus it might be said that innovativeness of the farmers was not an important factor in adopting modern maize cultivation. The relationship between the concerned variables was negligible. Conclusion can be drawn that maize growers of the study area are more or less innovative and there is less variation among them in this regard.

4.3.3 Knowledge in maize cultivation and adoption of modern maize cultivation

The relationship between knowledge in maize cultivation of the respondents and their adoption of modern maize cultivation were examined by testing the null hypothesis. “There is no relationship between knowledge in maize cultivation of farmers and their adoption of modern maize cultivation”. The calculated value of ‘r’ was found -0.033 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 levels 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 modern maize cultivation. The relationship between the concerned variables was negligible because farmers had a lot of knowledge about various types of crops like rice, white, tobacco, sugarcane, etc.

4.3.4 Farm size and adoption of modern maize cultivation

The relationship between farm size of the respondents and their adoption of modern maize cultivation were examined by testing the null hypothesis: “There is no relationship between farm size of the maize growers and their adoption of modern maize cultivation”. The calculated value of ‘r’ was found 0.211 * which was greater than that of the tabulated value 0.195 with 98 degrees of freedom at 0.05 level of probability. Hence, the concerned null hypothesis was rejected and therefore, it could be concluded that farm size of the maize growers had a positive significant relationship with their adoption of modern maize cultivation. The finding is quite rational, because adoption of modern maize cultivation is relatively costly. Hence, large farmers get more scope than the small farmers as they can invest money for adoption of selected maize cultivation practices. Many researchers (Hoque, 1993; Pal, 1995; Islam, M.S., 2002; Islam, M.A., 2003) observed the similar significant and positive relationship between these two variables.

4.3.5 Annual income and adoption of modern maize cultivation

The relationship between annual income of the respondents and their adoption of modern maize cultivation were examined by testing the null hypothesis: “There is no relationship between annual income of the maize growers and their adoption of modern maize cultivation”. The calculated value of ‘r’ was 0.155 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 concern null hypothesis was accepted and therefore, it could be concluded that annual income of the maize growers had no relationship with their adoption of modern maize cultivation. Thus it might be said that annual income of the farmers was not an important factor in adopting modern maize cultivation. The relationship between the concerned variables was negligible.

4.3.6 Cosmopolitanness and adoption of modern maize cultivation

The relationship between cosmopolitanness of the respondents and their adoption of modern maize cultivation were examined by testing the null hypothesis. “There is no relationship between cosmopolites of the maize growers and their adoption of modern maize cultivation”. The calculated value of ‘r’ was found -0.061 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 levels of probability. Hence, the concerned null hypothesis was accepted and therefore, it would be concluded that cosmopolitanness of the farmers had no relationship with their adoption of modern maize cultivation because farmers got more information by radio, TV, friends, etc in adopting modern maize cultivation. So the relationship between concerned variable was negligible.

4.3.7 Agricultural training exposure and adoption of modern maize cultivation

The relationship between training exposure of the respondents and their adoption of modern maize cultivation testing the null hypothesis: “There is no relationship between training exposure of the maize growers and their adoption of modern maize cultivation”. The calculated value of ‘r’ was found -0.039 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 levels 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 modern maize cultivation. The relationship between concerned variable was negligible. Majority of the farmers were not trained farmers influenced by high interest, extension contact, mass media, etc in adopting modern maize cultivation.

4.3.8 Extension contact and adoption of modern maize cultivation

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 modern maize cultivation”. The calculated value of V was found 0.202* 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 concerned null hypothesis was rejected and therefore, it could be concluded that extension contact of the farmers had a positive significant relationship with their adoption of modern maize cultivation. 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 modern maize cultivation. The finding is also reasonable because farmer with large extension contact received more information regarding the modern.

4.4 Problems faced by the farmers in modern maize cultivation

Problems of maize growers were measured through 12 items scale. The problems score ranged from 14 to 29 against the possible range of 0-36. The average was 23.21 and standard deviation was 3.79 respectively.

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

Categories	Respondents		Mean	SD
	Number (100)	Percent		
Low problem	28	28	23.21	3.79
Medium problem	36	36		
High problem	36	36		

Data presented in Table 4.5 indicate that most of the respondents in the study area faced medium to high (72 percent) problems. Only 28 percent respondents faced low problem.

The extent of problems in modern maize cultivation along with their Problem Facing Index (PFI) is presented in Table 4.6. The Table 4.6 indicates that the problem that ranked first on the basis of PFI was “nonavailability of hybrid” with a PFI of 248. The farmers mentioned that non-availability of maize hybrid in due time was a serious problem to the growers.

Table: 4.6 Extent of problem in modern maize cultivation

SL No.	Statement on problems	Extent of problem				Computed score	Rank order
		High	Moderate	Little	Not at all		
1	Non-availability of hybrid seed	62	24	14	0	248	1
2	Non-availability of storage facility at farmers level	48	27	15	0	213	2
3	No seed production at farmers level	40	25	35	0	205	3
4	Low scope for consuming as food	35	30	15	20	180	4
5	Non-availability land for maize	27	30	17	26	158	5
6	Non-availability of credit	15	31	24	30	131	6
7	High input cost	10	29	26	35	114	7
8	Low market price	12	25	23	40	109	8
9	Lack of technical information	12	25	20	43	106	9
10	Threshing problem	8	32	17	43	105	10
11	Less irrigation facilities	4	30	18	48	90	11
12	Low scope of marketing	5	23	25	47	86	12

“Non-availability of storage facility at farmer’s level due to high moisture content” was ranked second on the basis of PFI (213). The farmers mentioned that maize grain absorbs high moisture and it is very sensitive to fungal attack.

“No seed production in farmer’s level” was ranked third on the basis of PFI (205). Farmers want to produce seed but they cannot produce hybrid seed normally.

“Low scope for consuming as food” was ranked fourth on the basis of PFI (180). Farmers do not know the recipes if food made from maize.

“Non-availability of land” for maize cultivation was ranked fifth on the basis of PFI (158). Non-availability of land for maize cultivation due to low land was a problem to the farmers.

“Non-availability of credit” was ranked sixth on the basis of PFI (131). 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.

“High input cost” was ranked seventh on the basis of PFI (114). Sometime input dealers and agency cheats the farmers by taking high price of inputs. So the grower cannot afford to cultivate.

“Low market price of maize” was ranked eighth on the basis of PFI (109). Farmers mentioned that sometime smuggled maize grain come into the country from India, which create problem of low price of local maize.

“Lack of technical information” was ranked ninth on the basis of PFI (106). 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 tenth on the basis of PFI (105). Farmers mentioned that power sheller, its cost is high.

“Less irrigation facilities” was ranked eleventh on the basis PFI (90). There was no sufficient deep tube well in order to supply irrigation water to the maize field.

“Low scope of marketing” was ranked twelfth on the basis of PFI (86). Farmers mentioned that Bepari (media) purchase maize and sell it to wholesalers who sell to the feed industry. Thus it is long-term process.

CHAPTER 5

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

“Farmers Adoption of Modern Maize cultivation” the study title **was** undertaken with the objective: (i) to determine farmers’ adoption behavior of modern maize cultivation, (ii) to explore the relationship between selected characteristics of the farmers and their adoption **of** modern maize cultivation while the selected characteristics **were** age, education, innovativeness, knowledge in maize cultivation, **farm size**, annual income, cosmopolitanism. Agricultural training exposure and extension contact and (iii) to determine the extent of problem faced by the farmers in adopting modern maize cultivation. Sundalpur Union **of** Daudkandi upazila under Comilla district was the locale of the study. The sample of 100 farmers was drawn from a population of 496. Data were collected during January, 2007 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 29 to 65 years with an average of 44.62 years. Majority of the respondents (62 percent) were middle aged followed by 15 percent and 23 percent young and old-aged respectively.

Education: Education score of the respondents ranged from 0 to 16 with an average of 7.07. Majority of the respondents (52 percent) had secondary level education followed by 22 percent and 15 percent had primary level and higher-level education respectively. Percent and 6 percent respondents were illiterate and can sign only respectively.

Innovativeness: Innovativeness score of the maize growers range from 10 to 35 with and average 25.09. Most of the respondents (43 percent) had low innovativeness while only 28 percent medium and 29 percent respondents had high innovativeness.

Knowledge in maize cultivation: Knowledge in maize cultivation score of the respondents ranged from 20 to 36 with an average of 25.74. Most of the respondents (45 percent) low knowledge followed by 35 percent and 20 percent had medium and high knowledge respectively.

Farm size: Farm size of the respondents ranged from 0.42 to 6.13 with an average of 2.11. Majority of the respondents (67 percent) had medium farm followed by 9 percent and 24 percent small and large farm size respectively.

Annual income: Annual income score of the respondents ranged from 75 to 503 with an average of 206.01 Majority of the respondents (44 percent) had medium income followed by 33 percent and 23 percent low and high income respectively.

Cosmopolitaness: Cosmopolitaness score of the respondents ranged from 5 to 16 with an average of 10.38. Majority of the respondents (52 percent) had low cosmopolitaness followed by 18 percent and 30 percent medium and high cosmopolitaness respectively.

Agricultural training exposure: Agricultural training **exposure score** of the respondents ranged from 0 to 21 with an average of **6.79**. **Majority** of the respondents (44 percent) had low training exposure **followed by 27** percent and 29 percent had medium training and medium **training** exposure respectively.

Extension contact: Extension contact score of the respondents ranged from 21 to 34 with an average of 26.51. Majority of the respondents (42 percent) had low contact followed by 25 percent had medium and 33 percent had high extension contact respectively.

5.1.2 Adoption of modern maize cultivation

Farmer's adoption of modern maize cultivation was divided **into four** aspects such as modern variety, intercropping, use of recommended **dose** of urea and use of Sheller.

Adoption of modern variety: Farmers adoption of modern **variety score** ranged from 46.25 to 86 with an average of 70.32. **36 percent of the** respondents had medium adoption followed by 36 percent and **82 percent** low and medium adoption respectively.

Adoption of intercropping: Farmers adoption of intercropping **score** ranged from 46.25 to 86 with an average of 70.15. **36 percent of the** respondents had high adoption followed by 34 percent low and **30 percent** medium adoption respectively. No farmer was found having **no adoption** of intercropping.

Adoption of recommended dose of urea: Farmers' adoption **of** recommended dose of urea fertilizer use range from 0 to 71.20 with an average of 17.84. Majority of the respondents 72 percent had **low** adoption followed by 14 percent medium and 14 percent high adoption respectively.

Adoption of Sheller: Farmers' adoption of power Sheller score ranged from 33.17 to 88.60 with an average of 70.21. Majority of the respondents 48 percent had high adoption followed by 18 percent and 34 percent low and medium adoption respectively.

Total Adoption: Farmers' adoption of modern maize cultivation ranged from 50.80 to 89.78 with an average of 74.13. Majority of the respondents (65 percent) had been medium to high adoption followed by 35 percent had low adoption.

5.1.3 Result of the hypothesis testing

In order to determine relationship between farmers' adopting of modern maize cultivation and their selected characteristics, Pearson's Product Moment Correlation Co-efficient (r) was calculated.

Among nine characteristics of the farmers, three were found having significant relationship with their adoption of modern maize cultivation. Farmers' education, farm size and extension contact showed positive relationship with adoption. The rest of characteristics viz. age, innovativeness, knowledge in maize cultivation, annual income, agricultural training exposure and cosmopolitanism of the farmers did not show any significant relationship with their adoption of modern maize cultivation.

5.1.4 Problems faced by the farmers

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

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. Farmers' adoption of modern maize cultivation according to four aspects was investigated in this study. Overall adoption of the four aspects was low among 35 percent of the farmers, medium among 35 percent and high 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, intercropping with maize and use of Sheller. But the farmers' adoption of recommended dose of urea fertilizer was low.
3. About 67 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.
4. Education of the farmers having significant positive relationship with their adoption of modern maize cultivation, one may conclude that maize production can be improved if educational levels of the growers could be upgraded.

5. Farm size of the farmer having positive significant relationship with their adoption of modern maize cultivation, one may conclude that large farmers get more scope than the small farmers as they can invest money for adoption of selected maize cultivation practices.
6. Extension contact had significant positive relationship with farmers' adoption of modern maize cultivation. It helps farmers to 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 maize cultivation.

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

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 cultivation, particularly intercropping use. The various GOs and NGOs specially the production project of DAE 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 encourage maize cultivation.
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 their production as well as enhance their farm income.

5.3.2 Recommendations for further study

1. The study was conducted on the farmers of only one selected area of Daudkandi 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 nine characteristics of farmers with their adoption of modern maize cultivation 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 cultivation.
3. Age, innovativeness, knowledge in maize cultivation, annual income, cosmopolitaness and agricultural training exposure were non-significantly related with their adoption of modern maize cultivation. 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 modern maize cultivation.

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Appendix-A

Department of Agricultural Extension & Information System Sher-e-Bangla
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Interview schedule on the research study entitled “Farmers’ Adoption of Modern
Maize Cultivation Technologies”

[The information collected through this interview schedule will be kept confidential
and will be used for academic purpose only]

Sample No:.....

Farmer’s name:

Village:.....

Union name:

Upazila:

District:

Please provide information on the following aspects:

1. Age:

What is your age?

Year (s)

2. Education:

What is your level of education?

- i. I don’t know how to read and write
- ii. I don’t know how to read and write but can sign only
- iii. I studied up to class
- iv. or I passed _____ examination
- v. 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 year of adoption and subsequent continuation of the following innovations

SL No.	Innovations	Do not use	Date of hearing after • _ _ _ technology	Year of adoption			
				1 st	2 nd	3 rd	4 th
1.	Use of power tiller						
2.	Use of IPM						
3.	Cultivation of BR-29 variety						
4.	Use of granular urea fertilizer						
5.	Use of compost fertilizer						
6.	Use of rice threshing machine						
7.	Use of deep tube well for irrigation						
8.	Use of weedicides						
9.	Use of light trap						
10.	Rice-cum-fish culture						

**4. Knowledge in maize cultivation:
Please answer the following question.**

SL .No.	Questions	Weighted	Obtained
1.	Which type of land is suitable for maize cultivation?	2	
2.	Mention two modern maize varieties?	2	
3.	What is the proper sowing time of maize seed?	2	
4.	What is the proper sowing method of modern maize varieties?	2	
5.	What is the ideal seed rate (kg/bigha) for modern maize varieties?	2	
6.	What is the number of seed per hill sowing of maize?	2	
7.	What is the ideal plant spacing for modern maize cultivation?	2	
8.	After how many days of sowing you should complete gap filling or thinning out?	2	
9.	Mention the rate of fertilizer per bigha is needed in maize cultivation?	2	
10.	What is the importance of applying balance fertilizer in maize?	2	
11.	After how many days of sowing the 1 st irrigation is required?	2	
12.	How many times irrigation is required for cultivating maize in rabi season?	2	
13.	Mention two diseases of maize?	2	
14.	Mention the name of a pesticide for maize seed treatment?	2	
15.	How can you control cutworm in maize field?	2	

Cont'd

16.	Mention two important crops that can be used in intercropping with maize?	2	
17.	What is the time of maize harvesting?	2	
18.	What is the suitable time of harvesting maize cob?	2	
19.	What is the best method for seed storing?	2	
20.	How can you test optimum moisture content for maize seed storage?	2	
	Total	40	

5. Farm size:

Mention the area of your land according to tenure

Types of land	Land area	
	Local unit	Hectare
Homestead		
Own land under own cultivation		
Land taken from others on lease		
Land given to others on lease		
Land taken from others on borgha		
Others/pond/ garden		
Total		

6. Annual income:

Give particulars about your income from different sources the last one year,

i.....Service and other profession

ii. From crops (vegetables, fish, field crops).

iii. From animal, poultry and fish

iv. From business.....

v. From other sources

Total income =

7. Cosmopolitaness:

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

SL. No.	Place of visit	Extent o visit			
		Frequently	Occasionally	Rarely	Not at all
1.	Visit to houses of friends, relatives and other known persons out 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 times/3	0
3.	To other upazila	4-5 times/3 months	2-3 times/3 months	One times/3	0
4.	To own district	4-5 times/6 months	2-3 times/6 months	One times/6	0
5.	To other district	4-5 times/year	2-3 times/year	One times/year	0
6.	Capital city	4-5 times/year	2-3 times/year	One times/year	0

8. Agricultural training exposure:

Do you participate to agricultural training programme ?

If yes, furnish the following information:

SL. No.	Name of the training course	Organization	Days

9. 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 time/ month	At least 1 time/2month	1-5 times/year	0
2.	Going to upazila agriculture officer.	3-4 time/ month	1-2 times/month	1-5 times/year	0
3.	Officer of other extension agencies (ULO, UFO, VAS)	3-4 time/ month	1-2 times/month	1-5 times/year	0
4.	Deputy Asst. Agriculture Officer	3-4 time/ month	1-2 times/month	At least once a year	0
5.	Other extension agents (e.g. Health worker)S	3-4 time/ month	1-2 times/month		0
6.	NGO worker	3 times/month	1-2 times/month	At least once a year	0
7.	Input dealers	3 times a year or more	1-2 times/month	At least once a year	0
8.	Participation in group meeting	3 times a year or more	1-2 times/year	At least once a year	0
9.	Participation in demonstration (method and result)	3 times a year or more	1-2 times/year	At least once a year	0
10.	Attending at agricultural fair, exhibition, farmers rally etc.	3 times a year or more	1-2 times/year	At least once a year	0
11.	Hearing agricultural programmes at radio	4-7 days/ week	1-3 days/week	1-3 days/month	0
12.	Watching agricultural programmes at television	4-7 days/week	2-3 days/ week	1-5 days/month	0
13.	Reading printed materials like leaflet, bulletin, magazines etc.	1 piece/month	3-5 pieces/ year	1-2 piece/year	0
14.	Watching agricultural posters, flip charts, advertisement (in news paper)	1 piece/month	3-5 pieces/ year	1-2 piece/year	0

I. Adoption of modern maize cultivation technologies

	2004		2005		2006		2007	
Technologies	Cultivated area (ha)	Potential area (ha)	Cultivated area (ha)	Potential area (ha)	Cultivated area (ha)	Potential area (ha)	Cultivated area (ha)	Potential area (ha)
Use of modern variety								
Maize based intercropping (potato, mustard, pulse)								
Use of recommended dose of urea (3 times)								
Use of sheller								

11. Problems confrontation in modern maize cultivation

SL. No.	Problems	Extent of problem			
		High	Moderate	Little	Not at all
1.	Non-availability of hybrid seed				
2.	Lack of technical information				
3.	Non-availability of credit				
4.	No seed production at 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 consume as food				
10.	Threshing problem				
11.	Non-availability of land for maize cultivation				
12.	Non- availability of storage facility at farmers level due to high moisture content				

Thank you for your kind co-operation.

Signature of the interviewer Dated:

Appendix -B: Correlation Matrix showing interrelation among all the variables (N=100)

	r_{1j}	x_2	x_3		x_5	x_6	x_7	x_8
1	1							
x_1	.7206 [^]	1						
x_2	-.241 [*]	.781 ^{''}	1					
x_3	-.119	.774 ^{''}	.777 ^{''}	1				
x_4	.168	.048	.062	-.071	1			
x_5	.222 [']	.045	.021	.166	.574 ^{''}	1		
x_6	-.270	.691 ^{''}	.698 ^{''}	.762	-.097	.018	1	
x_7	-.163	.083	.171	.000	.265 ^{**}	.013	-.057	1
x_8	-.055	.332 ^{''}	.144	.270 ^{''}	-.035	-.036	.111	.016
x_9	.117	-.207 [']	-.206 [']	-.453 ^{''}	.362 ^{''}	.064	-.447	.031
x_{10}	.147	.198 [']	.030	-.033	.211 ^{'*}	.155	-.061	-.039

*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)

x_1 = Age x_2 = Education x_3 = Innovativeness x_4 = Knowledge in maize cultivation x_5 = Farm size x_6 = Annual income x_7 = Cosmopolitaness x_8 = Agricultural training exposure x_9 = Extension media contact x_{10} = Problem confrontation in maize cultivation Y_1 = Adoption of modern maize cultivation

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