

**ATTITUDE OF FARMERS TOWARDS MAIZE CULTIVATION IN
NORTHERN REGION OF BANGLADESH**

A Thesis

By

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MASTER OF SCIENCE
IN
AGRICULTURAL EXTENSION

Department of Agricultural Extension
Hajee Mohammad Danesh Science and Technology University
Dinajpur

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Student No. 1605310
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The author

Attitude of Farmers towards Maize Cultivation in Northern Region of Bangladesh

ABSTRACT

The purposes of the study were to determine extent of attitude of farmers towards maize cultivation, to determine the relationships between the selected characteristics of maize growers and their attitude towards maize cultivation, and to identify the problems faced by the maize growers. The study was conducted in two unions namely Paltapur and Nijpara unions of Birganj upazila of Dinajpur district of northern region of Bangladesh. Data were collected from 96 maize growers with a structured interview schedule during 12 March to 10 April 2017 with the assistance of Bangladeshi student who is capable to talk in Bangle and English. The selected 10 characteristics of the maize growers were considered as independent variable and attitude towards maize cultivation was considered as dependent variable. The findings revealed that 64.58 percent of the respondents had moderately favorable attitude towards maize cultivation compared to 18.75 percent had unfavorable and only 16.67 percent had favorable attitude. In contrast to individual statements it is evident that out of twenty statements ‘awareness of farmers regarding identification of quality maize seeds lead to higher production’ has ranked first and ‘maize cultivation need a huge amount of irrigation’ is the least rank. Among the 10 characteristics of the maize growers’ four characteristics namely educational qualification, agricultural knowledge, extension media contact and innovativeness showed positive relationship with their attitude towards maize cultivation on other hand age and farm size showed negative relationship with their attitude towards maize and the rest were failed to show any relationship with the dependent variable. Almost all of the respondents faced similar problems to similar extent. On the other hand, the topmost problem identified by the farmers was ‘non-availability of seed’ and the last was ‘non availability of storage facility at farmers’.

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CHAPTER 1

INTRODUCTION

1.1 Background Information

Maize (*Zea mays*) is one of the most important crops in the world. Agricultural economy grows over an area of 170.9 million hectares with a production of 870.1 million tons (Prasanna *et al.*, 2014). Maize is the third major cereal after rice and wheat in Bangladesh. Though the use of maize for direct human consumption is decline, its utilization in feed and wet milling industry is increased at a much faster pace than anticipated (Tariq and Iqbal, 2010). Several factors like technological change, higher input usages, better pest management etc. have contributed to the increase in maize production (Gulati and Dixon, 2008). It is articulated that within 2050, the demand for maize in the developing countries will double (Prasanna *et al.*, 2014). As it has yield potential for higher than any other cereal, it is sometimes referred to as the miracle crop or ‘Queen of Cereals’ (Anonymous, 2011).

Maize can grow throughout the year in the tropical climate of Bangladesh. It is grown in three cropping seasons: (a) Rabi (November-February), (b) Pre-monsoon (March-June) and (c) Monsoon (July-October). It is introduces as relatively new crop in the cropping patterns of Bangladesh, especially in the northern region. The trends of maize production and yield, in Bangladesh, have increased significantly in the past three decades (Table 1). To meet the exponentially rising demand for maize grain for feed as well as feedstock, the maize area has increased. During the same period, the largest jump in maize yield was observed in Pakistan, followed by Bangladesh and Indonesia. However, Bangladesh and China harvest about 6.0 t/ha, which is higher than the world or Asian average.

Table 1.1 Area, production and yield of maize in some Asian countries

Country	Area (hectare)			Production (Metric ton)			Yield (ton/hectare)		
	TE 1992	TE 2002	TE 2012	TE 1992	TE 2002	TE 2012	TE 1992	TE 2002	TE 2012
Bangladesh	Negl.	0.02	0.2	Negl.	0.1	1.3	1.0	3.6	6.0
India	5.9	6.6	8.6	9.0	12.1	21.5	1.5	1.8	2.5
Pakistan	0.9	0.9	1.0	1.2	1.7	3.8	1.4	1.8	3.9
China	21.4	24.0	33.7	97.4	114.0	192.9	4.6	4.8	5.7
Indonesia	3.2	3.3	4.0	7.0	9.5	18.5	2.2	2.9	4.6

TE= Total Evaluation

Source: FAOSTAT (<http://faostat3.fao.org/faostat-gateway/go/to/download/Q/QC/E>)

Although maize is the third major cereal after rice and wheat in Bangladesh. Farmers of Bangladesh were not experienced in commercial cultivation of maize. During the last few years, farmers have widely adopted cultivated of hybrid varieties of maize in their farming systems. Now-a-days they have been influenced by a number of Government Organizations (GOs) and Non-government Organizations (NGOs) to adopt hybrid varieties of maize. However, popularity of maize among the farmers of Bangladesh is sharply increased in the last few years (Table 1.2).

Table 1.2 Area, yield and volume of production of major cereal crops

Cereal crops	Year								
	2012-13			2013-14			2014-15		
	Area (Acres)	Production (Mt)	Yield (Kg)	Area (Acres)	Production (Mt/ha)	Yield (Kg/acre)	Area (Acres)	Production (Mt/acre)	Yield (Kg/acre)
Rice	28228	33833	1199	28101	34356	1222	28209	34710	1230
Wheat	1029	1255	1220	1062	1303	1226	1079	1348	1249
Maize	580	1548	2669	759	2123	2797	804	2272	2826

Source: BBS, 2015

Expert pointed out that rapid switch over to hybrid maize seeds from the traditional composite seeds held the magic behind Bangladesh's earning the distinction of highest maize yielding country in Asia. Public sector procurement of maize has been introduced like rice and wheat in order to encourage farmers in maize cultivation (Miajy, 2005).

1.2 Statement of the Problem

Attitude of a person plays an important role in the adoption or rejection of an innovation. It is needless to mention that success or failure of any developmental program or activity to a large extent depends upon the attitude of its clientele towards the proposed program. Experiences drawn from different studies have demonstrated that the people having favorable attitude towards an object reflects a cumulative positive effect in the form of favorable reactions. It has been found that people generally accept all those things which boost their ego and thus form a highly favorable attitude towards the same, whereas they simply abandon the idea which is tortuous to them and thus form a relatively negative attitude towards the same (Paul *et al.*, 2011). Farmers' attitudes determine the adoption of improved technology. Attitudes are evaluative responses towards the technology, and are formed as farmers gain information about it. Adopters tend to hold positive attitudes towards the technology (Chilonda and Van Huylenbroeck, 2001). This is quite evident that attitude plays crucial role in the adoption behavior of an individual with all this in background, the present investigation was undertaken to study the attitude of farmers towards maize cultivation in northern region of Bangladesh. Considering the above facts the following research questions were put forward:

1. What is the existing level of attitude of farmers on modern maize cultivation?
2. What are the farmers' characteristics that directly related to their attitude towards maize cultivation?
3. What are the relationships between the selected characteristics of the farmers and their attitude towards maize cultivation?
4. What are the problems faced by the maize growers?

1.3 Objectives of this study

Attitude as a component of human behavior is the pre-requisite for any action, which plays a dominant role in adoption of new technologies. Therefore, an investigation was undertaken with the objectives:

1. To determine extent of attitude of farmers towards maize cultivation.
2. To determine the relationships between the selected characteristics of maize growers and their attitude towards maize cultivation. The selected characteristics were:
 - i. Age
 - ii. Educational qualification
 - iii. Farm size
 - iv. Maize cultivation area
 - v. Annual income
 - vi. Agricultural knowledge
 - vii. Training experience
 - viii. Extension media contact
 - ix. Cosmopolitaness, and
 - x. Innovativeness
3. To identify the problems faced by the maize growers.

1.4 Significance of the Study

More than 90 percent of maize is used as poultry feed and the remaining in fish sector and as human food products. The country's poultry industry continues to grow and so there is also a growing demand for maize. Farmers cultivating maize are not completely aware of the benefits of maize cultivation. They are not interested to invest for maize cultivation as they do not have proper information on maize farming and marketing techniques (Hasan, 2008). There is a great scope to utilize maize as an alternative food to reduce the pressure on rice. Vitamin A rich maize is an example that has potential in addressing micronutrient deficiencies and promoting dietary diversity among the populations. Along with the higher amount of carbohydrate (66.2 percent) the protein content (11.1 percent) of maize is higher than rice, but this is of somewhat poor quality (USAID, 2010).

The efficacy of technology dissemination depends mostly on the factors that influence adoption by the farmers. Extension educators need to understand the factors affecting technology adoption in order to deliver effective programs. Sources of information, including extension, enhance the adoption of technology (Abebaw and Belay, 2001). Adoption of technology is influenced by many factors including age, education, knowledge, source of information, and farmer's attitudes towards the technology. Farmers who have adequate knowledge of technology use are likely to adopt it (Rogers, 2003). Young farmers are more likely to adopt a new technology because they have had more schooling and are more susceptible to attitude change than old farmers (CIMMYT, 1993). Farmers' attitudes determine adoption of improved technology. Attitudes are evaluative responses towards the technology, and are formed as farmers gain information about it. Adopters tend to hold positive attitudes towards the technology (Chilonda and Van Huylenbroeck, 2001).

1.5 Assumptions of the Study

The assumption has been defined as the supposition that an apparent fact or principle is true in the light of available evidence (Goode, 1945). The researcher made following assumptions while undertaking this study:

1. The respondents included in the sample for this study were capable enough to furnish proper responses to the questions set up in the interview schedule.
2. The sample size was representation of the whole population of the study area.
3. The questions and items and scale used in measuring variables were supposed to the answer of the respondent.
4. The views and opinions furnished by the respondents were reliable and they expressed the truth while passing their opinions and providing information and data.
5. All the data containing the selected characteristics of the respondents and focus issue were normally and independently distributed with their respective means and standard deviation.
6. The researcher who acted as interviewer with the help of trained enumerators was well adjusted of the study area. Hence, the respondents furnished their correct opinions with joy due to foreign researcher.

1.6 Scope of the Study

The main focus of the study was to determine extent of attitude of farmers towards maize cultivation. The findings will be specifically applicable to Dinajpur 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 special interest to the policy makers and planners in formulating redesigning the extension programs especially for maize cultivation. The findings are expected to be helpful to the field workers of different nation building department and organizations to develop appropriate extension strategies for effective working with the rural people.

1.7 Limitations of the Study

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

1. 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.
2. Populations 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 innovations.
3. The study was confined mainly to determine extent of attitude of maize farmers towards maize cultivation of Birganj upazila (sub-district) under Dinajpur district.
4. The attitude of the farmers was measured on the basis of their responses to selected statements.
5. A large number of sample sizes was more representative and provides more accurate information. Due to limitations of time and other resources, it was not possible to work with a big sample. Thus, only 96 farm household heads were selected for the study from a population of 655.
6. Facts and figures were collected by the investigator applied to the present situation in the selected area.

1.8 Definition of Important Terms

For the purpose of clarity, certain terms frequently used throughout the entire study are defined and explained as follows:

Age of a respondent defined as the span of his life and is measured by the number of years from his birth to the time of interviewing.

Educational qualification referred to the development of desirable knowledge, skill and attitude in an individual through the experience of reading, writing, observation and relative activities.

Farm size means the total area of land on which a farmer's family carries on farming operations in terms of full benefit to the family.

Maize cultivation area referred to the area in hectare of maize cultivation by the farmers in particular seasons (two proceeding seasons of data collection).

Annual income refers to the cumulative earnings of a respondent and family members debited from farming, business, services etc. in a year.

Agricultural knowledge is the sum of the respondents' body of information regarding different issues of agriculture, which based on their own experience, training and education.

Training received was defined as participating days in training on various aspects of activities organized by the extension agencies till to interviewing.

Extension media contact referred to one's becoming accessible to the influence of extension contact through different extension teaching methods or refers to the individual exposure to or contact with information sources.

Cosmopoliteness was defined as the orientation of an individual external to his own social system. Empirically it referred to the number of times a person played his visit to places other than his own locality.

Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system (Rogers, 2003).

Attitude towards maize cultivation refers to the belief, feeling and action tendencies of the farmers towards technologic innovations regarding maize cultivation activities already practiced in the locally.

Problem confrontation of the respondent refers to the problem faced by him in conducting maize cultivation activities.

Farmer means the principal decision maker involved in the management of a farm, not always be the head of the farm-household (Khan, 2004).

Respondent referred to the farmers who were involved in transformation of crop land into litchi orchard and were interviewed as a part of the sample of the study.

Maize growers are referred as the farmers who were cultivated modern varieties of maize during the session 2016.

Intercropping is the simultaneous cultivation of two or more crops on the same field.

Hybrid seeds are produced by artificial cross-pollination of improved varieties. Hybrids usually provide better yield, improved color, and are of more disease resistant. Hybrid is considered as one of the main contributing factors to increase the yield of crops. The improved characteristics of hybrid seeds cannot be reproduced through natural pollination. So, new seed must be purchased for each planting.

CHAPTER 2

REVIEW OF LITERATURE

In this Chapter, review of literature relevant to the objectives is presented. This is mainly concerned with farmers' attitude towards the maize cultivation. This Chapter has been presented under seven sections. First section deals with concept of attitude, the second section deals with formation of attitude, the third section deals with changes of attitude, the fourth section deals with influences of attitude on behavior, fifth section deals with general review on farmers' attitude, the sixth section deals with review related to the selected characteristics and the last section deals with the conceptual framework of the study.

2.1 Concept of Attitude

Goode (1945) in his dictionary of education define the term as state of mental and educational readiness to react to situation, process or things, in harmony with a habitual pattern of response previously conditioned to or associated with these.

Cambell (1950) defined attitude of an individual as an enduring syndrome response consistency with regards to a set of social objects.

Rosenburg and Hovland (1960) an attitude is an idea changed with emotion which predisposes a class or actions to a particular class or social situation. This definition suggests that attitude has three components namely; cognition, affective and behavioral.

Baldwin (1967) referred to attitude as a specific mental disposition towards an incoming or arising experience, whereby experience is modified; or in other words, it is a condition of readiness for a certain types of activity.

A predisposition or a tendency to respond positively or negatively towards a certain idea, object, person or situation. Attitude influences an individual's choice of action, and responses to challenges, incentives, and rewards (Business Dictionary, 2012).

The readiness to respond to a certain object in a favorable or unfavorable fashion; every attitude has both an intrinsic belief and a behavioral disposition. Attitudes are a permanent system of evaluations, emotions, and direct behavioral tendencies for or against an object.

Individuals develop their attitudes through a continuous process of adaptation to the social environment. Attitudes are organized ways of thinking and acting in relation to facts and people in our environment, and they help influence our overall way of life.

Psychologist defines attitudes as a learned tendency to evaluate things in a certain way. This can include evaluations of people, issues, objects or events. Such evaluations are often positive or negative, but they can also be uncertain at times. For example, one might have mixed feelings about a particular person or issues.

Researchers also suggest that there are several different components that make up attitudes.

- An Emotional Component: How the object, person, issue or event makes one feel?
- A Cognitive Component: One's thoughts and beliefs about the subject.
- A Behavioral Component: How the attitude influences one's behavior?

Attitudes can also be explicit and implicit. Explicit attitudes are those that we are copiously aware and that clearly influence our behaviors and beliefs. Implicit attitudes are unconscious, but still have an effect on our beliefs and behaviors (Cherry, 2012).

2.2 Formation of Attitude

Attitudes form directly as a result of experience. They may emerge due to direct personal experience, or they may result from observation. Social roles and social norms can have a strong influence on attitudes. Social roles relate to how people are expected to behave in a particular role or context. Social norms involve society's rules for what behaviors are considered appropriate.

Attitudes can be learned in a variety of ways. Consider how advertisers use classical conditioning to influence your attitude toward a particular product. In a television commercial, one see young, beautiful people having fun in on a tropical beach while enjoying a sport drink. This attractive and appealing imagery causes you to develop a positive association with this particular beverage.

Operant conditioning can also be used to influence how attitudes develop. Imagine a young man who has just started smoking. Whenever he lights up a cigarette, people complain, chastise him and ask him to leave their vicinity. This negative feedback from those around him eventually causes him to develop an unfavorable opinion of smoking and he decides to give up the habit.

Finally, people also learn attitudes by observing the people around them. When someone you admire greatly espouses a particular attitude, you are more likely to develop the same beliefs.

For example, children spend a great deal of time observing the attitudes of their parents and usually begin to demonstrate similar outlooks (Cherry, 2012).

2.3 Changes of Attitude

While attitudes can have a powerful effect on behavior, they are not set in stone. The same influences that lead to attitude formation can also create attitude change. The theories of attitude that can influence people's attitude are:

Learning theory of attitude change: Classical conditioning, operant conditioning and observational learning can be used to bring about attitude change. Classical conditioning can be used to create positive emotional reactions to an object, person or event by associating positive feelings with the target object. Operant conditioning can be used to strengthen desirable attitudes and weaken undesirable ones. People can also change their attitudes after observing the behavior of others.

Elaboration likelihood theory of attitude change: This theory of persuasion suggests that people can alter their attitudes in two ways. First, they can be motivated to listen and think about the message, thus leading to an attitude shift, or they might be influenced by characteristics of the speaker, leading to a temporary or surface shift in attitude. Messages that are thought-provoking and that appeal to logic are more likely to lead to permanent changes in attitudes.

Dissonance theory of attitude change: As mentioned earlier, people can also change their attitudes when they have conflicting beliefs about a topic. In order to reduce the tension created by these incompatible beliefs, people often shift their attitudes (Cherry, 2012).

2.4 Influence of Attitude on Behavior

We tend to assume that people behave in accordance with their attitudes. However, social psychologists have found that attitudes and actual behavior are not always perfectly aligned. After all, plenty of people support a particular candidate or political party and yet fail to go out and vote.

Researchers have discovered that people are more likely to behave according to their attitude under certain conditions:

- When one's attitudes are the result of personal experience.
- When one is an expert in the subject.
- When one expects a favorable outcome.
- When the attitudes are repeatedly expressed.
- When one stands to win or lose something due to the issue.

In some cases, people may actually alter their attitudes in order to better align them with their behavior. Cognitive dissonance is a phenomenon in which a person experiences psychological distress due to conflicting thoughts or beliefs. In order to reduce this tension, people may change their attitudes to reflect their beliefs or actual behaviors (Cherry, 2012).

2.5 General Review on Farmers' Attitude

Pandya and Timbadia (2016) revealed that slightly more than half (66 percent) of respondents had most favorable attitude towards soil health card program. While, 22 percent, 10 percent, 2 percent, respondent had favorable, neutral, and unfavorable attitude towards soil health card program, respectively.

Shah *et al.* (2016) in their findings confirmed that a majority of non-adopters (67.1 percent) and de-adopters (68.0 percent) showed neutral attitudes while the majority of continuing adopters (58.9 percent) developed favorable attitudes towards cultivating hybrid rice.

Singh *et al.* (2015) concluded that 73.0 percent of the respondents were found having medium level of attitude towards agro-forestry followed by 14.0 and 13.0 percent who had high and low levels of attitude towards agro-forestry system respectively.

Rahman (2015) observed that about 77.78 percent of the respondents had high favorable attitude towards the rice cultivation and 22.22 percent of the respondents had low favorable attitude towards the rice cultivation.

Hussain (2014) concluded that a majority of the respondents (74.36 percent) had low favorable attitude towards commercial flower production whereas 10.26 percent had unfavorable attitude, 11.11 percent had neutral attitude and only 4.27 percent of the respondents had highly favorable attitude towards commercial flower production.

Monalesa (2014) observed that about 49.5 percent of the farmers had favorable attitude, while 37.6 percent farmers had unfavorable attitude and 12.9 percent farmers showed neutral attitude towards summer tomato cultivation.

Mondal (2014) concluded that all most all (97.3 percent) of the respondents had favorable attitude towards strawberry cultivation and rest 1.8 percent and 0.9 percent of the respondents had neutral and unfavorable attitude towards strawberry cultivation.

Singh *et al.* (2014) observed that more than half of the farmers (56.34 percent) had favorable and most favorable attitude towards improved technology of wheat cultivation, 20.33 percent small farmers had unfavorable and most unfavorable attitude, while 23.33 percent farmers showed neutral attitude towards improved technology of wheat cultivation.

Ghosh and Hasan (2013) found that an overwhelming majority (79 percent) of the respondents had medium to high attitude towards sustainable agriculture.

Khan (2012) reported that the majority (64 percent) of the jujube farmers had moderately favorable attitude towards modern jujube cultivation compared to 29 percent having favorable attitude and only seven percent had unfavorable attitude.

Rahman *et al.* (2010) concluded that majority (67 percent) of the farmers had moderately favorable attitude towards vegetable cultivation followed by 26 percent slightly favorable while only seven percent had highly favorable attitude towards vegetable cultivation.

Samad (2010) found that the majority (69.84 percent) of the farmers had favorable attitude, while one percent had unfavorable attitude and 29.16 percent had neutral attitude for the project farmers. The attitude score of non-project farmers showed that the majority (58.33 percent) possessed neutral attitude, 2.08 percent had unfavorable attitude and 39.59 percent had favorable attitude towards aerobic rice cultivation.

Ahmed (2006) found that overwhelming majority (87 percent) of the shrimp farmers had favorable attitude towards shrimp farming compared to seven percent having neutral and only six percent had unfavorable attitude.

Uddin *et al.* (2006) reported that equal portion of the farmers (39 percent) having moderately favorable and highly favorable attitude towards sustainable agriculture. On the other hand, four percent and 18 percent farmers had highly favorable and moderately favorable attitude towards sustainable agriculture respectively.

Khan (2005) reported that the overwhelming majority (93.14 percent) of the groundnut farmers had favorable attitude towards groundnut cultivation compared to 4.90 percent having neutral and only 1.96 percent had unfavorable attitude. However, the groundnut farmers faced such major problem as unavailability of good seeds scarcity of labors in sowing and harvesting time and heavy rainfall in harvesting time.

Farhad and Kashem (2004) observed that the majority (68 percent) of the respondents had medium attitude while 17 percent low attitude and 15 percent high attitude in using IPM in vegetable cultivation.

Sarkar (2004) revealed that 28.75 percent of the farmers had favorable attitude towards crop cultivation, while 51.25 percent had moderately favorable attitude and the rest 20 percent had less favorable attitude towards improved agricultural technologies.

Chowdhury (2003) observed that majority of the farmers in progressive village had moderately favorable attitude (52 percent) compared to farmers of traditional village of

whom 43 percent had moderately favorable and 29 percent had moderately unfavorable attitude towards crop diversification. Farmers of progressive village having favorable attitude towards crop diversification were more than the farmers of traditional village. Overall 61 percent farmers of the study area had moderately favorable to highly favorable attitude towards crop diversification.

Afrad (2002) revealed that majority (59.1 percent) of the farmers had favorable attitude towards vegetable cultivation while 40.9 percent had moderately favorable attitude towards vegetable cultivation.

Rahman (2001) found that the highest proportion (49 percent) of the Binadhan-6 growers had unfavorable, 24 percent highly favorable and 26 percent had favorable attitude towards Binadhan-6.

Bari (2000) found that the highest proportion of rice growers had moderate, 27.0 percent unfavorable and 28.0 percent had favorable attitude towards hybrid rice AALOK 6201.

2.6 Reviews on Relationship between Selected Characteristics of Farmers' and Attitude

2.6.1 Age and attitude

Singh *et al.* (2015) concluded that there was no significant relationship between age of the respondents and their attitude about agro-forestry system.

Rahman (2015) concluded that age of the farmers had significant positive relationship with their attitude towards BRRI dhan47 cultivation.

Singh *et al.* (2014) concluded that there was significant positive relation between ages of the farmers with their attitude towards improved wheat production technology.

Haneishi *et al.* (2014) in their study observed that age of the farmers had significantly correlated with their risk attitudes to influence the productivity and planting decision.

Ghosh and Hasan (2013) concluded that age of the farmers shows negative but non-significant relationship with their attitude towards sustainable agricultural practices.

Khan (2013) examined that age of the responds shows negative but non-significant relationship with attitude towards farmers' attitude.

Khan (2012) observed that there was no significant relationship between age of the farmers and their attitude towards modern jujube cultivation.

Darandale and Soni (2011) examined that age of the respondents shows negative but non-significant relationship with their attitude towards organic farming in maize crop.

Darandale *et al.* (2009-2010) concluded that age of the tribal maize growers shows negative but non-significant relationship with their attitude towards organic farming.

Parvez (2007) reported that there was non-significant relationship between age of the farmers and their attitude towards IPM for HYVs production.

Chowdhury *et al.* (2006) in their study observed that age of the farmers was non-significant relationship with their attitude towards sustainable agriculture.

Haque (2006) concluded that age of the responds shows negative but non-significant relationship with attitude.

Uddin *et al.* (2006) observed that age of the respondents had significantly correlated with their attitude towards sustainable agriculture.

Khan (2005) concluded that there was no significant relationship between age of the farmers and their attitude towards ground nut cultivation.

Alam *et al.* (2004) found that there was a positive significant relationship between age of the rural women and their attitude towards homestead vegetable cultivation.

Chowdhury (2003) in his study found that there was no significant relationship between age of the farmers and their attitude towards crop diversification.

Afrad (2002) concluded that there was no significant relationship between age of the farmers and their attitude towards vegetable cultivation.

Rahman (2001) in his study reported that there was no significant relationship between age of the farmers and their attitude of farmers towards Binadhan-6.

2.6.2 Educational qualification and attitude

Singh *et al.* (2015) concluded that there was no significant relationship between education of the respondents and their attitude about agro-forestry system.

Rahman (2015) concluded that level of education of the farmers had significant positive relationship with their attitude towards BRRI dhan47 cultivation.

Singh *et al.* (2014) concluded that there was significant positive relation between educations of the farmers with their attitude towards improved wheat production technology.

Mithun (2013) observed that level of education had positive and significant relationship with the attitude of the farmers towards sustainable agriculture.

Khan (2012) concluded that education of the responds shows non-significant relationship with their attitude towards modern jujube cultivation.

Darandale and Soni (2011) observed that educational qualification of the tribal maize growers had positive and significant relationship with their attitude of towards organic farming.

Samad (2010) reported that education of the farmers had positive and significant relationship with their attitude towards aerobic rice cultivation.

Darandale *et al.* (2009-2010) in their study concluded that educational qualification of the tribal maize growers shows positive and significant relationship with their attitude towards organic farming.

Rahman *et al.* (2007) concluded that education of the farmers shows positive and significant relationship with their attitude.

Chowdhury *et al.* (2006) in their study found that education of the farmers had positive and significant relationship with their attitude towards sustainable agriculture.

Uddin *et al.* (2006) concluded that educational qualification of the respondents had positive and significant relationship with their attitude towards sustainable agriculture.

Khan (2005) concluded that educational qualification of the farmers had positive and significant relationship with their attitude towards ground nut cultivation.

Farhad and Kashem (2004) observed that education of the rural women had positive and significant relationship with their attitude towards using IPM practices in vegetable cultivation.

Chowdhury (2003) concluded that education of the farmers had positive and significant relationship with their attitude towards crop diversification.

Afrad (2002) reported that educational qualification of the farmers had positive and significant relationship with their attitude towards vegetable cultivation.

Rahman (2001) observed that there was no significant relationship between education of the farmers and their attitude of farmers towards Binadhan-6.

2.6.3 Farm size and attitude

Aus (2014) concluded that farm size of the farmers showed positively significant with their attitude towards commercial flower production.

Singh *et al.* (2014) concluded that there was significant positive relation between farm size of the farmers with their attitude towards improved wheat production technology.

Ghosh and Hasan (2013) concluded that farm size of the farmers' had positive and significant relationship with their attitude towards sustainable agricultural practices.

Khan (2012) observed that farm size of the responds shows non-significant relationship with attitude towards farmers' attitude.

Darandale and Soni (2011) observed that farm size of the farmers had positive and significant relationship with their attitude towards organic farming in maize crop.

Darandale *et al.* (2009-2010) observed that farm size of the tribal maize growers shows positive and significant relationship with their attitude towards organic farming.

Parvez (2007) reported that there was no significant relationship between farm size of the farmers and their attitude towards IPM for HYVs production.

Chowdhury *et al.* (2006) in their study observed that farm size of the farmers had positive and significant relationship with their attitude towards sustainable agriculture.

Uddin *et al.* (2006) concluded that farm size of the farmers' had positive and significant relationship with their attitude towards sustainable agriculture.

Khan (2005) concluded that farm size of the farmers had positive and significant relationship with their attitude towards ground nut cultivation.

Afrad (2002) observed that farm size of the farmers' had positive and significant relationship with their attitude towards vegetable cultivation.

2.6.4 Area under maize cultivation and attitude

Rahman (2015) concluded that rice cultivation area of the farmers had significant positive relationship with their attitude towards BRRI dhan47 cultivation.

Hussain (2014) concluded that land under flower cultivation of the farmers showed positively significant with their attitude towards commercial flower production.

Khan (2012) observed that area under jujube cultivation of the responds had positive and significant relationship with attitude towards farmers' attitude.

Rahman *et al.* (2007) found that there was no significant relationship between cultivation area of the farmers and their attitude towards organic farming.

Sarker (2002) reported that cultivation area of the farmers had a positive significant relationship with their attitude.

2.6.5 Annual family income and attitude

Singh *et al.* (2015) concluded that there was no significant relationship between annual income of the respondents and their attitude about agro-forestry system.

Singh *et al.* (2014) concluded that there was significant positive relation between incomes of the farmers with their attitude towards improved wheat production technology.

Ghosh and Hasan (2013) concluded that there was no significant relationship between annual income of the farmers' and their attitude towards sustainable agricultural practices.

Darandale and Soni (2011) observed that annual income had positive and significant correlation with attitude towards organic farming in maize crop.

Darandale *et al.* (2009-2010) concluded that annual income of the farmers had positive and significant correlation with their attitude towards organic farming.

Parvez (2007) concluded that there was no significant relationship between annual income of the farmers and their attitude towards IPM for HYVs production.

Chowdhury *et al.* (2006) in their study observed that annual income of the farmers was non-significant relationship with their attitude towards sustainable agriculture.

Uddin *et al.* (2006) concluded that annual income of the farmers had positive and significant correlation with their attitude towards sustainable agriculture.

Khan (2005) concluded that there was no significant relationship between annual income of the farmers and their attitude towards ground nut cultivation.

Chowdhury (2003) concluded that annual income of the farmers had positive and significant correlation with their attitude towards crop diversification.

Afrad (2002) observed that there was no significant relationship between annual income of the farmers and their attitude towards vegetable cultivation.

Rahman (2001) observed that annual income had positive and significant correlation with attitude of farmers towards Binadhan-6.

Bari (2000) found that there was significant negative relationship between family income and attitude of farmers towards hybrid rice AALOK 6201.

2.6.6 Agricultural knowledge and attitude

Singh *et al.* (2015) concluded that knowledge of the respondents had positive and significant relationship with their attitude about agro-forestry system.

Ghosh and Hasan (2013) concluded that farm knowledge of the farmers had positive and significant relationship with their attitude towards sustainable agricultural practices.

Darandale and Soni (2011) observed that knowledge of the farmers had positive and significant relationship with their attitude towards organic farming in maize crop.

Samad (2010) observed that agricultural knowledge of the respondents had positive and significant relationship with their attitude towards aerobic rice cultivation.

Darandale *et al.* (2009-2010) observed that agricultural knowledge of the tribal maize grower's shows positive and significant relationship with their attitude towards organic farming.

Khan (2005) observed that knowledge of the farmers had positive and significant relationship their attitude towards ground nut cultivation.

Chowdhury (2003) concluded that agricultural knowledge of the farmers had positive and significant correlation with their attitude towards crop diversification.

Afrad (2002) observed that farm agricultural knowledge of the farmers' had positive and significant relationship with their attitude towards vegetable cultivation.

Rahman (2001) observed that agricultural knowledge had positive and significant correlation with attitude of farmers towards Binadhan-6.

2.6.7 Training experience and attitude

Shah *et al.* (2016) observed that between training experiences of the farmers had significant positive relationship with their attitudes towards hybrid rice.

Hussain (2014) concluded that training exposure of the farmers showed positively significant with their attitude towards commercial flower production.

Khan (2012) observed that training exposure of the responds shows negative and non-significant relationship with their attitude towards modern jujube cultivation.

Samad (2010) reported that training experience had significant positive relationships with their attitude towards aerobic rice cultivation.

Ahmed (2006) observed that training experience of the farmers had significant positive relationships with their attitude towards shrimp farming.

Khan (2005) observed training experience of the respondent had significant positive relationships with their attitude towards ground nut cultivation.

Sarker (2004) reported that training of the respondents had significant positive relationships with their attitude towards improved agricultural technologies.

Chowdhury (2003) observed that that training exposure of the farmers' had non-significant relationship with their attitude towards crop diversification.

Afrad (2002) concluded that training exposure of the farmers' had non-significant relationship with their attitude towards vegetable cultivation.

Bari (2001) reported that training exposure of the farmers had no relationship with their attitude.

2.6.8 Extension media contact and attitude

Shah *et al.* (2016) observed that between communications exposure of the farmers had significant positive relationship with their attitudes towards hybrid rice.

Singh *et al.* (2015) concluded that extension contact of the responds shows negative and non-significant relationship with their attitude about agro-forestry system.

Rahman (2015) concluded that extension contact of the farmers had significant positive relationship with their attitude towards BRRI dhan47 cultivation.

Singh *et al.* (2014) concluded that there was significant positive relation between contacts with extension agency of the farmers with their attitude towards improved wheat production technology.

Aus (2014) concluded that extension contact of the farmers showed positively significant with their attitude towards commercial flower production.

Ghosh and Hasan (2013) concluded that extension contact of the responds shows positive and significant relationship with their attitude towards sustainable agricultural practices.

Khan (2013) observed that communication media contact of the responds shows positive and significant relationship with attitude towards farmers' attitude.

Darandale and Soni (2011) observed that extension media contact of the respondents had positive and significant relationship with their attitude towards organic farming in maize crop.

Darandale *et al.* (2009-2010) observed that extension contact of the tribal maize growers shows positive and significant relationship with their attitude towards organic farming.

Ahmed (2006) observed that extension contact of the respondents had significant positive relationships with their attitude towards shrimp farming.

Uddin *et al.* (2006) observed that extension media exposure of the respondents did not show significant relationship with their attitude towards sustainable agriculture.

Khan (2005) reported that extension media contact of the respondents did not show significant relationship with their attitude towards ground nut cultivation.

Farhad and Kashem (2004) observed that extension contact of the respondents had significant positive relationships their attitude towards using IPM practices in vegetable cultivation.

Sarker (2004) reported that extension media contact of the respondents had significant positive relationships with their attitude towards improved agricultural technologies.

Chowdhury (2003) concluded that extension contact of the farmers did not show significant relationship with their attitude towards crop diversification, Bari (2000) similar results in their respective studies.

Afrad (2002) concluded that extension contact of the responds shows positive and significant relationship with their attitude towards vegetable cultivation.

Rahman (2001) observed that extension media contact of the responds shows positive and significant relationship their attitude towards Binadhan-6.

2.6.9 Cosmopolitaness and attitude

Ghosh and Hasan (2013) concluded that cosmopolitaness of the farmers had positive and significant relationship with their attitude towards sustainable agricultural practices.

Samad (2010) concluded that cosmopolitaness of the farmers had positive and significant relationship with their attitude towards aerobic rice cultivation.

Ahmed (2006) observed that cosmopolitaness of the respondents did not show significant relationship with their attitude towards shrimp farming.

Uddin *et al.* (2006) observed that cosmopolitaness of the respondents did not show significant relationship with their attitude towards sustainable agriculture.

Khan (2005) reported that cosmopolitaness of the respondents did not show significant relationship with their attitude towards ground nut cultivation.

Farhad and Kashem (2004) concluded that cosmopolitaness of the farmers had positive and significant relationship with their attitude towards using IPM practices in vegetable cultivation.

Sarker (2004) reported that cosmopolitaness of the farmers had positive and significant relationship with their attitude towards improved agricultural technologies.

Chowdhury (2003) observed that cosmopolitaness of the farmers' had positive and significant relationship with their attitude towards crop diversification.

Afrad (2002) concluded that cosmopolitaness of the farmers' had positive and significant relationship with their attitude towards vegetable cultivation.

Rahman (2001) observed concluded that cosmopolitaness of the farmers' had positive and significant relationship with their attitude towards Binadhan-6.

2.6.10 Innovativeness and attitude

Uddin *et al.* (2006) observed that innovativeness of the respondents had positive and significant relationship with their attitude towards sustainable agriculture.

Khan (2005) reported that innovativeness of the respondents had positive and significant relationship with their attitude towards ground nut cultivation.

Chowdhury (2003) observed that that innovativeness of the farmers' had non-significant relationship with their attitude towards crop diversification.

Rahman (2001) concluded that innovativeness of the respondents had positive and significant relationship with their attitude towards Binadhan-6.

2.7 Conceptual Framework

Conceptual framework (theoretical framework) is a type of intermediate theory that attempt to connect to all aspects of inquiry (e.g. problem definition, purpose, literature review, methodology, data collection and analysis). Theoretical frameworks can act like maps that give coherence to empirical inquiry. Because theoretical framework is potentially so close to empirical inquiry, they take different forms depending upon the research questions or problem (Wikipedia, 2012).

In order to develop the conceptual framework for the independent and dependent variables of this study, attitude was conceptualized having three components: i) cognitive domain come from head, affective domain come from heart and iii) behavior component come from different visible parts of the body such a hand, skin, air, eye, etc. From the past studies and literature it was observed that various factor influenced and affected farmers in acquiring their attitude towards innovation.

In this study the researcher attempts to highlight three concepts, namely farmers' selected characteristics, attitude of farmers towards maize cultivation and problems being faced by the maize growers. An individual's attitude may be influenced by his/her personal characteristics and through other interacting forces in his/her surroundings. As it is quite impossible to deal with all the forces and characteristics in a single study, it was therefore, need to be confirmed with some selected characteristics which were age, educational qualification, farm size, maize cultivation area, annual income, agricultural knowledge, training experience, extension media contact, cosmopoliteness and innovativeness. In order to have a clear understanding of the nature of problems ten selected items were considered in this regard. However, relating other situational factors with farmer's attitude was not considered in this study. In contrast, problems faced by the maize growers may hamper formation of positive attitude. Personal characteristics may also influence attitude. The solid one-way arrows indicate the cause-effect relationships which have been investigated and the broken one-way arrows indicate the relationships which have not been investigated in the present research work. On the basis of above discussion and review of literature, the conceptual framework if this study has been structured (Figure 2.1).

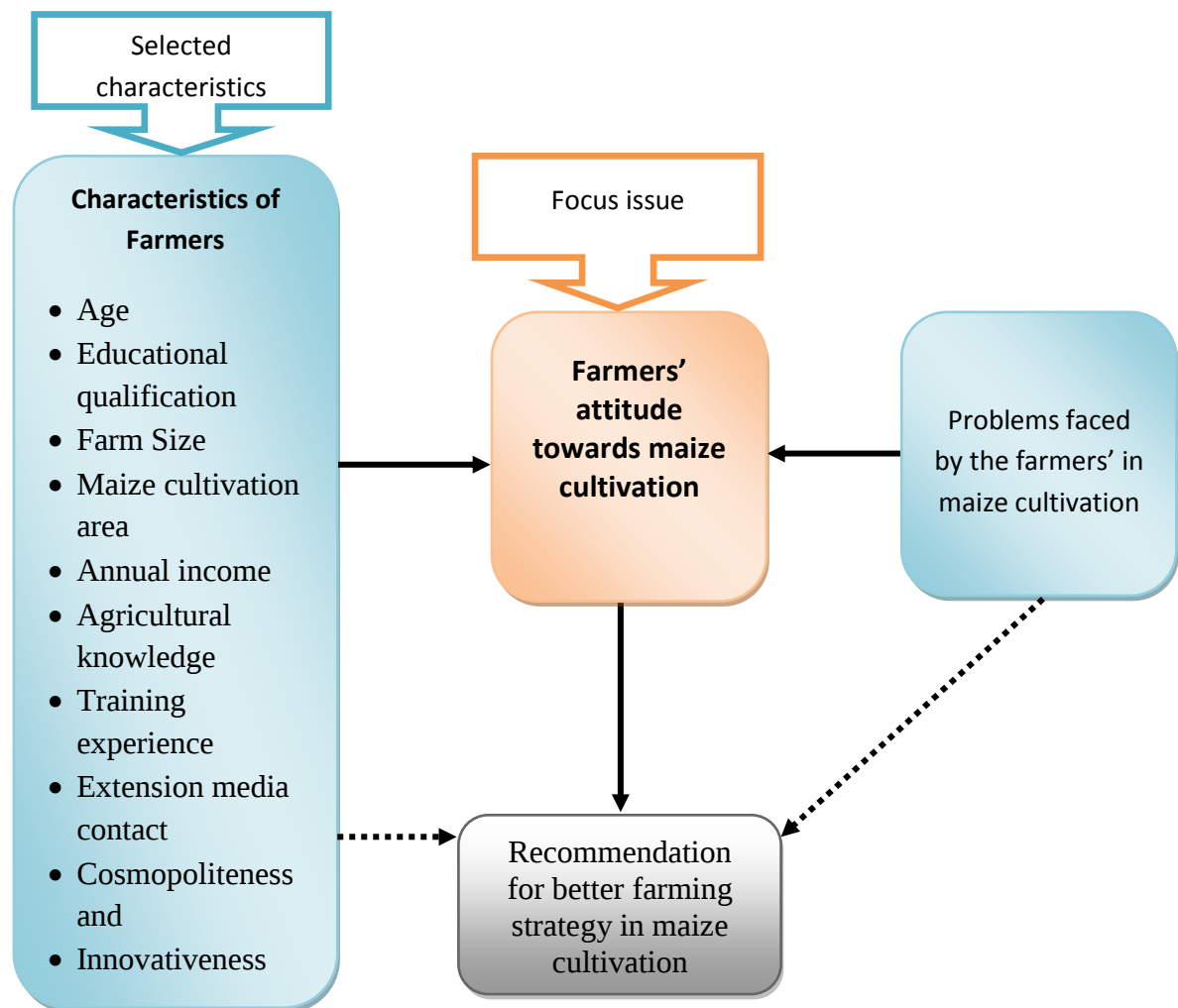


Figure 2.1 Conceptual framework of the study

Legend:  Direct relation
 Indirect relation

CHAPTER 3

METHODOLOGY

Methodology deserves a very careful consideration in any scientific research. Importance of methodology in considering any research cannot be ignored. Methodology should be such as would enable and guide the researcher to collect information. Keeping this point in view, the researcher took paramount care for using proper methods in all aspects in this study. This Chapter contains the methods and procedures in the present study in accordance with the objectives.

3.1 Research Design of the Study

Research design means the plan, structure and strategy of investigation conceived so as to obtain answer to research question and control variance (Kerlinger, 1996). Designing the research for the study was taken in a scientific method. Firstly, different research themes are collected and analyzed followed by research problem formulation. Reviews were studied to select appropriate variables and preparation of research instrument. Pretesting of the research instrument was done before final data collection. Finally data were collected, analyzed and report was prepared. An explanatory and cross sectional research design was used in this research which has been presented in Figure 3.1.

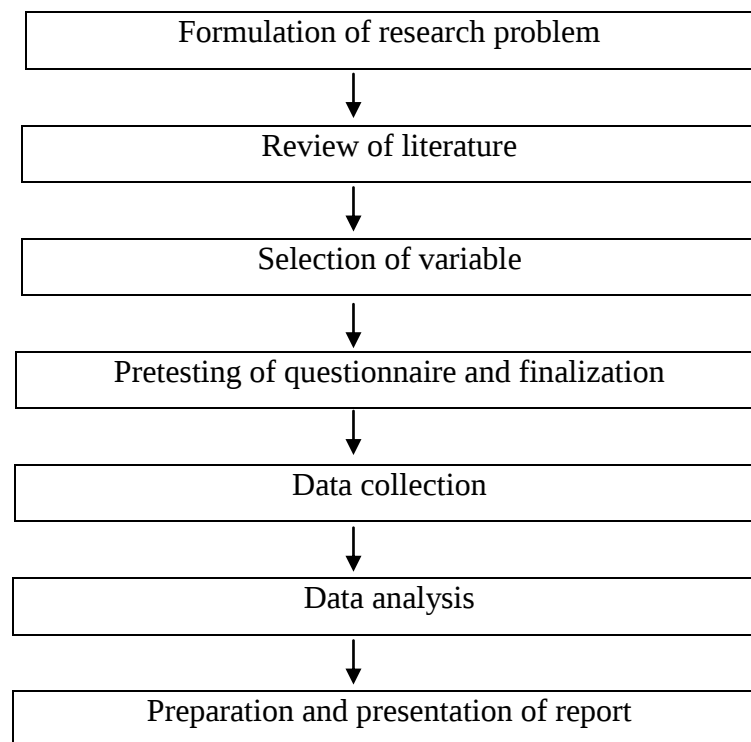


Figure 3.1 Research design of the study

3.2 Methods Used for Data Collection

Data were collected from maize farmers in the study area using individual interview method.

3.3 Study Area

The study was conducted in Birganj upazila under Dinajpur district of northern region of Bangladesh, where maize farmers are available. Birganj upazila of Dinajpur district was selected purposively as the study area. The maps of Birganj upazila of Dinajpur district have been presented in Figure. 3.2 and 3.3 respectively.

3.4 Sampling Procedure

Multi-stage random sampling procedure was followed in this study. Dinajpur district was at first purposively selected. Secondly, Birganj sub-district (upazila) of Dinajpur district was selected purposively also. Subsequently two unions (local administrative unit of Bangladesh) namely Paltapur and Nijpara were selected by using random sampling procedure out of 11 unions from the selected upazila (sub-district). These unions consist of 30 villages in which four villages are under Paltapur union and three villages are under Nijpara union. Seven villages (about 23 percent) were selected from these unions by using random sampling in which Four villages (about 23.5 percent) were from Paltapur union, and Three villages (about 23 percent) were from Nijpara union (Table 3.1). An up-to-date list of farmers was prepared with the help of Upazila Agriculture Office (Sub-district Agricultural Officer) of the Department of Agricultural Extension (DAE).

Total numbers of farmers in these seven villages were 655, out of which 96 (about 15 percent) were selected as the sample by using random sampling procedure. A reserve list of 10 farmers (about 10 percent) was prepared so that these farmers could be used for interview in case any farmer included in the original sample was not available in spite of utmost effort during collection of data. The detailed plan of selection and distribution of population and sample are shown in Table 3.1.

Table 3.1 Distribution of population and sample of farmers of the selected two unions in the upazila of Birganj

Name of union	Village	Population	Sample	Reserve list
A. Paltapur	1. Sengram	65	9	1
	2. Paltapur	100	15	2
	3. Ghoraband	85	13	2
	4. Kajol	75	10	1
B. Nijpara	1. Dariapur	100	15	2
	2. Shobhugoan	120	18	2
	3. Kalyani	110	16	2
Total		655	96	10

3.5 Research Instruments

An interview schedule was used as the data gathering instrument. The interview schedule was carefully prepared considering the objectives of the study. The interview schedule contained both open and closed form questions. Considering the selected characteristics of maize growers, easy and direct questions were included in the schedule to obtain necessary information. On the basis of pre-test, necessary corrections, alterations and modifications were made before finalizing the interview schedule. The interview schedule was then printed in its final form and was multiplied for collecting data from the respondents (Appendix-A).

3.6 Questionnaire Administration

Prior to the data collection exercise three enumerators with experience were recruited. The enumerators were familiarized with the survey by explaining the objective of the survey. Accordingly, each question of the questionnaire was discussed in detail regarding its reason, measurement, concept, coverage and the reference period. Both English and Bangla version questionnaire were prepared but face to face interviews were conducted with household heads in Bangla language. To ensure high quality of the data, close supervision of enumerators was undertaken by the researcher during the process of data collection.

3.7 Measurement of Variables

The characteristics of the maize growers i.e. age, educational qualification, farm size, maize cultivation area, annual income, agricultural knowledge, training experience, extension media contact, cosmopolitaness and innovativeness were the independent variables. The dependent variable of the study was attitude of farmers towards maize cultivation.

3.7.1 Measurement of the selected characteristics

The selected characteristics of the farmers were the independent variables of the study. To keep the study manageable, ten independent variables were selected. The procedures of measurement of the selected variables were as follows:

3.7.1.1 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 the item No. 1 in the interview schedule in (Appendix- A).

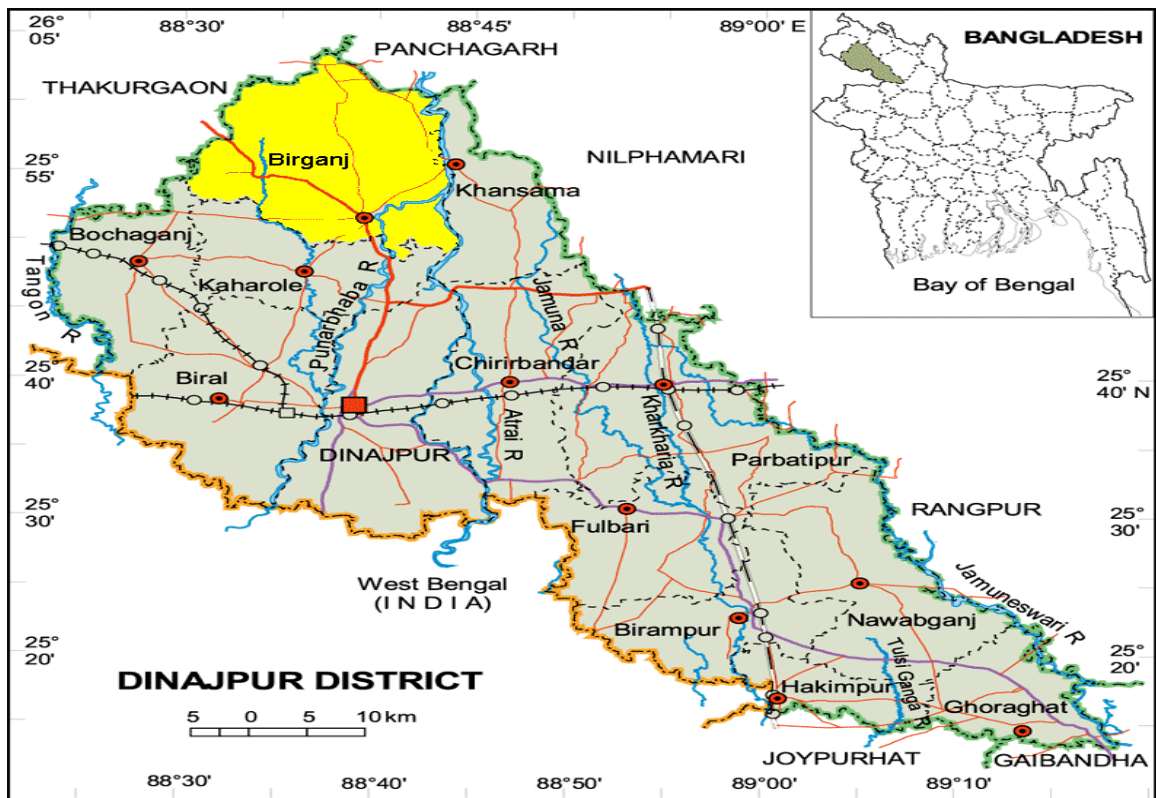


Figure 3.2 Map of Dinajpur district including its upazilas (Bangladesh inset)



Figure 3.3 Map of Birganj upazila showing the study area

3.7.1.2 Educational qualification

Educational qualification was measured as the ability of the respondent to read and write or the formal education received up to a certain standard. A score of zero (0) was given to a respondent who could not read and write, a score of 0.5 was given to the respondent who could sign only and a score of one (1) was given for each year of formal schooling completed by the respondent e.g. one (1) for completing class I, two (2) for class II and so on. This variable appears in the item No. 2 in (Appendix-A).

3.7.1.3 Farm size

Farm size of a respondent refers to the total area of land on which his family carried out farming operations. It was measured in terms of full benefit for him and was expressed in hectare. The variable appears in item No. 3 in the interview schedule (Appendix-A). It was computed in hectare by using following formula (Reza, 2016).

$$FS = A_1 + A_2 + A_3 + A_4 + A_5$$

Where,

FS = Farm size

A_1 = Homestead area (including garden and fallow land)

A_2 = Own land under own cultivation

A_3 = Land taken from others on lease

A_4 = Pond

A_5 = Others (if any)

3.7.1.5 Maize cultivation area

Area under maize cultivation of the respondent was measured as the area of land on which each respondent was cultivating maize. It was calculated in hectare. This variable appears in the item No. 4 in the interview schedule as presented in (Appendix-A).

3.7.1.5 Annual income

Annual income was measured on the basis of the total yearly earning by a respondent himself and his family members from agricultural and non-agricultural sources (service, business etc.). However, unit score of one (1) was taken for every TK. 1000 of annual income. This variable has been presented in item No. 5 of the interview schedule (Appendix- A).

3.7.1.6 Agricultural knowledge

For measuring agricultural knowledge of a respondent, researcher followed the revised Bloom's Taxonomy technique which was developed by Anderson and Krathwohl (2001). In this regard, 18 questions on six main capacities of respondents, i.e. remembering, understanding, applying, analyzing, evaluating and creating capacity of the respondents about agriculture. Score were assigned for correct responses of different questions. For correct response to all 18 questions a respondent could score a total score of 51, while for wrong response to all questions he could score zero (0). Thus agricultural knowledge of the respondents could range from 0 to 51, where 0 indicating no knowledge on agriculture and 51 indicating very high knowledge on agriculture (item No. 6, Appendix-A).

3.7.1.7 Training experience

Training experience was determined by total number of days of training received by the maize farmers from any organization in their entire lifetime. If a respondent took three days training on agriculture from GOs, NGOs or any other organization then his training experience score was 3 and so on (Ahmed, 2013). The instrument of this variable appears in the item No. 7 of the interview schedule (Appendix-A).

3.7.1.8 Extension media contact

The term extension media contact refers to one's becoming accessible to the influence of extension education through different extension media. Question on this variable was measured by computing an extension media contact score on the basis of a farmer's extent of contact with 18 selected media as obtained in response to item No.8 of the interview schedule (Appendix-A). Each farmer was asked to indicate the frequency of his contact with each of the selected media. In measuring the contact with extension media, scores were separately assigned for each of the media contact on the basis of the response of the farmers in such a way that 0 (zero) was assigned for 'not at all', 1 for 'rarely', 2 for 'occasionally' and 3 for 'frequently' contact with media. The contact with extension media by the farmer was therefore determined by adding the score against the 18 selected with extension media. The extension contact score could range from 0 to 54, where 0 indicated no extension media contact and 54 indicated maximum extension media contact.

3.7.1.9 Cosmopoliteness

Cosmopoliteness referred to the degree of an individual's orientation to external or outside to his social system. The cosmopoliteness of a farmer was measured by computing his cosmopoliteness score on the basis of his frequency of visit to six selected places outside to his social system. The farmers were asked to indicate the numbers of his visit to the six selected places. The score obtained for visiting above mentioned places were added together to get the cosmopoliteness score of a farmer. The possible range of scores could vary from 0 to 18, where 0 indicates no cosmopoliteness and 18 indicates very high cosmopoliteness (Mondol, 2009). The variable appears in item No. 9 in the interview schedule (Appendix-A). The scale used for computing cosmopoliteness score was done in the following way:

Places of visit	Extent of visit	Weights
Visit to houses of friends or relatives (times/week)	Not at all	0
	1	1
	2-3	2
	≥ 4	3
Visit to local market or UP office (times/month)	Do	Do
Upazila head quarter or market (times/3 month)	Do	Do
Visit to own district town (times/6 month)	Do	Do
Visit to other district town (times/year)	Do	Do
Division/capital city (times/year)	Do	Do

3.7.1.10 Innovativeness: Innovativeness of a farmer was measured by computing an innovativeness score on the basis of his adoption of 10 selected modern agricultural technologies. Innovativeness sub-score was assigned on the basis of his duration of adoption and extent of adoption of a particular technology. Duration of adoption of a new technology was measured as 'do not use', 'within 1 year of hearing', 'within 1-2 years of hearing', 'above 2 years of hearing' and score were assigned as 0, 1, 2, and 3 respectively.

Innovativeness score of a respondent could range from 0 to 30 where 0 indicated no innovativeness and 30 indicated highest innovativeness. The variable appears in item No. 10 in the interview schedule (Appendix-A).

3.7.2 Measurement of the dependent variable

Attitude of farmers towards maize cultivation was the dependent variable of the study. This variable was measured through Likert scale. Twenty statements on various aspects of maize cultivation were asked to the farmers. The positive and negative statements were arranged randomly in the schedule in order to achieve the real picture of attitude of the farmers. There

were five options to response a statement namely ‘strongly agree’, ‘agree’, ‘undecided’, ‘disagree’ and ‘strongly disagree’ with a corresponding score of 5, 4, 3, 2 and 1, respectively for the positive statements and the scoring was reversed for the negative statements. A respondent was asked to indicate his attitude regarding a statement by selecting the appropriate option. The attitude score of a respondent was computed by summing the scores for his responses to all the statements. Hence, scores of a respondent could range from 20 to 100 against a possible score of 0 to 30; 20 indicating highly unfavorable attitude and 100 highly favorable attitudes towards maize cultivation. This variable appears in question No. 11 in the interview schedule (Appendix-A).

3.8 Problem Confrontation by the Farmers in Maize Cultivation

Like other crops, farmers face many problems in cultivating maize. To determine the problems the researcher made discussion with farmers of the study area and Upazila Agriculture Officer (UAO). With discussion with them ten problems were selected for study. Each farmer was asked to indicate his option regarding each problem. Farmers had option to indicate each problem as ‘no’, ‘low’, ‘moderate’, and ‘severe’. To get score of each problem ‘no’, ‘low’, ‘moderate’, and ‘severe’ were assigned by 0, 1, 2 and 3, respectively. For getting total score the ten problems of the farmers, each item along with rank order was computed by using the following formula (Khan, 2012):

$$\text{Problem Confrontation Index (PCI)} = P_{np} \times 0 + P_{lp} \times 1 + P_{mp} \times 2 + P_{sp} \times 3$$

Where,

P_{np} = Number of respondents with ‘no problem’

P_{lp} = Number of respondents with ‘low problem’

P_{mp} = Number of respondents with ‘moderate problem’

P_{sp} = Number of respondents with ‘severe problem’

The problem confrontation score could range from 0 to 300. This variable appears in item No. 12 in the interview schedule (Appendix-A).

3.9 Hypothesis of the Study

In order to guide relevant data collection, analysis and interpretation of data, a set of hypothesis was formulated for empirical resting. The following null hypothesis was formulated to test the relationships of ten independent variables with attitude of farmers towards maize cultivation.

“There is no relationship between the attitude of farmers towards maize cultivation and the variation of their age, educational qualification, farm size, maize cultivation area, annual income, agricultural knowledge, training experience, extension media contact, cosmopolitanism and innovativeness in the study.

3.10 Collection of Data

The interview schedule was pretested before using the same for data collection. Necessary correction, alterations and amendments were made in the interview schedule on the basis of results of the pretest. Data for this study were collected through personal interview by the help of enumerators during 12 March to 10 April 2017. Interview was conducted with the farmers in their house during their leisure time.

3.11 Data Processing and Analysis

3.11.1 Compilation of data

After completion of field survey data from all interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. In this process, all responses in the interview schedule were given numerical coded values. Local units were converted into standard units and qualitative data were converted into qualitative ones by means of suitable scoring whenever necessary. The responses to the questions in the interview schedules were transferred to a master sheet to facilitate tabulation.

3.11.2 Categorization of data

For describing and bring out homogeneity in the selected characteristics, the respondents were classified into several categories. These categories were developed by considering the nature of distributing of data, general understanding prevailing in the social system and possible scores system. The procedure of categorization of data in respect of different variable will elaborately be discussed while describing those variables in Chapter 4.

3.11.3 Statistical Techniques

The analysis was performed by using Statistics Package for Social Science (SPSS) computer package. Descriptive analysis such as range, number, percentage, mean, standard deviation and rank order were used whenever possible. Correlation test was used in order to explore the relationship between the concerned variable. Throughout the study, at least five percent (0.05) level of probability was used as basis of rejecting a null hypothesis.

CHAPTER 4

RESULTS AND DISCUSSION

The findings of this study and their logical interpretations have been scientifically presented in different sections in this Chapter according to the objectives. This Chapter deals with four sections. First section deals with the description of the characteristics of the maize growers. Farmers' attitude towards maize cultivation has been presented in the second section. Relationship between dependent and independent variables has been described in the third section and the last section has been concerned with the problem confrontation by the farmers in maize cultivation.

4.1 Selected Characteristics of the Farmers

4.1.1 Age

The age of the maize growers ranged from 24 to 73 years with a mean of 38.97 and standard deviation of 10.20. The respondents were classified into three categories. The categories and distribution of the respondents are shown in Table 4.1 along with their frequency and percentage. Data presented in Table 4.1 indicated that the joint proportion (43.75 percent) of the respondents fell in the young and middle aged category and only 12.50 percent of them were old aged category. Aus (2014), Mondol (2014) and Zaman (2010) observed similar results in their respective studies.

The result indicated that 87.50 percent of the respondents were young to middle aged category. Young and middle aged farmer might have valuable opinions in maize cultivation. Young people are generally receptive to new ideas and things. They would have a favorable attitude towards maize cultivation if necessary steps are taken to disseminate new technologies and practices on maize to them by the extension personnel.

4.1.2 Educational qualification

Education is assumed to be an important factor in accessing advanced information on new improved agricultural technologies and increased agricultural productivity (Elahiet *al.*, 2015). The educational qualification scores of the respondents ranged from 0 to 14 with a mean of 5.08 and standard deviation of 3.94. On the basis of observed data the respondents were classified in to five categories (Table 4.1). Data presented in the Table 4.1 indicated that about 36.46 percent of the maize growers fell in the primary level. On the other hand 25.00 percent of the farmers can sign only, 22.92 percent of them had secondary level, 10.00 percent of them had above secondary level, and illiterate percentage counted only 5.00 percent.

Table 4.1 Descriptive statistics of the selected characteristics of the farmers (N= 96)

Characteristics	Scoring method	Range	Categories	Respondents		Mean	SD
		Observed (Possible)		No.	Percent		
Age	No. of year	24-73 (Unknown)	Young (22-35)	42	43.75	38.97	10.20
			Middle aged (36-50)	42	43.75		
			Old (>50)	12	12.50		
Educational qualification	Year of schooling	0-14 (Unknown)	Illiterate (0)	05	5.21	5.08	3.94
			Can sign only (0.5)	24	25.00		
			Primary (1-5)	35	36.46		
			Secondary (6-10)	22	22.92		
			Above secondary(>10)	10	10.41		
Farm size	Hectare	0.14-2.59 (Unknown)	Small (0.02-1.0)	51	53.13	1.09	0.65
			Medium (1.01-3.0)	45	46.87		
Maize cultivation area		0.04-2.22 (Unknown)	Small (0.02-1.0)	77	80.21	0.64	0.46
			Medium (1.01-3.0)	19	19.79		
Annual income	('000' Tk.)	20.5-525 (Unknown)	Low (≤ 44)	5	5.21	134.22	90.38
			Medium (45-225)	81	84.38		
			High (>225)	10	10.41		
Agricultural knowledge	Marks	20-44 (0-51)	Poor (≤ 25)	19	19.79	29.78	5.13
			Good (26-35)	64	66.67		
			Excellent (>35)	13	13.54		
Training experience	Days	0-7 (Unknown)	No (0)	60	62.50	1.40	2.00
			Short (up to 2)	3	03.13		
			Medium (3-5)	26	27.08		
			Long (> 5)	7	7.29		
Extension media contact	Score	10-44 (0-54)	Low (≤ 10)	21	21.88	14.26	4.68
			Medium (11-19)	63	65.62		
			High (>19)	12	12.50		
Cosmo politeness	Score	6-16 (0-18)	Low (≤ 7)	32	33.33	8.70	1.93
			Medium (8-10)	46	47.92		
			High (>10)	18	18.75		
Innovativeness	Score	10-21 (0-30)	Low (≤ 11)	28	29.16	14.03	3.44
			Medium (12-17)	46	47.92		
			High (>17)	22	22.92		

The findings indicated that almost three-fifths (59.38 percent) of the maize growers had primary to secondary educational qualification. As education has a vital role on farmer's attitude towards new practice, the illiterate farmers should be brought under extension program. Hence, it can be concluded that farmers with more years of schooling are more likely to favorable attitude towards maize cultivation compared to the farmers with little or no education. Hasan *et al.* (2014), Yeasmin (2013), Khan (2012), Zaman (2010) reported more or less similar results in their respective studies.

4.1.3 Farm size

The farm size of the maize growers varied from 0.14 to 2.59 hectare with a mean of 1.09 hectare and standard deviation of 0.65 hectare. The respondents were classified in to two categories on the basis of their farm holdings. The categories and distribution of farmers are shown in Table 4.1 with their number, percent, mean, possible range, observed range and standard deviation. Data presented in the Table 4.1 shown that 53.13 percent of the farmers were small size, and 46.87 percent were medium size.

Most of the maize growers of this study found smaller farm sized. The average farm size of the farmers of the study area (1.09 hectares) was higher than that of national average (0.60 hectare) of Bangladesh. This may be due to the reason that the respondents in this study were considered on the basis of maize growing farmer and they were not the general criteria of the farmers. However, the maize growers are not bears the general criteria of the farmers in Bangladesh.

4.1.4 Maize cultivation area

The area under maize cultivation ranged from 0.04 to 2.22 ha. The average maize farm size was 0.64 ha with standard deviation of 0.46 ha. The maize growers were classified into two categories. The distribution of the land under maize cultivation according to category is shown in Table 4.1. Data presented in Table 4.1 revealed that majority (80.21 percent) of the maize growers had small sized maize farm and 19.79 percent had medium sized maize farm. Khan (2012) also observed more or less similar result.

The average farm size of the farmers in the study area was (1.09 ha) which was higher than average maize cultivation area (0.64 ha). This fact implies that maize was not the major farming practice of the farmers in the study area in Bangladesh.

4.1.5 Annual Income

Annual income of the respondents ranged from 20.5 to 525.0 Thousand Tk. with a mean of 134.22 Thousand Tk. and standard deviation of 90.38 Thousand Tk. On the basis of their annual family income the farmers were categorized into three classes, namely low, medium, and high income. The categories and distribution of respondents are shown in Table 4.1 with their characteristics and range, percent, frequency, mean, and standard deviation.

Data presented in Table 4.1 indicate that 5.21 percent of the farmers had low income, 84.38 percent had medium income and only 10.41 percent of them belonged to high income category. Findings indicate that 89.59 percent of the maize growers in the study area constituted medium to low categories of income. Monalesa (2014) in her study reported similar finding.

4.1.6 Agricultural knowledge

Agricultural knowledge score of the maize growers ranged from 20 to 44 against the possible range of 0 to 51. The mean value of agricultural knowledge was 29.78 with a standard deviation of 5.13. On the basis of agricultural knowledge, the maize growers were classified into three categories (Table 4.1). Data presented in Table 4.1 revealed that almost two-thirds (66.67 percent) of the respondents had good knowledge, compared to 19.79 percent belonged to poor knowledge and only 13.54 percent had excellent knowledge in different agricultural activities. Mondal (2014) reported similar result in his study.

The findings of the study revealed that more than four-fifths (86.46 percent) of the maize growers had poor to good agricultural knowledge. Such findings are quite logical because of the respondents are closely attached with farming activities and these experience increase their agricultural knowledge. Proper training, guidance and increasing facility provided by GOs and NGOs may improve their agricultural knowledge. On the other hand, people especially in rural areas gather knowledge from their ancestor and surrounding environment where they live.

4.1.7 Training experience

Previous training experience of the maize farmer was measured by the frequency of the training received up to the time of interview. Frequency of previous training of the respondents ranged from 0 to 7 with an average 1.40 with standard deviation of 2.00. The maize growers were classified in to four categories on the basis of their previous training experience (Table 4.1). Data presented in Table 4.1 indicate that 62.50 percent of the respondents had no training compared to 3.13 percent of the respondents having short training, 27.08 percent had medium training and only 7.29 percent of the respondents had a long training experience.

Training helps the respondents to acquire knowledge and skills in improved methods of cultivation. As a result the farmers having no previous training are likely to be deficient in knowledge and skills. Most of the farmers in the study area had no previous training experience and hence they might need considerable amount of training for successful maize cultivation. Thus, it should be concluded that the concern extension agencies (GOs and NGOs) arrange training program for those respondents who had no training received as well as who had low training received.

4.1.8 Extension media contact

The range of extension contact scores of the respondents was 10 to 44 with an average of 14.26 and standard deviation of 4.68. The maize growers were classified to three categories on the basis of mean and standard deviation of their extension contact scores. Data furnished in Table 4.1 indicate that 65.62 percent of the maize growers had medium extension counted compared to 21.88 percent having low extension counted and only 12.50 percent had high extension contact. Monalesa (2014) in her study reported similar findings.

Most of the respondents (87.50 percent) fell in medium and low extension contact category which has a significant relationship with positive attitude towards maize cultivation. The result means that the maize growers' extension media contact was moderately satisfactory. Thus, DAE should be taken initiatives to more contacts with the maize farmers in Northern region of Bangladesh.

4.1.9 Cosmopoliteness

Cosmopoliteness scores of the respondents ranged from 6 to 16 percent with an average of 8.70 and standard deviation of 1.93. On the basis of mean and standard deviation of cosmopoliteness scores, the respondents were categorized to three categories such as low, medium and high. Data presented in Table 4.1 indicate that 47.92 percent of the maize growers fell in the medium cosmopoliteness category, compared to 33.33 percent falling in low cosmopoliteness category and 18.75 percent of them fell in high cosmopoliteness category. Mortuza (2015) reported similar result.

However, 81.25 percent farmers belonged to low to medium cosmopoliteness category. Cosmopoliteness means farmers movement outside of his own farm. When a maize grower moved frequently outside of his own area makes his attitude positive towards maize cultivation.

4.1.10 Innovativeness

Innovativeness is a desirable characteristic for a farmer that helps him to consider and except new technologies earlier than other members of his society. Proper extension contact of the farmers provides evidences in favor of the innovations. The acceptance and adoption of an idea/innovation is the ultimate goal of a communication campaign sponsored by communication channels. The farmer who has low innovativeness is likely to face difficulty in making positive decision about an innovation as well as its adoption to the real situation.

The innovativeness scores of the maize growers ranged from 10 to 21, against the possible score of 0 to 30. The mean and standard deviation were 14.03 and 3.44 respectively. On the

basis of overall scores of innovativeness, the respondents were classified into three categories such as low, medium and high (Table 4.1). A little less than half (47.92 percent) of the maize growers had medium innovativeness compared to 29.16 percent with low and 22.92 percent high innovativeness.

This means that majority of the respondents of the study area were medium to low innovativeness towards the adoption of improved farming practices in terms of duration of practicing improved farming.

4.2 Farmers' Attitude towards Maize Cultivation

Farmers' attitude towards maize cultivation was the main focus of the study. Attitude scores of the maize farmers varied from 59 to 84 against the possible range of 20 to 100, with a mean of 75.39 and standard deviation 5.46. Based on the observed attitude scores, the respondents were classified into three categories (Table 4.2).

Table 4.2 Distribution of the farmers according to their attitude towards maize cultivation

Range	Categories	Respondent		Mean	SD
Observed (Possible)		Number	Percent		
59-84 (0-100)	Unfavorable attitude (59- 70)	18	18.75	75.39	5.46
	Moderately favorable (71-81)	62	64.58		
	Favorable attitude (> 81)	16	16.67		
	Total	96	100.00		

The majority (64.58 percent) of the maize growers had moderately favorable attitude towards maize cultivation compared to 18.75 percent had unfavorable and only 16.67 percent had favorable attitude.

The reasons behind the moderately favorable attitude may be fairly market price, high yield etc. Favorable attitude means farmers of the study area cultivate maize in commercial basis and they get a pretty profit. Majority (64.58 percent) of the maize growers showed moderately favorable attitude towards maize cultivation because about three-fifths (59.38 percent) of them had primary to secondary level of education. Educated farmers were more innovative to receive technologies than the non-educated farmers. Though maize cultivation in commercial basis is quite less in Bangladesh compared to other neighboring countries, it is gaining place in time. Since Bangladesh is an agro based country and a considerable share of her GDP comes from agriculture, this sector always given due importance. Khan (2012), Farhad and Kashem (2004) reported similar results in their respective studies.

Table 4.3 Extent of attitude of the maize growers towards their maize cultivation

Sl. No.	Statements	Frequency					Men score	Rank order
		SA	A	U	D	SD		
+1	Awareness of farmers regarding identification of quality maize seeds lead to higher production	43	43	10	0	0	4.34	1
- 2	BARI cannot develop environment tolerant variety of maize	08	12	14	18	18	2.46	19
+3	Input companies should encourage improved cultivation technique to maize farmers	46	43	15	02	0	4.18	2
- 4	Maize cultivation need a huge amount of irrigation	08	05	10	15	23	2.32	20
+5	Crop rotation including maize cultivation improves soil productivity	11	45	14	0	0	3.70	8
-6	Maize cultivation require extra cost	03	04	07	52	30	4.06	4
+7	Cultivation of modern maize variety has increased social acceptance	21	53	19	03	0	3.96	6
-8	Crop rotation including maize requires more labor than other agricultural practices	06	16	19	27	18	3.05	18
+9	Consumption can increase through alternative and diversified use of maize through flour mills and industrial bakeries	25	41	23	0	01	3.74	7
-10	Maize cultivation requires heavy amount of fertilization which sometimes can to be afforded by farmers	08	10	14	29	25	3.24	17
+11	Heavy dependency on poultry and fish feed sector leads to liability to market shocks	14	42	36	04	0	3.69	9
-12	Intercropping reduces yield of maize	02	08	38	25	23	3.58	13
+13	Unavailability of proper drying facility results in low quality of maize	11	47	31	5	2	3.63	11
- 14	Farmers don't get proper information support in maize cultivation	03	16	28	36	13	3.41	16
+15	Activities of Micro Finance Institute can help maize growers	33	45	14	03	01	4.10	3
-16	Poor linkage between farmer and buyer leads to poor access to high market price	03	11	37	33	12	3.42	15
+17	I feel comfort in cultivating modern maize varieties as it's more profitable than local variety	27	38	12	9	0	3.55	14
-18	Maize should not be encouraged as priority crop in national agricultural policy in Bangladesh	05	05	32	33	21	3.63	12
+19	I think training facilities for modern maize cultivation need to increased	26	47	21	2	0	4.01	5
-20	Sustainable agriculture can be applied only on small family farms	01	04	38	35	18	3.68	10

Notes:SA= Strongly agreed, A=Agreed, U=Undecided, D=Disagreed and SD= Strongly disagreed

On the other hand to have an understanding about the extent of attitude of the maize growers for each statement computed mean score and rank order have been shown in Table 4.3. It is evident from Table 4.3 that 'awareness of farmers regarding identification of quality maize seeds lead to higher production' has ranked first as the attitude score of the maize growers was the highest (4.34) need description importance of quality seeds.

The second ranked statement is 'input companies should encourage improved cultivation technique to maize farmers'. The input companies supply hybrid maize seed, along with micronutrient, pesticide, weedicide etc. among the farmers and thus there is a scope of providing information on improved maize cultivation among them by the input companies.

The third ranked statement is 'activities of micro finance institute can help maize growers'. Almost 90.0 percent of the respondents were found low to medium income category and they have need credit. The farmers are collect credit from the local money leader with high interest in that case the microfinance institute can provide credit with easy condition and lower interest to the maize growers.

The 19th ranked statement is 'BARI cannot develop environment tolerant variety of maize'. Now a day most of the farmers cultivate hybrid variety of maize and most of these are imported from foreign country like India. In this regard there is an argent need to develop hybrid maize varieties from BARI and thus a huge amount of foreign currency may be saved.

The 20th ranked statement is 'maize cultivation need a huge amount of irrigation'. Some of the farmers cultivate maize besides the river bank and Char land and this type of farm land is sandy soil and requires huge amount of irrigation and thus the respondents may opined this type of opinion.

4.3 Relationships between Selected Characteristics of the Maize Growers and Their Attitude towards Maize Cultivation

The purpose of this section is to explore the relationships between each of the selected characteristics of the maize growers and their attitude towards maize cultivation. The relationship between the selected characteristics of the respondents and their attitude towards maize cultivation is presented in Table 4.4. Pearson's Product Moment Correlation Coefficient (r) was used to test the null hypotheses concerning relationships between any two variables. Out of ten variables, the relationships of four variables with farmers' attitude were found significant and positive, two were negatively significant and the rest four were non-significant. However, the interrelationships among the different variables have been computed by using Pearson's Product Moment correlation coefficient. The correlation matrix has been presented in Appendix B.

Table 4.4 Relationships between the dependent and independent variables

Dependent variable	Independent variables	Computed values of 'r' with 94df
Attitude towards maize cultivation	Age	-0.236*
	Educational qualification	0.262**
	Farm size	-0.415**
	Maize cultivation area	-0.184
	Annual income	-0.013
	Agricultural knowledge	0.308**
	Training experience	-0.064
	Extension media contact	0.222*
	Cosmopolitaness	-0.053
	Innovativeness	0.271**

*Significant at 0.05 level of probability (0.203) **Significant at 0.01 level of probability (0.234)

4.3.1 Age of the maize growers and their attitude

The computed value of correlation co-efficient between age of the maize growers and their attitude towards maize cultivation was -0.236, which was negatively significant at 1 percent level of significance (Table 4.4). Hence, the concerned null hypothesis could be rejected. Thus, it could be stated that there was significant negative relation between age of the maize growers with their attitude towards maize cultivation. The findings indicate that, there was a negative trend between age of the maize growers and their attitude. It means that, the lower age of the farmers, the more favorable attitude towards the maize cultivation. Thus, it can be said that age was an important factor for attitude of the maize growers. The findings also indicated that old aged farmers' possess an unfavorable attitude towards maize cultivation and vice versa. Mondol (2009) also found similar findings.

4.3.2 Educational qualification of the maize growers and their attitude

The computed value of correlation co-efficient between educational qualification of the respondents and their attitude towards maize cultivation was 0.262 which was significant at 1 percent level of significance (Table 4.4). Therefore the concerned null hypothesis was rejected. Thus, it can be said that educational qualification was an important factor for attitude of the maize growers. The findings indicated that higher educated farmers' possess a favorable attitude towards maize cultivation and vice versa. Singh *et al.* (2014), Mithun (2013), Rahman (2015), Darandale and Soni (2011), Samad (2010), Darandale *et al.* (2009-2010), Uddin *et al.* (2006), Rahman *et al.* (2007), Chowdhury *et al.* (2006), Khan (2005), Farhad and Kashem (2004), Chowdhury (2003), Afrad (2002) and Rahman (2001) observed similar findings in their respective studies.

4.3.4 Farm size of the maize growers and their attitude

The computed value of correlation co-efficient between farm size of the maize growers and their attitude towards maize cultivation was -0.415 which was negatively significant at 1 percent level of probability (Table 4.4). Hence, the concerned null hypothesis could be rejected and can be said that farm size was an important factor for attitude formation of the respondents. The findings indicated that large farm size of the maize growers' posses an unfavorable attitude and small farm size of the maize growers' posses a favorable attitude towards maize cultivation.

4.3.3 Maize cultivation area of the maize growers and their attitude

The computed value of correlation co-efficient between maize cultivation area of the farmers and their attitude towards maize cultivation was -0.184 which was less than tabulated value at 0.05 level of probability (Table 4.4). Hence, the concerned null hypothesis could not be rejected and hence the researcher found that maize cultivation area had non-significant negative relationship with the attitude towards maize cultivation. It was proved that attitude of the maize growers was independent of their maize cultivation area.

4.3.5 Annual income of the maize growers and their attitude

The computed value of correlation co-efficient between annual income of the growers and their attitude towards maize cultivation was -0.013 which was less than tabulated value at 0.05 level of probability (Table 4.4). Hence, the concerned null hypothesis could not be rejected and hence the researcher found that annual income of the maize growers had non-significant negative relationship with the attitude towards maize cultivation. It was proved that attitude of the maize growers was independent of their annual income. Ghosh and Hasan (2013), Parvez (2007), Chowdhury *et al.* (2006), Khan (2005) and Afrad (2002) revealed similar findings in their respective studies.

4.3.6 Agricultural knowledge of the maize growers and their attitude

The computed value of correlation co-efficient between agricultural knowledge of the respondents and their attitude towards maize cultivation was 0.308 which was significant at 1 percent level of significance (Table 4.4). Therefore the concerned null hypothesis was rejected. Hence the researcher found the agricultural knowledge of the maize growers had significant positive relationship with their attitude towards maize cultivation. Thus, it can be said that agricultural knowledge was an important factor for attitude of the maize growers. The findings indicated that good agricultural knowledge of the farmers' posses a favorable attitude and poor agricultural knowledge posses an unfavorable attitude towards maize cultivation. Ghosh and Hasan (2013), Darandale and Soni (2011), Samad (2010), Darandale *et al.* (2009-2010), Khan (2005), Chowdhury (2003), Afrad (2002) and Rahman (2001) found similar results in their respective studies.

4.3.7 Training experience of the maize growers and their attitude

The computed value of correlation co-efficient between training experience of the farmers and their attitude towards maize cultivation was -0.064 which was less than tabulated value even at 0.05 level of probability (Table 4.4). Hence, the concerned null hypothesis could not be rejected and hence the researcher found that training experience had non-significant negative relationship with the attitude towards maize cultivation. It was proved that attitude of the maize growers was independent of their training experience. In other words it may be concluded that training experience of the respondents was not significant with their attitude towards maize cultivation. Rahman (2015) Chowdhury (2003) and Afrad (2002) found similar results in their respective studies.

4.3.8 Extension media contact of the maize growers and their attitude

The computed value of correlation co-efficient between extension contact of the maize growers and their attitude towards maize cultivation was 0.222 which was significant at 5 percent level of significance (Table 4.4). Therefore the concerned null hypothesis was rejected. Hence the researcher found that extension media contact had significant positive relationship with their attitude. Thus, it can be said that extension media contact was important factor for attitude towards maize cultivation. Shah *et al.* (2016), Rahman (2015), Singh *et al.* (2014), Khan (2013), Ghosh and Hasan (2013), Darandale and Soni (2011), Darandale *et al.* (2009-2010), Ahmed (2006), Farhad and Kashem (2004), Sarker (2004), Afrad (2002) and Rahman (2001) found similar results in their respective studies.

4.3.9 Cosmopolitaness of the maize growers and their attitude

The computed value of correlation co-efficient between cosmopolitaness of the respondents and their attitude towards maize cultivation was -0.053 which was less than tabulated value even at 0.05 level of probability (Table 4.4). Hence, the concerned null hypothesis could not be rejected and hence the researcher found that cosmopolitaness of the maize growers had non-significant negative relationship with the attitude towards maize cultivation. It was proved that attitude of the maize growers was independent of their cosmopolitaness. In other words it may be concluded that annual cosmopolitaness was not significant with attitude towards maize cultivation area. Uddinet *et al.* (2006), Ahmed (2006) and Khan (2005) found similar results in their respective studies.

4.3.10 Innovativeness of the maize growers and their attitude

The computed value of correlation co-efficient between innovativeness of the farmers and their attitude towards maize cultivation was 0.271 which was significant at 1 percent level of significance (Table 4.4). Hence, the concerned null hypothesis could be rejected and hence the researcher found that innovativeness of the maize growers had significant positive relationship with the attitude towards maize cultivation. Thus, it can be said that

innovativeness was an important factor for attitude of the maize growers. The findings indicated that high innovativeness of the farmers' possesses a favorable attitude and low innovativeness possesses an unfavorable attitude towards maize cultivation. Uddinet *al.* (2006), Khan (2005) and Rahman (2001) found similar results in their respective studies.

4.4 Problem Confrontation by the Farmers in Maize Cultivation

The observed score of the problem faced by the respondents in cultivating maize ranged from 5 to 20 against a possible of 0 to 30.

Table 4.5 Distribution of the maize growers according to problem confrontation

Range	Categories	Respondent		Mean	SD
Observed (Possible)		Number	Percent		
5-20 (0-30)	Low (≤ 8)	06	06.25	13.16	5.46
	Medium (9-19)	87	90.62		
	High (> 19)	03	03.13		
	Total	96	100.00		

Data presented in Table 4.5 shows that mean and standard deviation of this core was 13.16 and 5.46, respectively. This means that almost all of the respondents faced similar problems to the same extent. This might be due to the similar socio-economic background of the respondents. Monalesa (2014) in her study reported almost similar findings.

On the other hand, the extents of problem confrontation by the maize growers with their problem confrontation index (PCI) are presented in Table 4.6. The result indicates that the problem which rank 1st on the basis of PCI was 'non-availability of seed'. At the beginning of maize season sometimes there were a gap between demand and supply of maize seed and thus the respondents purchase their required maize seed with high.

'Production cost is high' was ranked 2nd of the basis of PCI (186). This might be due to the reason that now a day farm labors are shifted their profession and thus labor price is high at the season time in Bangladesh.

'Lack of production inputs in time' was ranked 3rd on the basis of PCI. The respondents mentioned this might be due to the reason that sometimes input dealers and agency cheats the farmers by taking high price for high price.

'No hybrid seed production in Bangladesh' was ranked 8th on the basis of PCI. This might be due the reason that BARI is not generating sufficient hybrid maize varieties according to the demand of the farmers.

Table 4.6 Rank order to the problem confronted by the maize growers

Sl. No.	Problems	Farmers				PCI	Rank Order
		No	Low	Mode-rate	Sev-ere		
1.	Production cost is high.	6	27	30	33	186	2
2.	Non-availability of seed.	15	16	19	46	192	1
3.	Lack of production inputs in time.	04	38	40	14	160	3
4.	Lack of technological knowledge about maize cultivation.	13	38	21	24	152	3.5
5.	Getting fair price is difficult due to interfere of middleman.	21	40	27	08	118	6
6.	Insufficient credit facilities.	41	28	17	10	92	7
7.	No hybrid seed production in Bangladesh.	46	23	22	05	82	8
8.	Non-habit of human for consumption as food	18	28	26	24	152	3.5
9.	Non-suitability of land for maize cultivation.	48	29	15	04	71	9
10.	Non availability of storage facility at farmer's level due to high moisture content.	76	0	02	18	58	10

Note: Problem Confrontation Index= PCI

‘Non-suitability of land for maize cultivation’ was ranked 9th on the basis of PCI. The respondents mentioned this might be due to the reason that most of the farmers had low land under cultivation.

‘Non availability of storage facility at farmer’s level due to high moisture content’ was last ranked on the basis of PCI. This might be due to maize grain absorbs high moisture and very sensitive to fungal attack.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Selected characteristics of the farmers

Age of the maize growers ranged from 24 to 73 years with a mean of 38.97 and standard deviation (SD) of 10.20. The respondents were classified into three categories. The result indicated that the joint proportion (43.75 percent) of the respondents fell in the young and middle aged category and only 12.50 percent of them were old aged category. **Educational qualification** scores of the respondents ranged from 0 to 14 years, with a mean of 5.08 and standard deviation of 3.94. The respondents were classified in to five categories. It is observed that about 36.46 percent of the maize growers fell in the primary level, 25.00 percent can sign only, 22.92 percent had secondary level, 10 percent of them had above secondary level, and illiterate percentage counted only 5 percent. **Farm size** of the maize growers varied from 0.14 to 2.59 ha. The respondents were classified in to two categories on the basis of their farm holdings. It is observed that 53.13 percent of the farmers were small size, and 46.87 percent were medium size.

Area under maize cultivation ranged from 0.04 to 2.22 ha. The average maize farm size was 0.64 ha with standard deviation of 0.46 ha. The maize growers were also classified into two categories. The result revealed that 80.21 percent of the maize growers had small sized maize farm and 19.79 percent had medium sized maize farm. **Annual income** of the respondents ranged from 20.5 to 525.0 Thousand Tk. The farmers were categorized into three classes, namely low, medium, and high income. The findings revealed that 5.21 percent of the farmers had low income, 84.38 percent had medium income and only 10.41 percent of them belonged to high income category. **Agricultural knowledge** score of the maize growers ranged from 20 to 44 against the possible range of 0 to 51 with a mean value of 29.78 and standard deviation of 5.13. The findings of the study revealed that 86.46 percent of the maize growers had poor to good agricultural knowledge.

Frequency of previous **training** of the respondents ranged from 0 to 7 with an average of 1.40 and standard deviation of 2.0. The farmers were classified in to four categories on the basis of their previous training experience. The result indicate that 62.50 percent of the respondents had no training compared to 3.13 percent of the respondents having short training, 27.08 percent had medium training and only 7.29 percent of the respondents had a long training experience.

The range of **extension contact** scores of the respondents was 10 to 44 with an average of 14.26 and standard deviation (SD) of 4.68. It was observed that most of the respondents (87.50 percent) fell in medium and low extension contact category. **Cosmopolitaness** scores of the respondents ranged from 6 to 16 percent with an average of 8.70 and SD of 1.93. The farmers were categorized to three categories. It is observed that 81.25 percent of the farmers belonged to low to medium cosmopolitaness category. **Innovativeness** scores of the maize growers ranged from 10 to 21, against the possible score of 0 to 30. The mean and standard deviation were 14.03 and 3.44, respectively. The respondents were classified into three categories such as low, medium and high. It is found that 47.92 percent of the maize growers had medium innovativeness compared to 29.16 percent with low and 22.92 percent high innovativeness.

5.1.2 Farmers' attitude towards maize cultivation

Attitude scores of the maize farmers varied from 59 to 84 against the possible range of 20 to 100, with a mean of 75.39 and SD of 5.46. The respondents were classified into three categories. The result indicated that 64.58 percent of the respondents had moderately favorable attitude towards maize cultivation compared to 18.75 percent had unfavorable and only 16.67 percent had favorable attitude. In contrast to individual statements it is evident that out of twenty statements 'awareness of farmers regarding identification of quality maize seeds lead to higher production' has ranked first and 'maize cultivation need a huge amount of irrigation' is the least rank.

5.1.3 Relationships between selected characteristics of the maize growers and their attitude

According to the computed correlation coefficients (r) among the 10 selected characteristics of the maize growers' four characteristics namely educational qualification, agricultural knowledge, extension media contact and innovativeness showed positive relationship with their attitude towards maize cultivation on other hand age and farm size showed negative relationship with their attitude towards maize. However, maize cultivation area, annual income, training experience and cosmopolitaness fail to show any relationship with the dependent variable.

5.1.4 Problem confrontation by the farmers in maize Cultivation

The observed score of the problem faced by the respondents in cultivating maize ranged from 5 to 20 against a possible of 0 to 30. The mean and standard deviation of this score was 13.16 and 5.46, respectively. This means that almost all of the respondents faced similar problems to similar extent. This was might be due to the similar socio-economic background of the respondents. On the other hand, the topmost problem identified by the farmers was 'non-availability of seed' and the last was 'non availability of storage facility at farmers'.

5.2 Conclusions

1. The findings of the study revealed that majority (64.58 percent) of the maize growers had moderately favorable attitude towards maize cultivation. Thus, it may be concluded that maize growers are very enthusiastic and ambitious about maize cultivation.
2. a) Among the 10 selected characteristics of the maize growers four characteristics such as educational qualification, agricultural knowledge, innovativeness and extension media contact of the maize growers showed a positive relationship with their attitude towards maize cultivation. It can be concluded that maize production can be increased if educational level of the respondents could be upgraded; agricultural knowledge enhance of the maize growers to adopt new improved practices; availability of improve practices of maize production will be increased; and maize cultivation will sustainable among those farmers who maintain a contact with information sources.

b) As maize cultivation area, annual income, training experience and cosmopoliteness of the maize growers were not found having any positive relationship with their attitude towards maize cultivation; these variables seem to have no major influence in forming attitude of the maize growers.
3. A very great majority (93.75 percent) of the maize growers faced medium to high problems. It can be concluded that until the maize farmers are free from different problems in maize cultivation, they will not be able to produce more maize in their field.

5.3 Recommendations

5.3.1 Recommendations for policy implications

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

1. It is observed that 64.58 percent of the maize growers had moderately favorable attitude towards maize cultivation. So the concerned GOs, NGOs and input companies should take necessary steps to increase positive attitude towards maize cultivation.
2. As average annual income of the maize growers is found Tk. 134.22 thousand which is fairly well. Therefore, the farmers who are not getting profit from other crops they may cultivate maize for their economic solvency.

3. The maize growers' literacy rate was found 59.38 percent and it related to their knowledge gain. It is therefore, recommended that farmers can take advantage of different printed materials i.e. book, booklets, leaflets, posters, newspapers, etc. so that they can get more knowledge easily and can increase positive attitude. It is, therefore, recommended that arrangement should be made by the concerned authorities to undertake more educational activities for increasing the education level of the maize growers.
4. More than three-fifths (65.63 percent) of the maize growers had no to low training experience, while there was a non-significant relationship between training experience of the maize growers with their attitude towards maize cultivation. Therefore it may be recommended that DAE, NGOs and input supplying companies should take special type of extension programs for maize growers to arrange necessary training on maize cultivation by providing detail maize cultivation guideline.
5. Innovativeness of the maize growers and their attitude towards maize cultivation had a significant positive relationship. It is observed that the farmers who were highly innovative took decision and other extension services. The maize farmers' innovativeness should be increased by arranging different extension services provided by DAE and other related organizations.
6. A very great majority (93.75 percent) of the maize growers faced medium to high problems. In view of the urgent need for increasing maize production, it is recommended that steps should be taken on a priority basis to remove the various problems causing hindrance to the maize cultivation, harvesting, storage and marketing.
7. Farmers faced higher problems in 'non-availability of seed' followed by 'Production cost is high' and 'Lack of production inputs in time'. Therefore, it may be recommended that necessary technical support should be provided for the maize growers to minimize their problems with special emphasis to these problems.

5.3.2 Recommendations for further study

This study was conducted on the attitude of the maize growers towards maize cultivation. In order to have a deeper insight into the various aspects of the attitude of the farmers towards maize cultivation, further studies needed to be conducted covering the following aspect:

1. The study was conducted in Birganj upazila (sub-district) under Dinajpur district of northern region of Bangladesh. Findings of the study need verification by the similar research in other part of the country.
2. Relationships of 10 characteristics of the maize growers with their attitude towards maize cultivation were investigated in this study. Further research should be conducted to explore relationships of other characteristics of the maize growers with their attitude towards maize cultivation.
3. Maize cultivation area, annual income, training experience and cosmopolitaness of the maize growers had no significant relationship with their attitude towards maize cultivation. So, further verification is necessary.
4. An attempt to conduct few case studies with regard to get in-depth information about attitude of farmers towards maize cultivation can be considered in future research.
5. The current research has pointed out 20 important statements of attitude towards maize cultivation. However, other important statements could be incorporated while conducting research in future.
6. Further research is necessary to find out the effective ways and means which would contribute in developing maize cultivation.

APPENDIX A

Department of Agricultural Extension
Hajee Mohammad Danesh Science and Technology University, Dinajpur

An interview schedule of the research study entitled

Attitude of Farmers towards Maize Cultivation in Northern Region of Bangladesh

Date: - - - - -

Serial No.

Respondent's name - - - - - Father's Name - - - - -

Village: - - - - - Union - - - - - Mobile No - - - - -

(Please answer the following questions and put tick (✓) whenever necessary)

1. Age: What is your age? Years

2. Educational qualification: Mention your educational qualification.

- a) Can't read and write
- b) Can sign name only
- c) Passed class.....

3. Farm size: Please indicate the area of land in your possession.

Sl. No.	Nature of holding	Area		
		Local Unit		Hectare
		Decimal	Bigha	
a.	Homestead (including garden and fallow land)			
b.	Own land under own cultivation			
c.	Land taken from others on lease			
d.	Pond area			
e.	Others (if any)			
Total=				

4. Maize cultivation area: Mention your area of land under maize cultivation in the last year according to the following aspects.

Sl. No.	Area of land	Area		
		Local Unit		Hectare
		Decimal	Bigha	
1.	Possible maize cultivation area			
2.	Actual maize cultivation area			

5. Annual income: Please mention your annual income according to the following sources.

Sl. No.	Sources of income	Production (local unit)	Market price (Tk./local unit)	Total (Tk.)
A. Agricultural				
1.	Maize			
2.	Rice			
3.	Wheat			
4.	Potato			
5.	Vegetable			
6.	Fruits			
7.	Fish			
8.	Dairy and poultry			
9.	Land lease			
B. Non-Agricultural				
1.	Service			
2.	Business			
3.	Others (if any)			
Total=				

6. Agricultural knowledge: Please reply the following questions.

Sl. No.	Questions	Full mark	Mark obtained
A. Remembering			
1.	Mention the seed rate per ha for cultivation of maize.	2	
2.	Name two crops of green manure fertilizer.	2	
3.	Name two diseases of poultry.	2	
B. Understanding			
1.	Mention the ways and means of increasing soil fertility.	3	
2.	Why do you give light irrigation to wheat field?	3	
3.	Which type of land is suitable for maize cultivation?	3	
C. Applying			
1.	Mention the means for using higher dose of MP in MV of potato.	3	
2.	Mention the means of pest control without insecticide.	3	
3.	What is the duration of first irrigation of maize after seed sowing?	3	
D. Analyzing			
1.	Why chemical fertilizers are more harmful to environment than organic manures?	3	
2.	Which irrigation water between river/canal and underground is better and why?	3	
3.	Why ideal plant spacing for modern maize need to be followed?	3	

Contd.

Sl. No.	Questions	Full mark	Mark obtained
E. Evaluating			
1.	When do you apply pesticide in rice field according to the concept of IPM?	3	
2.	Which types of sapling are considered for tree plantation?	3	
3.	Do you think low moisture content of the grain need to be maintained for safe storage? Why?	3	
F. Creating/Synthesizing			
1.	What is the important concern if wheat is grown after harvesting of T. aman?	3	
2.	How can you prevent of foot and mouth disease (FMD) of cattle?	3	
3.	How will you control stored grain pest without chemical pesticide?	3	
Total		51	

7. Training experience: Did you receive any training related to agricultural activities?

Yes..... No.....

If yes, please mention the duration of training:days.

8. Extension media contact: Please indicate the extent of your contact with following extension media.

Sl. No.	Extension media	Not at all	Extent of contact		
			Rarely	Occasionally	Frequently
A.	Individual Contact				
1.	Neighbour (times/week)		1-2	3-4	≥ 5
2.	Local leader (times/week)		1	2	≥ 3
3.	Agricultural input dealer (times/season)		1-3	4-5	≥ 6
4.	Sub-Assistant Agricultural Officer (times/season)		1-2	3-4	≥ 5
5.	Agricultural Extension Officer (times/year)		1-2	3-4	≥ 5
6.	Upazila Agricultural Officer (times/year)		1	2-3	≥ 4
7.	Veterinary Surgeon (times/year)		Do	Do	Do
8.	Upazila Livestock Officer (times/year)		Do	Do	Do
9.	Upazila Fisheries Officer (times/year)		Do	Do	Do
B.	Group contact				
1.	Participate in field day (times/year)		0.5	1	≥ 2
2.	Participate in result demonstration meeting (times/year)		Do	Do	Do

Contd.

Sl. No.	Extension media	Not at all	Extent of contact		
			Rarely	Occasionally	Frequently
C.	Mass Contact				
1.	Reading agricultural features from newspaper (times/week)		1-2	3-4	≥ 5
2.	Watching agricultural TV program (times/month)		1-4	5-9	≥ 10
3.	Watching agricultural poster (times/year)		1-4	5-9	≥ 10
4.	Reading agricultural leaflet (times/year)		Do	Do	Do
5.	Reading agricultural booklets or magazines (No./year)		1	2-3	≥ 4
6.	Visit to union agricultural information center		1	2	≥ 3
7.	Visit to agricultural fair (times/year)		0.25	0.50	≥ 1

9. Cosmopoliteness: Please indicate how frequently you visit the following places.

Sl. No.	Places of visit	Not at all	Extent of visit		
			Rarely	Occasionally	Frequently
1.	Visit to houses of friends or relatives (times/week)		1	2-3	≥ 4
2.	Visit to local market or Up office (times/month)		Do	Do	Do
3.	Upazila head quarter or market (times/3 month)		Do	Do	Do
4.	Visit to own district town (times/6 month)		Do	Do	Do
5.	Visit to other district town (times/year)		Do	Do	Do
6.	Division/capital city (times/year)		Do	Do	Do

10. Innovativeness: If you adopt the following technologies please mention their duration of adoption after you first hearing of the same.

Sl. No.	Name of technology	Do not use	Duration of adoption		
			Within 1 yr. of hearing	Within 1-2 yrs of hearing	Above 2 yrs of hearing
1.	Soil test for fertilizer dose determination				
2.	Use of BADC seed in crop cultivation				
3.	Application of balance fertilizer				
4.	Cultivation of hybrid variety of rice				
5.	Exercise IPM in crop field				
6.	Recommended seed rate and spacing for maize cultivation				
8.	Cultivation of 900 M Gold of maize variety				
9.	Pacific-717 of maize variety				
10.	Inter cropping in maize cultivation				

11.0 Attitude towards maize cultivation: Please indicate your opinion about the following statements.

Sl. No.	Statements	Level of agreement				
		SA	A	U	D	SD
+1.	Awareness of farmers regarding identification of quality maize seeds lead to higher production					
- 2.	BARI cannot develop environment tolerant variety of maize					
+3.	Input companies should encourage improved cultivation technique to maize farmers					
- 4.	Maize cultivation need a huge amount of irrigation					
+5.	Crop rotation including maize cultivation improves soil productivity					
-6.	Maize cultivation require extra cost					
+7	Cultivation of modern maize variety has increased social acceptance					
-8.	Crop rotation including maize requires more labor than other agricultural practices					
+9.	Consumption can increase through alternative and diversified use of maize through flour mills and industrial bakeries					
-10.	Maize cultivation requires heavy amount of fertilization which sometimes can to be afforded by farmers					
+11.	Heavy dependency on poultry and fish feed sector leads to liability to market shocks					
-12.	Intercropping reduces yield of maize					
+13.	Unavailability of proper drying facility results in low quality of maize					
- 14.	Farmers don't get proper information support in maize cultivation					
+15.	Activities of Micro Finance Institute can help maize growers					
-16.	Poor linkage between farmer and buyer leads to poor access to high market price					
+17.	I feel comfort in cultivating modern maize varieties as it's more profitable than local variety					
-18.	Maize should not be encouraged as priority crop in national agricultural policy in Bangladesh					
+19.	I think training facilities for modern maize cultivation need to increased					
-20.	Sustainable agriculture can be applied only on small family farms					

SA= Strongly agree, A=Agree, U=Undecided, D=Disagree and SD= Strongly disagree

12. Problem confrontation: Please mention of your problems in maize cultivation.

Sl. No	Problems	Extent of problem confronted			
		No	Low	Moderate	Severe
1.	Production cost is high.				
2.	Non-availability of seed				
3.	Lack of production inputs in time.				
4.	Lack of technological knowledge about maize cultivation.				
5.	Getting fair price is difficult due to interfere of middleman.				
6.	Insufficient credit facilities.				
7.	No hybrid seed production in Bangladesh.				
8.	Non-habit of human for consumption as food				
9.	Non-suitability of land for maize cultivation.				
10.	Non availability of storage facility at farmer's level due to high moisture content.				

Thanks for your kind cooperation.

.....
Signature of interviewer
Date:

APPENDIX B

Correlation matrix of the dependent and independent variables

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	Y
X ₁	1										
X ₂	-0.166	1									
X ₃	0.252 [*]	0.180	1								
X ₄	-0.433 ^{**}	-0.160	-0.124	1							
X ₅	0.116	0.401 ^{**}	0.713 ^{**}	-0.141	1						
X ₆	.0296 ^{**}	0.253 [*]	0.075	-0.634 ^{**}	0.309 ^{**}	1					
X ₇	-0.100	0.106	0.182	0.087	0.155	0.045	1				
X ₈	0.173	0.465 ^{**}	0.229 [*]	-0.242 [*]	0.420 ^{**}	0.431 ^{**}	0.170	1			
X ₉	-0.270 ^{**}	0.153	0.223 [*]	0.341 ^{**}	0.301 ^{**}	-0.230 [*]	0.191	0.212 [*]	1		
X ₁₀	-0.139	0.655 ^{**}	0.106	-0.386 ^{**}	0.322 ^{**}	0.383 ^{**}	0.030	0.314 ^{**}	0.021	1	
Y	0.288 ^{**}	0.265 ^{**}	-0.051	-0.888 ^{**}	0.139	0.676 ^{**}	-0.126	0.258 [*]	-0.337 ^{**}	0.457 ^{**}	1

^{*}, Correlation is significant at the 0.05 level of significance

^{**}, Correlation is significant at the 0.01 level of significance

X₁= Age

X₇= Training

X₂= Education

X₈= Extension media contact

X₃= Farm size

X₉=Cosmopoliteness

X₄= Maize cultivation area

X₁₀= Innovativeness

X₅= Annual income

Y = Attitude towards technology

X₆= Agricultural knowledge

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