ADOPTION OF WHEAT PRODUCTION TECHNOLOGIES BY THE FARMERS OF A VILLAGE OF NARAYANGANJ DISTRICT

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ADOPTION OF WHEAT PRODUCTION TECHNOLOGIES BY THE FARMERS OF A VILLAGE OF NARAYANGANJ DISTRICT

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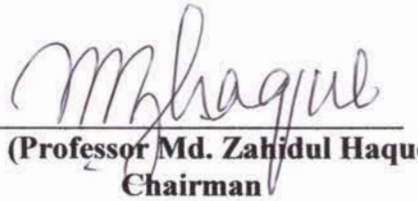

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CERTIFICATE

This is to certify that the thesis entitled, "Adoption of Wheat Production Technologies by the Farmers of a Village of Narayanganj District" *submitted to the Faculty of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* MASTER OF SCIENCE in AGRICULTURAL EXTENSION AND INFORMATION SYSTEM, *embodies the result of a piece of bona-fide research work carried out by* Md. Masum Khan Jewel *Registration No.* 27457/00660 *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

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

Dated:
Place: Dhaka, Bangladesh

.....
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Dedicated to
My
Beloved Parents

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The Author

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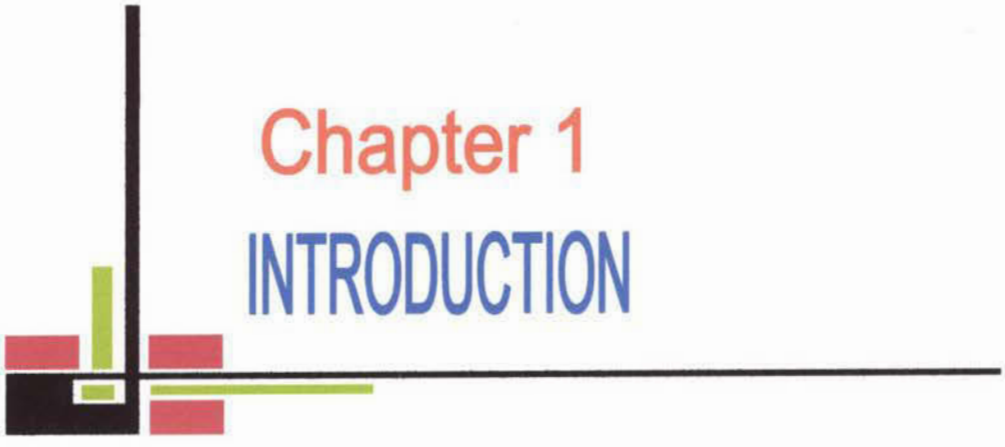
ABSTRACT

The purpose of the study was to determine the extent of adoption of wheat production technologies by the farmers and to explore the relationships between farmers' selected characteristics and their adoption of wheat production technologies. Tingaon village of Bandar union at Bandar upazila under Narayanganj district was the locale of the study. Data were collected from randomly selected 96 farmers by using interview schedule during 05 August to 15 September 2007.

The finding revealed that the highest proportion (81.2 percent) of the farmers had medium adoption, 4.2 percent had low and 14.6 percent had high adoption of wheat production technologies. Computed 'r' value depicts that among eleven selected characteristics of the farmers, level of education, farm size, annual income, organizational participation, extension media contact, agricultural knowledge, attitude towards wheat cultivation and innovativeness had significant positive relationship with the adoption of wheat production but age was negatively correlated with the adoption of wheat production. On the other hand, family size and cosmopoliteness had no significant relationships with the adoption of wheat production. Majority (59.4 percent) of the farmers faced medium extent of problems and the rest 40.6 percent faced high extent of problem regarding adoption of wheat cultivation. Nine problems identified by the farmers, which they had been confronting in adopting wheat production. The major problems confronted by the farmers were inadequate irrigation in dry season, inadequate knowledge about wheat production, lack of accurate price, lack of sufficient machineries and tools for wheat cultivation and scarcity of modern variety of seed, fertilizer and pesticides when they are needed.



Chapter 1

INTRODUCTION

INTRODUCTION

1.1 Background of the Study

Bangladesh is mainly an agro-based country with an area of 1, 47,570 square kilometers and agriculture is the backbone of her economy. About 79.9 percent of her population lives in rural areas and 62 percent of the country's total labor force are engaged in agriculture (BBS, 2005). The predominance of agriculture in the country's economic life becomes all the evident if one looks at the magnitude of its contribution to Gross Domestic Product (GDP) of the country. Agricultural output at current prices has been found to contribute 23.50 percent to the GDP in which 13.44 percent comes from crops, 1.90 percent from forestry, 2.93 percent from livestock and 5.23 percent from fisheries (BBS, 2005). So, agriculture plays a vital role through employment generation, poverty alleviation, food security and enhances standard of living by increasing income level of rural population. In 2003-04 fiscal year production of food crop were 27.6 million metric tons whereas Aus 1.83 million metric tons, Aman 11.52 million metric tons, Boro 12.83 metric tons, wheat 1.25 million metric tones and maize 2.41 lakh metric tons (Anonymous, 2005). Different natural calamities or disasters such as flood, drought, cyclone, tidal bore etc. affect the rice production. As a result rice production becomes uncertain. In this situation the cultivation of wheat can be given priority for solution of food crisis.

Wheat is one of the most important cereal crops and main staple food crops in the world. About two-thirds of the world's population use wheat as staple food (Mujumder, 1991). Dubin and Grinkel (1991) reported that in the recent years the largest area of wheat cultivation in the warmer climates exists in the South-East Asia including Bangladesh, India and Nepal. In 2004-2005, the wheat production, seeds required 79000 metric tones, current supply rate 17.98 percent and present production 14208 metric tones (Fakir, 2000). In spite of its

importance, the yield of the crop in our country is low in comparison to the other countries of the world, where average yield estimated 2.69 t/ha (FAO, 1997). Though the area, production and yield rate of wheat have been increasing dramatically during the last decade, the wheat yield in Bangladesh is too low (2.2 t/ ha) in comparison to the developed countries of the world like Japan, France, Germany and UK producing 3.76, 7.12, 7.28, and 8.00 t/ha, respectively (FAO, 2000).

The total production of rice in Bangladesh is not sufficient to feed her people. Wheat can be a good supplement of rice and can play the most vital role to feed the teeming millions of the people. There is ample scope for wheat cultivation in Bangladesh as it is cultivated in Rabi season having minimum competition with rice for land. Wheat can be grown in winter season along with other crops like pulses, oil seeds, vegetables etc. Five wheat production zones have been identified in Bangladesh. The North-West (N-W), North-East (N-E), North Central (N-C), South Central (S-C) and South West (S-W) zones include most of the major wheat growing areas in the country. The majority of the area under wheat cultivation is found in the northern part is the most important wheat growing area.

Bangladesh is a rice growing country but its climatic conditions are suitable for wheat production. Wheat is the second important cereal crop next to rice in our country and has achieved a remarkable progress in increasing wheat production and productivity over the last 30 years. In 1970 wheat cultivation area was only 0.1 million hectare. In 1985 the area increased at 0.7 million hectare and total production were 1.2 million metric ton. In 1999 wheat cultivation area of our country was 0.85 million hectare and the production were about 1.9 million metric ton (Razzaque, 2000). Wheat is an important winter cereal crop in our country. It requires relatively cool, moist growing season followed by dry, warm season for ripening. The crop is cultivated during the cool season with

temperature of less than 25^0C. Wheat requires a minimum temperature of 3°C-4°C, optimum of 25°C and maximum of about 30°C-32°C.

In wheat production the requirement of irrigation water and disease infestation is less than that of rice. It is the cheapest source of carbohydrate. It contains a considerable amount of proteins, minerals and vitamins. Wheat grain is rich in nutrient value containing 78.1 percent starch, 14.7 percent protein, 2.1 percent fat and 2.1 percent mineral. Wheat grown in Bangladesh is used by making flour. The flour is used for such products as bread, cakes, crackers, macaroni and spaghetti. A small amount of wheat is also used in the manufacture of dextrose, alcohol and certain breakfast food. Wheat is an excellent feed for livestock, but because of its importance as human food only a small part of the total production is used for this purpose. All of the by-products are higher in content of protein than wheat itself and served as a valuable protein supplement in many livestock ration.

The areas under wheat crop were estimated at 741830, 706475 and 641875 hectares in 2001-2002, 2002-2003 and 2003-2004 respectively. Therefore the wheat area 9.1 percent decrease compared to previous year due to more cultivation of boro, maize and potato crops in 2003-04. The following table shows the area & yield rates of wheat crop during 2001-02 to 2003-04.

Table 1.1 Estimated area and yield of wheat crop

Year	Area (hectare)	Yield per hectare (M. tons)	% change of yield rate over last year
2003-04	641,875	1.953	(-) 8.44
2002-03	706,475	2.133	(-) 19.50
2001-02	741,830	2.650	(-) 22.11

Source: BBS, 2004

Average yield rate of wheat has been found 1.953 metric ton per hectare this year compared to 2.133 metric tons last year. The yield rate has declined by 8.44 percent this year over last year.

Total production of wheat crop has been estimated at 1.25 million metric tons in 2003-04 as against 1.51 million metric tons in the previous year which is 16.81 percent lower. Decrease in areas and yield rate contributed to lower production in 2003-04.

Table 1.2 Production of wheat

Year	Production (M. tons)	% change over previous year
2003-04	1253380	(-) 16.81
2002-03	1506710	(-) 6.17
2001-02	1605760	(-) 4.04

Source: BBS, 2004

1.2 Statement of the Problem

Wheat is one of the most important cereal crops in Bangladesh next to rice. The importance of the cultivation of this crop is increasingly recognized by the implement as of agricultural extension programs as well as policy makers. The government of Bangladesh is promoting the extent of cultivation and production of this crop through various projects. As a high value crop (HVC), wheat has much potentiality for widespread cultivation by the respondents. But before undertaking any massive programme for its increased cultivation in Bangladesh, it is first necessary to know the existing situation of the extent of cultivation of wheat in the most potential areas of Bangladesh. Bandar upazila of Narayanganj district is mostly well known for cultivation of wheat in this country. To expand the cultivation of this crop in other parts of the country, the knowledge on the present situation of wheat production in this region would be significantly contributory to design appropriate programs for its widespread cultivation. In these respects, the answers to the following questions would be very much pertinent.

1. To what extent of wheat production technologies have been adopted by the wheat growers?
2. What was the trend of wheat cultivation by the growers?

3. What were the important characteristics of the wheat growers influencing their adoption of wheat production technologies?
4. Was there any relationship between the characteristics of the wheat growers and their extent of adoption of wheat production technologies?
5. What problems were the growers encountered in during wheat production?

These questions obviously indicate the need for conducting a research study entitled "Adoption of Wheat Production Technologies by the Farmers of a Village of Narayanganj District".

1.3 Specific Objectives of the Study

The following objectives were formulated to give clear direction to the study:

1. To determine the extent of adoption of wheat production technologies by the farmers.
2. To determine the trend of adoption of wheat cultivation by the grower.
3. To determine and describe some selected characteristics of the farmers.
4. To explore the relationships between selected characteristics of the farmers and their adoption of wheat production technologies. The selected characteristics are:
   (a) Age
   (b) Education
   (c) Family size
   (d) Farm size
   (e) Annual income
   (f) Organizational participation
   (g) Extension media contact
   (h) Cosmopoliteness
   (i) Agricultural knowledge
   (j) Attitudes towards wheat cultivation
   (k) Innovativeness.
5. To describe the extent of problems faced by the farmers in adopting wheat production technologies.

1.4 Justification of the Study

Production of wheat may be increased with the care of wheat cultivation by the farmers. The concept and benefits of the wheat cultivation should be disseminated to the farmers in a convincing and attractive manner, so that farmers response quickly to adopt wheat cultivation. This is undoubtedly an educative process and it possible through Extension Education System, concerned mainly with increasing agricultural production and improving living standards of the farmers. On an average about 2.4 to 2.8 million hectares of land remain uncultivated during winter season. A substantial portion of that, wheat cultivation need less water, faces less problem due to weed and insect. There is an assurance of next crop after harvesting of wheat for its short duration and obtain self sufficiency in food, it can play a great role along with rice. To increase wheat production, transfer of modern technology is essential and to get necessary information related to wheat production would be the key factor for the farmers in adoption of wheat cultivation (Islam, 1996). Now considerable effort is being made through research and extension delivery system to increase wheat production in our country. But the actual increase in production will depend on the activities of the wheat growers. The behavior of a farmer is influenced by his personal, economic, social and physiological characteristics (Hossain, 1991). Bandar upazila under Narayanganj district was considered as the most suitable location to study the phenomenon of adoption of wheat production technologies by the wheat growers.

1.5 Scope of the Study

The main focus of the study was to determine the adoption of wheat production technologies. The findings of the study would be specifically applicable to Narayanganj district. However, the findings would 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 would reveal the phenomenon related to diffusion of innovation. These would be of special interest to the policy makers and planners in formulating and redesigning the

extension programmes especially for wheat cultivation. The findings were expected to be helpful to the field workers of different nation building departments and organizations to develop appropriate extension strategies for effective working with the rural people.

1.6 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of available evidence (Goode and Hatt, 1952). The researcher had the following assumptions in mind while undertaking this study:

1) The respondent included in the sample was capable of providing proper answer to the question in the interview schedule.
2) The researcher who acted as interviewer was adjusted to social and environmental condition of the study area. Hence, the data collected by him and the respondents were free from bias.
3) The responses furnished by the respondents were reliable. They expressed the truth about their conviction and opinions.
4) Views and opinions furnished by farmers included in the sample were representative views and opinions of the whole population of the study.
5) The finding of the study will have general application to other parts of the country with similar, socio-economic, cultural and agro-ecological conditions of the study area.
6) The respondents were more or less conscious about the use of wheat production technologies.

1.7 Limitations of the Study

Considering the time, money and other necessary resources available to make the study manageable and meaningful, it was necessary to consider the following limitations:

1. The study was confined mainly to farmers' adoption of wheat production technologies.

2. The study was confined in Tingaon village at Bandar union of Bandar upazila under Narayanganj district.
3. The characteristics of wheat growers were many and varied but only eleven characteristics were selected for investigation in this study.
4. Population of the study includes only the heads of the farm families.
5. Facts and figures were collected by the investigator applied to the present situation in the selected area.
6. For information about the study, the researcher was dependent on the data furnished by the selected respondent during data collection.

1.8 Definition of Key Terms

A concept is an abstract of observed thing; events or phenomenon or in other words, it is a short hand representation of variety of facts (Wilkinson and Bhandarkar, 1977). A researcher needs to know the meaning and contents of every term that he used. It should clarify the issue as well as explain the fact to the investigator and readers. However, for clarity of understanding, a number of key concepts/terms frequently used throughout the study are interpreted as follows:

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

Age: It means the age of a farmer that will refers to the period of time from his birth to the time of investigation.

Agricultural knowledge: It is the extent of basic understanding of the farmers in different aspects of agricultural subject matters i.e. crops, livestock,

fisheries, agro forestry, soil, seed, fertilizer, insects and diseases of crops, high yielding variety etc. It includes the basic understanding of the use of different agricultural inputs and practices.

Annual income: It means the total earning by the respondents himself and the members of his family from agriculture and other sources during last year. It is expressed in taka.

Assumption: An assumption is "The supposition that an apparent fact or principle is true in the light of the available evidence" (Goode and Halt, 1952).

Attitude towards wheat cultivation: The term attitude towards wheat cultivation of an individual was used to refer to his feelings, belief and action tendencies towards the various aspects of wheat cultivation i.e. knowledge + beliefs + action = attitude

Cosmopoliteness: Cosmopoliteness of a respondent is measured by computing a cosmopoliteness score. The Cosmopoliteness score is assigned on the basis of different places and frequency of his visit external to and outside his own social system.

Education: Education is referred to the describe change of human behavior, i. e. change in knowledge, skill and attitude of an individual through reading, writing and other related activities. It is measured in terms of year of schooling.

Extension media contact: It is referred to the respondents becoming accessible to the influence of different information media through different extension teaching methods.

Family size: The family size is measured by the total number of members in the family of a respondent. The families members are include the respondent, spouse, sons, daughters and other dependents. A unit score is assigned for each member of the family.

Farm size: The term related to the land owned by a farmer on which he carried his farming and family business, the area being estimated in terms of full benefit to the farmer. A farmer was considered to have full benefit from cultivated area either owned by himself or obtained or, lease from others and half benefit from the area which *was* either cultivated by borga or given to others for cultivation on borga basis.

Farmers /growers: The persons who were involved in farming activities are called farmers. They participated in different farm and community level activities like crops, livestock, fisheries, other farming activities etc.

Hypothesis: Defined by Goode and Halt (1952), a proposition this can be put to "a test to determine its validity". It may be true or false, it may seem contrary to or in accord with common sense. However, it leads to an empirical test.

Innovation: An innovation is an idea or practice perceived as new by the individual. It is the newness of the idea to the individual that determines his reaction to it.

Innovativeness: According to Rogers(1995) Innovativeness is the degree to which an individual is relatively earlier in adopting agricultural innovations, new ideas, practices and things than the other members of a social system. This was comprehended by the quickness of accepting innovations by an individual in relation to others and was measured on the basis of time dimension

Null hypothesis: The hypothesis which we pick for statistical test is null hypothesis (H_0). In this study the null hypothesis is stated that there is no relationship between the concerned variables.

Organizational participation: Organizational participation of the respondent is measured in two dimension status of his participation and duration of participation in different organizations during the time of interviewing.

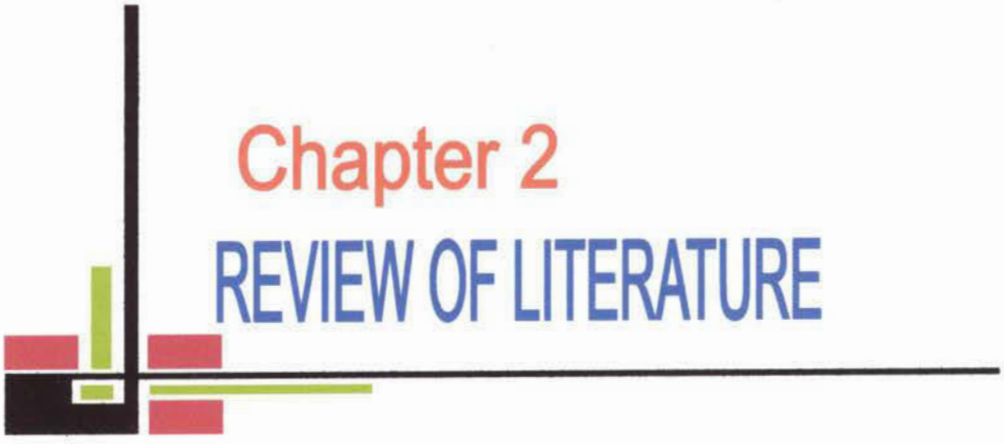
Problem: Problem referred to a difficult about which something to be done. Problem faced by the farmers in this study was defined as the extent of difficulties faced by growers in the way of adoption of wheat production technologies.

Research methodology: Research methodology is the description, explanation and justification of various methods of conducting research. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying the research problem along with the logic behind them.

Respondents: People who have answered questions by an interviewer for a social survey. They are the people from whom a social research worker usually gets most data required for his research.

Statistical test: A body of rules which help to take decision regarding acception or rejection of the hypothesis is defined as test. In this study if a null hypothesis is rejected it is assumed that there is a relationship between the variables.

Variable: A general indication in statistical research of characteristic that occurs in a number of individuals, objects, groups etc. and that can take on various values, for example the age of an individual.



Chapter 2
REVIEW OF LITERATURE

REVIEW OF LITERATURE

The purpose of this Chapter is to review the literatures having relevance to the present study. The researcher made an elaborate search of available literature for the above purpose. But there is hardly any study dealing with the relationship of the characteristics of farmers and their adoption of selected wheat production technologies. The researcher or attempted to search the literatures on a number of studies have been conducted on the adoption of innovations by the farmers. Therefore, the findings of such studies related to the extent of adoption of selected wheat cultivation by the farmers and other partial studies have been reviewed in this Chapter. This Chapter is divided into four sections; the first section deals with the concept of diffusion and adoption of innovation, the second section with past research findings relating to adoption of innovations, the third section with past research findings relating to the relationships of farmers adoption of innovations with their selected characteristics and the fourth section with the conceptual framework of the study.

2.1 Concept of Diffusion and Adoption of Innovation

Adoption is a decision to make fill use of innovation as the best course of action available. When an individual takes up a new idea as the best course of action and practices it, the phenomenon is known as adoption. Diffusion is the process by which an innovation is communicated through certain channels overtime among the members of social system (Ray, 1991).

Rogers and Shoemaker (1971) stated the adoption process as the traditional view of the innovation-decision process, called "adoption process" which was postulated by a committee of rural sociologists in 1955 as consisting of five stages:

1. **Awareness stage:** The individual learns of the existence of the new idea but lacks detailed information about it.

2. **Interest stage:** The individual develops interest in the innovation and seeks additional information about it.

3. **Evaluation stage:** The individual makes mental application of the new idea to his present and anticipated future situation and decides whether or not to try it.

4. **Trial stage:** The individual actually applies the new idea on a small scale in order to determine its utility in its own situation.

5. **Adoption stage:** The individual uses the new idea continuously on a full scale.

The innovation-decision process is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, implementation of new idea and to confirmation of this decision. This process consists of series of actions and choices over time through which an individual or organization evaluates a new idea into ongoing practices. The behaviour consists essentially of dealing with the uncertainty that is inherently involved in deciding about a new alternative to those previously in existence. It is the perceived newness of the innovation and the uncertainty associated with this newness that is a distinctive aspect of innovation-decision making.

An individual decision about an innovation is not an instantaneous act. Rather, it is a process that occurs overtime and consists of a serious of actions (Rogers, 1995).

The innovation-decision process consists of five stages:

1. **Knowledge:** It occurs when an individual is exposed to the innovation's existence and gains some understanding of how it functions.

2. **Persuasion:** It occurs when an individual (or other decision-making unit) forms a favorable or unfavorable attitude towards the innovation.

3. **Decision:** It occurs when an individual (or other decision making unit) engages in activities that leads to choice either adoption or rejection of the innovation.

4. **Implementation:** It occurs when an individual (or other decision-making unit) puts an innovation into use.

5. **Confirmation:** It occurs when an individual (or other decision-making unit) seeks reinforcement of an innovation decision already made but he or she may reverse his or her previous decision if exposed to conflicting messages about the innovation.

2.2 Past Research Findings Relating to Adoption of Innovations

Hossain (1971) carried out a research study on the adoption of four improved practices in Gouripur of Mymensingh district. The practices were (i) plant protection measure, (ii) recommended variety of paddy, (iii) line transplanting and (iv) recommended dose of fertilizers. It revealed that among the respondent farmers 57.40 percent adopted plant protection measure, 35.51 percent adopted recommended variety of paddy, 25.36 percent adopted line transplanting and 11.52 percent adopted recommended dose of fertilizers.

Karim (1973) conducted a study on the adoption of fertilizers by transplanting Aman growers in former Keyotkhali union of Mymensingh district. He studied the adoption of three fertilizers-urea, tripple super phosphate (TSP) and muriate of potash (MP). He found that 4 percent of the respondent growers had high adoption of fertilizers while 9 percent had medium adoption and 41 percent low adoption. Remaining forty six percent (46 percent) of the respondent growers did not use any of the three fertilizers.

Rahman (1974) studied the adoption of IR-20 variety of paddy in Bhabakhali union of Mymensingh districts. He found that 29 percent of the growers had medium adoption of IR-20 while 31 percent of the growers did not adopt the innovation.

Mohammad (1974) studied the extent of adoption of insect control measures by the farmers in Khamar union of Rajshahi district. He found that among the respondent farmers, 25 percent did not adopt insect control measure; 28 percent had high level of adoption; 32 percent had medium level of adoption and 25 percent had low level of adoption.

Sobhan (1975) studied on the extent of adoption of ten winter vegetables namely tomato, radish, lettuce and potato in Boilar union of Mymensingh district. Over all winter vegetable adoption scores of the farmers could range from 0 to 140. Over all adoption scores indicated that 27 percent of the farmers did not adopted winter vegetables cultivation while 28 percent had low adoption and 55 percent high adoption.

Hossain (1981) studied on the relationship of the farmers (jute growers) with their adoption of improved practices of jute cultivation. He found that more than half (54 percent) of the respondents had medium adoption of the improved practices compared to 31 percent having high adoption and 15 percent low adoption

Hossain (1983) studied the extent of adoption of HYV rice (T. aman) and other related aspect in Bhabalhali union of Mymensingh district. He observed that among the respondent farmers, 54 percent had high adoption of HYV rice and 46 percent had medium adoption of HYV rice as T. aman.

Haque (1984) investigated the extent of adoption of improved practices in sugarcane cultivation in selected areas of Jessore district. He observed that 62.75 percent respondent growers adopted early time of planting, 60.75 percent of the respondent growers adopted recommended dose of fertilizers and 54.9 percent growers adopted trench method.

Rahman (1986) conducted a research study on the extent of adoption of four improved practices which were, use of fertilizers, line sowing, irrigation and use of insecticides in transplanted aman rice cultivation in two village of Mymensingh district. It revealed that 22 percent of the farmers adopted all the four practices compared to 49 percent adopted three practices, 22 percent adopted two practices, 5 percent adopted one practices and only 2 percent adopted of the four practices.

Karim and Mahboob (1986) conducted a study on the adoption of HYV wheat in Kushtia union of Mymensingh district. They observed that 74 percent of the farmers adopted HYV wheat to varying extent, while the remaining 26 percent were non adopters.

Gogoi and Gogoi (1989) conducted a study on adoption of recommended plant protection practices in rice in Zorhat district of Assam state in India. The study revealed that among the respondents, 50 percent had low level of adoption, 35.36 percent medium level of adoption and 13.64 percent had high level of adoption of recommended plant protection practices.

Naika and Rao (1989) found that more area was brought under plant protection chemical after adoption of recommended plant protection chemicals. The area increased from 45.75 areas to 104.75 acres in adopted villages and from 8 acres to 11 acres in non-adopter villages.

Singh and Rajendra (1990) found that out of 150 farmers adopted 767 variety of sugarcane, while only 45.0 of the respondents did not adopt. A high level of adoption was found in nitrogen fertilizers, weeding and intercultural operations (110 percent), followed by plant protection measures (74.3 percent), potassium fertilizer (33.1 percent). Only 28.6 percent adopted ridge-sowing practices.

Juliana *et al.* (1991) undertook a study on adoption of integrated pest management practices in five villages of vasusdevanallar block in Tirunelvi district, Tamilnddu, India. They found that about 50 percent of marginal

farmers, 47.50 percent of small farmers and 52.50 percent of big farmers had medium adoption and 42.50 percent of big farmers, 22.50 percent of small farmers and 5 percent of the marginal farmers had high level of adoption. In both adoptions level of big farmers' participation was higher in comparison to other categories of farmers.

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

Kashem and Hossain (1992) conducted a research study on adoption behaviour of sugarcane growers of Zilbangla Sugar Mill, Dewanganj, Jamalpur, Bangladesh. They found among the growers, that 89 percent had high level of adoption of recommended practices of sugarcane.

Kher (1992) conducted a study on adoption of improved wheat cultivation practices I selected villages of Rajouri block. He found that 72 percent of the respondent had medium level of adoption, 17 percent had low level of adoption and 11 percent had high level of adoption.

Singh *et al.* (1992) undertook a research study in India on factors affecting the adoption of improved sugarcane production technology. They observed that majority of sugarcane growers had the medium level of adoption and were partial adopters of scientific recommendations of sugarcane production technology.

Nikhade *et at.* (1993) observed in their study on adoption of improved practices of soybean cultivation that percent adopted improved varieties. More than 82 percent had complete adoption of package practices like time showing, spacing and intercultural operations. Partial adoption was observed in majority of the soybean growers (74.6 percent) with regard to recommended seed rate.

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

Nikhade *et al.* (1995) found that the adoption gap about the use of recommended technology of cotton among cotton growers was found to be about 30 percent which was quite high.

Siddaramaiha *et al.* (1995) studied adoption of improved seri-cultural practices among big and small farmers. They indicate that there were cent percent adoptions in following the recommended system of planting by both big and small farmers. Other practices adoptions by a large percentage of farmers were: optimum time of planting (95 percent), adoption of recommended irrigation schedule (93.75 percent), recommended spacing (91.25 percent) and the use of improve variety of mulberry crop (87.50 percent). Nearly half of the respondents used the recommended quantity of farmyard manure and plant protection chemicals in mulberry cultivation.

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

Hasan (1996) found in his study that the highest proportion (44 percent) of the respondents perceived the existence of medium adoption, compared to 26 percent low adoption and 30 percent high adoption in respect of selected agricultural technologies.

Islam (1996) carried out a study on farmers' use of indigenous technical knowledge (ITK) in the context of sustainable agricultural development. He

found the extent use of ITK by individual farmers that, the highest proportion (42.73 percent) of the respondents belonged to the lower user category as compared to 41.82 percent in the moderate user category and 15.45 percent in the higher user category, respectively.

Alam (1997) studied the extent of the use of improved farm practices by the rice growers in Anwara Thana of Chittagong district. The study revealed that 43.0 percent of the respondent had medium use of improved farm practices and 50 percent of the respondents had low use of farm practices and only 7.0 percent of the respondents had high use of improved practices.

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

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

Muttaleb *et al.* (1998) found that over all adoption of plant protection practices was medium. Among the plant protection practices high adoption were observed in fungicides, insecticide and soil treatment and low adoption were found that treatment and low adoption were found in suberization of cut tuber hand picking of cutworm and rouging of diseased plant.

Rahman (1999) conducted investigation on adoption of balanced fertilizer by the farmers of Ishwargonj upazila in Mymensingh district. The study revealed that the majority (71 percent) of the respondents had medium adoption compared to 29 percent having below optimum adoption and there was no respondent at all who adopted the fertilizer at above optimum level.

Mostafa (1999) studied the adoption of recommended mango cultivation practices by the mango growers of Nawabganj Sadar Thana. He found that about half (49 percent) of the mango growers had "low adoption" 31 percent "very low" adoption and 20 percent had "medium" adoption of fertilizers.

Hossain (1999) studied farmer's perception of the effect of agro-chemical on environment. They study revealed that 64 percent of the farmers had medium adoption 21 percent had low adoption and 15 percent had high adoption of pesticides.

Podder and Kashem (2000) concluded that about half (47 percent) of the growers had medium adoption compare to 14 percent low adoption and 39 percent high adoption of Mehersagar banana.

Razzaque (2000) studied on the extent of adoption of HYV rice in three villages of Bangladesh Agricultural University Extension Project area. He observed that among the respondent growers, 6.6 percent of the farmers had high adoption of HYV rice, 33.3 percent had medium adoption and 40 percent low adoption.

Squire (2000) studied on factors influencing traditional farmers to adopt improved food crop production technologies in BO district of Southern Sierra Leone. He found that agricultural technology communication media (other farmers (54 percent)): characteristics of the arable crops (good to excellent eating quality of the improved crop varieties (53 percent)); artificial fertilizers (55 percent); mechanical technology (65 percent); draught animal technology (59 percent); pest and disease control technologies (increase in crop yield (61 percent)); and row planting technologies (easy to weed (53 percent)).

Haider *et al.* (2001) studied the adoption level of improved Package of practices for T. Aman rice cultivation in Gouripur upazila of Mymensingh district. He found that the adoption level of farmers categories were 5 percent non adoption, 62 percent low adoption, 24.5 percent medium adopter and 8.5

percent high adopter. Vast majority (95 percent) of the farmers adopted MV programme of T. Aman rice.

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

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

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

Aurangojeb (2002) studied on the extent of adoption of integrated farming technology by the rural women in RDRS. He observed that the highest percent of rural women (64 percent) used high level, (28 percent) of the women used medium level and only 8 percent used low level integrated homestead farming technologies.

Sardar (2002) studied on "adoption of IPM practices by the farmers under PETRRA Project of RDRS. He observed that majority (45.9 percent) of the farmers had medium, 38.3 percent had low and 15.8 percent had high adoption of IPM practices.

Swinkeles *et al.* (2002) studied assessing the adoption potential of hedgerow intercropping for improving soil fertility, in western Kenya. They conduct that the average cost of hedgerow intercropping was 10.5 percent (SD = 5.5) when

based on returns to land and 17.5 percent (SD = 6.5) based on returns to labor. Fifth planted additional hedges and only 14 percent did so to improve soil fertility. It thus appears that the potential for its adoption as a soil fertility practices. Hedgerow intercropping appears to have greater adopter potential if its aim is to provide feed for an intensive dairy operation or for curbing soil erosion.

Alexander and Goodhue (2002) conducted the study on pricing of innovations. They evaluate the producer's returns to planting patented seed innovation, using a calibrated optimization model of a south-central maize producer's adoption decision in Iowa, USA. Their results suggest that patented seed innovations do not increase the market power of biotechnology firm in the relevant market for production system.

Hasan (2003) found that majority (60 percent) at the farmers had medium adoption while 33 percent had low adoption and 7 percent had high adoption of recommended potato cultivation practices.

Hossain (2003) found that majority (67 percent) of the Boro rice farmers had medium adoption, 17 percent had low adoption and 16 percent high adoption of modern Boro rice cultivation practices.

Rahman (2003) revealed that about half (47 percent) of the growers had medium adoption 44 percent had low and I percent had high adoption of year round homestead fruit cultivation practices.

Salam (2003) found that an overwhelming majority (94 percent) of the respondents were found having high constraints in adopting environmentally friendly farming practices while 6 percent had medium constraints. No farmer was found having low constraint.

Rahman (2003) found that ninety seven percent of the pineapple growers adopted 2-4 intercrops viz, Zinger, turmeric, sweet ground and aroid in pineapple cultivation.

Haque (2003) found that the majority (47 percent) of the growers had medium adoption of modern maize cultivation technologies while 28 percent had high adoption and 25 percent low adoption.

2.3 Past research findings relating to the relationships of farmers' adoption of innovations with their selected characteristics

This selection presents a review of previous studies relating the association of the selected characteristics of the farmers and their adoption of innovations. Twelve characteristics of the contract growers were selected as independent variables of this study. The researcher made outmost efforts to search out studies dealing with relationships of each of the selected characteristics with the adoption of wheat cultivation.

2.3.1 Age and adoption of innovation

Ali *et al.* (1986) observe that their was positive and significant relationship between the age of the marginal farmers and their adoption of jute technologies.

Singh and Rajendra (1990) in their study on adoption of improved sugarcane variety found that age were to have positive association with the adoption of 767 variety of sugarcane.

Hossain (1991) conducted a study to determine the extent of adoption behavior of contract wheat growers in Sadar upazila of Jamalpur district. He found negatively significant relationship between age of the farmers and their level of adoption of improved farm practices.

Singh (1991) conducted a study to determine the extent of adoption of selected recommended practices. He found no relationship between age of the farmers and their level of adoption of plant protection measures.

Pathak *et al.* (1992) observed that there was positive and significant relationship between the age of the marginal farmers and their adoption of jute

technologies. Similar finding was observed by Okoro *et al* (1992) and Hossain *et al.* (1992).

Haque (1993) observed that age had negative relationship with the adoption of improved practices in sugarcane cultivation.

Islam (1993) observed that there was no relationship between the age of respondent potato farmers and their adoption of improved practices in potato cultivation.

Islam (1996) carried out a research study on grower's use of indigenous technical knowledge (ITK), in the context of sustainable agricultural development. He observed that age of the respondent's growers had significant negative relationship with their extent of use of ITK (at 0.01 level of probability). Ali (1993), Khan (1993), Pal (1995) and Hasan (1996) found similar relationships.

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

Aurangozeb (2002) observed that there was significant negative relationship between age and use of integrated homestead farming technologies. The interpretation is that with increased age level of the respondents there was a corresponding decrease of the adoption of homestead farming technologies.

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that age of the respondents had negatively significant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

2.3.2 Education and adoption of innovation

Kaur (1988) found that education influenced the opinion of the women about adoption of vegetable gardening animal husbandry etc.

Bavalatti and Sundaraswamy (1990) observed no significant relationship between education of the farmers and their adoption of dry land farming practices.

Hossain (1991) conducted a study to determine the extent of adoption behavior of contract wheat growers in Sadar upazila of Jamalpur district. He found positively and moderate significant relationship between education of the farmers and their level of adoption of improved farm practices.

Okoro and Obibuaka (1992) studied adoption of recommended practices among small holders in IMO state, Nigeria. The findings of the study indicated a positive relationship between education of the respondents and their adoption of recommended management practices.

Pal (1995) conducted a study on adoption of recommended sugarcane cultivation practices by the farmers. He found that education had significant and positive relationship with the adoption of recommended sugarcane cultivation practices. Most of the studies revealed similar findings. Haque (1993) and Khan (1993) observed similar results.

Muttaleb (1995) studied the relationship of education with adoption of improved potato technologies. The study observed that education had a positive relationship with their adoption potato technologies.

Hasan (1996) conducted a study on adoption of some selected agricultural technologies among the farmers as perceived by the frontline GO and NGO workers. He found that the education had no significant relationship with the perceived adoption of selected agricultural technologies.

Alam (1997) observed that the level of education of the farmer had a positive and significant relationship with the use of their improved farm practices.

Sarkar (1997) found that the level of education of the farmer had a positive significant relationship with adoption of improved potato cultivation practices.

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

Rahman (2001) conducted a study on knowledge, attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Sadar upazila of Mymensingh district. He found that age of the farmers had no significant relationship with their adoption regarding Aalok 6201 hybrid rice.

Aurangozeb (2002) observed that there was positive relationship between education and adoption of integrated homestead farming technologies. The educated women were more interested in adoption of integrated homestead farming technologies than the illiterate women.

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

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

Hossain (2003) concluded that education of the farmers had a significant and positive relationship with their adoption and modern Boro rice cultivation practices.

2.3.3 Family size and adoption of innovation

Okoro and Obibuaka (1992) conducted a research in Nigeria on the adoption of recommended management practices in oil palm. He found that in his study family size had a significant positive relationship in the adoption of the recommended management practices.

Ali (1993) in his study found that family size of the respondents had no significant relationship with STP adoption behavior of sugarcane farmers.

Haque (1993) in his study found that family size of growers had a negative and significant relationship with their adoption of improved practices in sugarcane cultivation.

Chowdhury (1997) observed that there was a positively significant relationship between family size and adoption of selected BINA technologies. Similar results were found by Islam (1993), Bashar (1993), Khan (1993), Pal (1995) and Sarkar (1997) in their respective studies.

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that family size of the respondents had negatively insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

2.3.4 Farm size and adoption of innovation

Abdullah (1983) reported that homestead agricultural production activities undertaken by different categories of households varied according to ownership and size of homestead land. It reveals the families living on others land usually were not interested in growing permanent fruit or fuel trees. However, vegetable cultivation, livestock rearing, poultry arising etc. were common in all the families.

Hossain (1983) found that size of the farm of transplanted Aman farmers in Bhabakhali union of Mymensingh district had a negative relationship with their adoption of HYVT-Aman rice.

Ali *et al.* (1986) found a strong negative relationship between farm size and adoption of improved sugarcane production practices.

Gogoi and Gogoi (1989) in their study observed that size of land holding of farmers had a significant relationship and positive effect on their adoption of plant protection practices.

Singh (1991) in a study found that income of the farmers was significantly associated with the level of adoption of plant protection measures.

Hossain (1991) conducted a study to determine the extent of adoption behavior of contract wheat growers in Sadar upazila of Jamalpur district. He found negatively insignificant relationship between farm size of the farmers and their level of adoption of improved farm practices.

Hossain and Crouch (1992) studied the relationship of farm size with adoption of farm practices. They found positive relationship between the farm size and adoption of farm practices. Similar result was found by Kashem (1991).

Ali (1993) in his study found that farm size of the respondents had no significant relationship with STP adoption behavior of sugarcane farmers.

Bashar (1993) conducted a study on the adoption of intercropping of sugarcane. He observed that there was no relationship between farm size of the respondent farmers and their adoption of sugarcane intercropping.

Haque (1993) has conducted a study to determine and describe the extent adoption of BR 14 by the farmers. He found that negatively significant relationship between farm size of the farmers and their level of adoption of BR 14 during Boro season.

Khan (1993) observed that farm size was positively related to the adoption of insecticides. Similarly, Muttaleb (1995) observed that farm size of the growers had a positive relationship with the adoption of improved potato varieties.

Islam (1996) found that there was significant and negative relationship between the farm size of the farmers and their extent of use of indigenous technical knowledge.

Chowdhury (1997) observed that there was a positively significant relationship between farm size and adoption of selected BINA technologies. Similar results were found by Islam (1993), Pal (1995) and Sarker (1997) in their respective studies.

Alam (1997) studied the use of improved farm practices in rice cultivation by the farmers. The findings of the study showed that the farm size had a significant relationship with their use of improved farm practices in rice cultivation.

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

Hussen (2001) found that the farm size had positive significant relation with their adoption of modern sugarcane cultivation practices.

Aurangozeb (2002) observed that there was no relationship between homestead area and adoption of integrated homestead farming technologies.

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

Sardar (2002) found that the farm size of the farmers had significant positive relationship with their adoption of IPM practices.

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that farm size of the respondents had insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

Hossain (2003) revealed that farm size of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation practices.

2.3.5 Annual income and adoption of innovation

Hossain (1991) conducted a research study on the adoption behavior of contact wheat growers. In the study, he found that there was negatively insignificant relationship between the annual income of contact growers and the adoption of improved farm practices in wheat cultivation.

Singh (1991) found that income of the farmers was associated with the level of adoption of plant protection measures. He also found that low income farmers had greater tendency to apply less than the recommended doses.

Hossain and Crouch (1992) revealed that income of farmers had significant relationship with adoption of improved farm practices in Bangladesh.

Haque (1993) found a negative and significant relationship between farm income and adoption of improved practices in sugarcane cultivation.

Khan (1993) found significant relationship between annual income of the farmers and their adoption of insecticides.

Pal (1995) in his study found a positive and significant relationship between income of the farmers and their adoption of recommended practices in sugarcane cultivation.

Chowdhury (1997) found that the annual income of the respondents had a positively significant relationship with their adoption of selected BINA technologies.

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

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

Aurangozeb (2002) in his study found a positive significant relationship between annual income and adoption of integrated homestead farming technologies.

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

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

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that annual income of the respondents had insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

Hossain (2003) revealed that annual income of the farmers had a significant relationship with their adoption at modern Boro rice cultivation practices.

2.3.6 Organizational participation and adoption of innovation

Hossain (1983) conducted a research in Bhabakali union Mymensingh district to examine the relationships of the farmer's characteristics with their adoption of HYV rice as transplanted Aman. He found no relationships between organizational participation of rice cultivators and their adoption of HYV rice as transplanted.

Haque (1984) conducted a study in Jessore district on the adoption of improved practices in sugarcane cultivation. He reported that organizational participation of the growers significantly influenced their adoption of the improved practices.

Kher (1992) carried out a research study on the adoption of improved wheat cultivation practices by the farmers in selected village Rajouri block, India. He observed that there was no significant relationship between the farmers' social participation and their adoption of improved wheat cultivation practices.

Sarker (1997) conducted a study on correlates of selected characteristics of potato growers with their adoption of improved potato cultivation practices in five village of Comilla district. He observed that organizational participation of the potato growers had no relationship with their adoption of improved potato cultivation practices.

Mostafa (1999) conducted a study on adoption of recommended mango cultivation practices by the mango growers of Nawabganj Sadar Thana. He found that organizational participation of mango growers had a significant positive relationship with their adoption of recommended mango cultivation practices.

Rahman (2001) conducted a study on knowledge attitude and adoption of the farmers regarding Aalok 6201 hybrid rice in Mymensingh Sadar upazila. He found that organizational participation of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

Sardar (2002) conducted a study on adoption of IPM practices by the farmers under PETRRA project of RDRS. He observed that organizational participation of the farmers had no significant relationship with their adoption of IPM practices.

2.3.7 Extension media contact and adoption of innovation

Bezbora (1980) studied adoption of improved agricultural technology by the farmers of Assam. The study indicated a positive relationship between extension contact and adoption of improved cultivation practices.

Osunloogun *et al.* (1986) studied adoption of improved agril. practiced by co-operative farmers in Nigeria. The findings of the study indicated a positive relationship between extension contact and adoption improved practices.

Slade *et al.* (1988) studied that adoption rates among farmers receiving one or more VEW visits per month were generally higher than those farmers who were not visited by VEW'S contact farmers were better adopter of some technologies that non contact farmers.

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

Ali (1993) conducted a study based on farmer's response to spaced transplanting technology of sugarcane. He found a significant positive relationship between extension contact and adoption. Similar results were obtained by Kher (1992), Haque (1993) and Pal (1995).

Alam (1997) studied use of improved farm practices of rice cultivation by the farmers of Anwara thana of Chittagong district. He study indicated no significant relationship of extension contact of farmers with their use of improved farm practices in rice cultivation.

Sarkar (1997) observed a positive and significant relationship between extension contact and adoption of improved potato cultivation practices.

Hossain (1999) conducted a study to determine the farmers' perception of the effect of agro-chemicals on environment. He found that there was no relationship between the farmers media exposure with the adoption of agro-chemicals. Ali *et al.* (1986) observed similar findings with respective studies

Rahman (1999) found that extension contact of the Boro rice farmers had a significant positive relationship with their adoption of balanced fertilizers in Boro rice cultivation.

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

Rahman (2001) found that extension contact of the farmers had a significant and positive relationship with their adoption regarding Aalok 6201 hybrid rice.

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

Sardar (2002) concluded that the extension contact had positively significant relationship with their adoption of IPM practices.

Haque (2003) concluded that extension contact of the farmers had significant positive relationship with their adoption of modern maize cultivation technologies.

2.3.8 Cosmopoliteness and adoption of innovation

Hossain (1991) undertook a research study on the adoption behavior of contact wheat growers in Jamalpur Sadar upazila. He observed that there were no significant relationship between the cosmopoliteness of the growers and improved farm practices. Similar findings were observed by Islam (1996).

Islam (1993) fond a significant relationship between cosmopoliteness of the farmers and their adoption of recommended doses of fertilizer and plant protection measures in potato cultivation.

Pal (1995) conducted a research study on the adoption of recommended sugarcane cultivation practices by the farmers. He observed that the cosmopoliteness of the farmers had significant positive relationship with their adoption of recommended sugarcane cultivation practices.

Rogers (1995) found that innovators and early adopters had much more non-localite behavior than late majority and laggard, were some isolates who had relatively little interaction without their own social system.

Chowdhudy (1997) conducted a study on the adoption of selected BINA technologies by the farmers of Boyra union in Mymensingh district. He found that tree was no significant relationship between farmers' cosmopoliteness and their composite adoption of selected BINA technologies.

Hossain (1999) found a positive significant relationship between cosmopoliteness of the farmers and their adoption of improved practices.

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

Hussen (2001) found that the cosmopoliteness had positive significant relationship with their adoption of modern sugarcane cultivation practices.

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

Sardar (2002) concluded that the cosmopoliteness had positively significant relationship with their adoption of IPM practices.

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

Haque (2003) conducted a study on farmer's adoption of modern maize cultivation technologies. He observed that cosmopoliteness of the respondents had insignificant relationship with their extent of farmer's adoption of modern maize cultivation technologies.

Hossain (2003) revealed that cosmopoliteness of the farmers had a significant and positive relationship with their adoption of modern Boro rice cultivation practices.

2.3.9 Knowledge and adoption of innovation

Moullik *et al.* (1966) conducted a study on predictive values of some factors of adopting nitrogenous fertilizers by the north Indian farmers in India. He found a significant positive relationship between agricultural knowledge and adoption of nitrogenous fertilizers among the cultivators.

Koch (1985) conducted a study in the North western organize Free State. South Africa concerning perception of agricultural innovations aspiration, knowledge and innovation adoption. He observed that three was a strong positive relationship between knowledge and practice adoption. This finding is very much in agreement with that of Rogers and Shoemaker (1971).

Reddy *et al.* (1987) found that the significant association between knowledge and use of improved package of practices in paddy production by participant and non-participant farmers.

Haque (1993) has conducted a study to determine and describe the extent adoption of BR 14 by the farmers. He found that no relationship between agricultural knowledge of the farmers and their level of adoption of BR 14 during Boro season.

Rahman (1995) in his study observed no significant relationship between farmer adoption of improved practices and their knowledge on improved practices of potato cultivation.

Alam (1997) observed that agricultural knowledge of the rice growers had significant relationship with their use of farm practices in rice cultivation.

Sarkar (1997) found that potato production knowledge of potato growers had a positive and significant relationship with their adoption of improved potato cultivation practices.

Sardar (2002) studied adoption of IPM practices by the farmers under PETRRA Project of BDRS. He found that agricultural knowledge had positive significant relationship with their adoption of IPM practices.

2.3.10 Attitude towards wheat cultivation and adoption of innovations

Hossain (1981) conducted a study on relationships of selected characteristics of the Jute growers with their adoption of improved practices of Jute cultivation. He found that there is no relationship between attitude towards intensive jute cultivations scheme of the Jute growers and their adoption of improved practices of jute cultivation.

Hasan (1996) conducted a study on adoption of some selected agricultural technologies among the farmers as perceived by the frontline GO and NGO workers. He found that there was strong positive relationship between attitude towards development and perceived adoption of selected technologies.

Podder (1999) conducted a study on the adoption of Mehersagar Banana by the farmers of Gazaria union under Sakhipur Thana of Tangail district. He found that there was no relationship between attitude towards technology of the growers and their adoption of modern agricultural technologies.

Islam (2002) revealed that the attitude towards technology of the farmers had a significant positive relationship with their adoption of modern agricultural technologies.

2.3.11 Innovativeness and adoption of innovation

Moulik *et al.* (1966) observed that innovativeness significantly influenced the adoption of nitrogenous fertilizers among the farmers. They stated that it was in simple term that the more a cultivator exhibited a general tendency towards accepting innovations, the higher would be his adoption score.

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

Mohammad (1974) conducted the study on the extent of adoption of insect control measures by the farmers. He observed a strong positive relationship between innovativeness and adoption of insect control measures.

Kashem and Halim (1991) reported that innovativeness of the farmers had significant positive correlation with their adoption of modern rice technology use of communication media in live stock production.

Rogers (1995) reviewed 2,376 past research studies and postulated 31 generalization of innovativeness. This include among others are personal characteristics and socio-economic characteristics of the farmers. He stated that innovative farmers had more years of education, larger farm size, higher income, more cosmopoliteness, higher organization participation, lower degree

of fatalism and higher knowledge in farming. However, age did not yield a consistent relationship with innovation proneness. Hossain *et al.* (1992) indicated similar results.

Jamal (1996) found no relationship between innovativeness of dropout rural youth with their preference in selected agricultural and nin-agricultural entrepreneurship. Similar findings were obtained by Rahman (1995) and Rahu (1989). Found a significant negative relationship between the farmers' innovativeness and their problem confrontation in feeds and feeding cattle.

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

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

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

2.4 The Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute on important task. The hypothesis of a research while constructed properly contains at least two important elements i.e "A dependent variable" and "an independent variable". A dependent variable is that factors which appears, disappears or varies as the researcher introduces, removes or varies the independent variables (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. In view of prime findings of review literature, the researcher constructed a conceptual frame work of the study which is self explanatory and is presented in Figure 2.1.

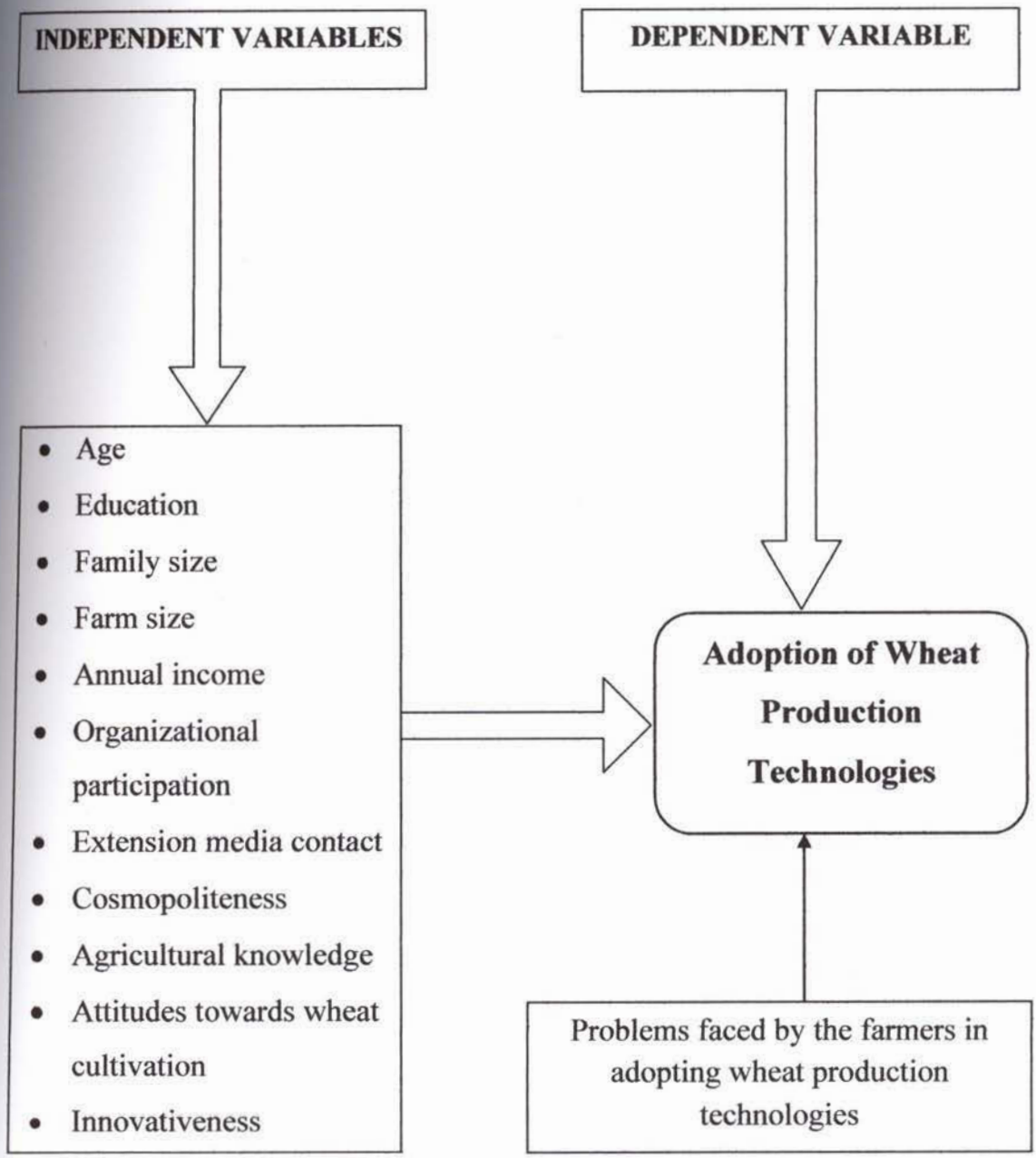
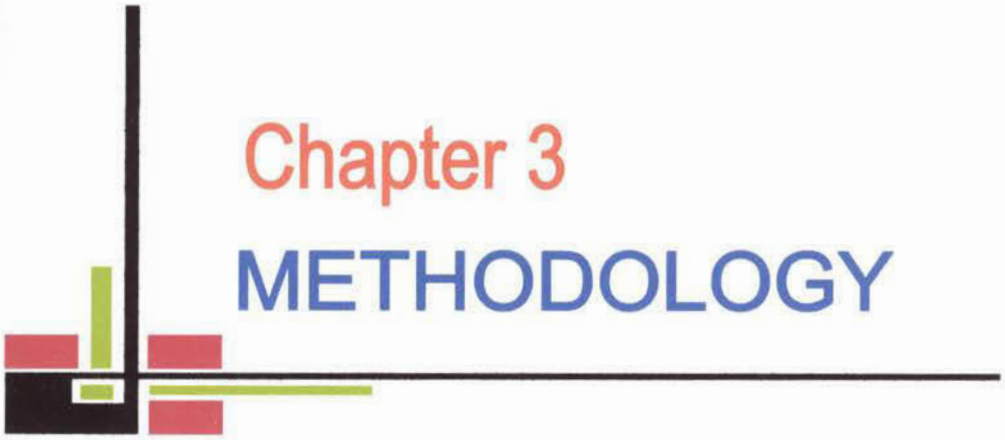


Figure 2.1 The conceptual framework of the study



Chapter 3

METHODOLOGY

METHODOLOGY

The methodology used in conducting any research is critically important and deserves careful consideration. It enables the researcher to collect valid and reliable information in terms of hypothesis or research instrument and to analyze the information properly to arrive at valid results. The methodology used in the present study has been described in this Chapter.

3.1 Locale of the Study

The study was confined to Bandar upazila of Narayanganj district- a former sub-divisional town of Dhaka district upgraded to a district headquarter in February 1984. This upazila with an area of 55.84 sq km consists of 09 unions. It has a total population 212572; male 52.47 percent, female 47.53 percent; average literacy 44.1 percent. Main occupations are agriculture 04 percent, agricultural laborer 7.09 percent, wage laborer 4.04 percent, industries 4.91 percent, commerce 19.7 percent, transport 4.48 percent, construction 1.85 percent, service 34.27 percent, others 19.66 percent. Land use statistics include total cultivable land 1774.99 hectares, fallow land 3808.98 hectares; single crop 18.94 percent, double crop 61.44 percent and treble crop 19.62 percent. Cultivable land under irrigation is 1887.49 hectares. Land control among the peasants estimated as 25 percent are landless, 38 percent small, 31 percent medium and 6 percent rich. Main crops are potato, paddy, mustard seed, wheat, karalla, chichinga, barbati, onions, chilli. NGO activities are done mainly ASA, BRAC, PROSHIKA, SIDA and Seba Parisad (Banglapedia, 2004).

Bandar union of Bandar upazila contains various agricultural activities. Considering the wheat cultivation practices by the inhabitants, Tingao village of Bandar union was purposively selected as the study location of the present study. For clarity of understanding, maps of Narayanganj district and Bandar upazila have been presented in Figure 3.1 and 3.2.

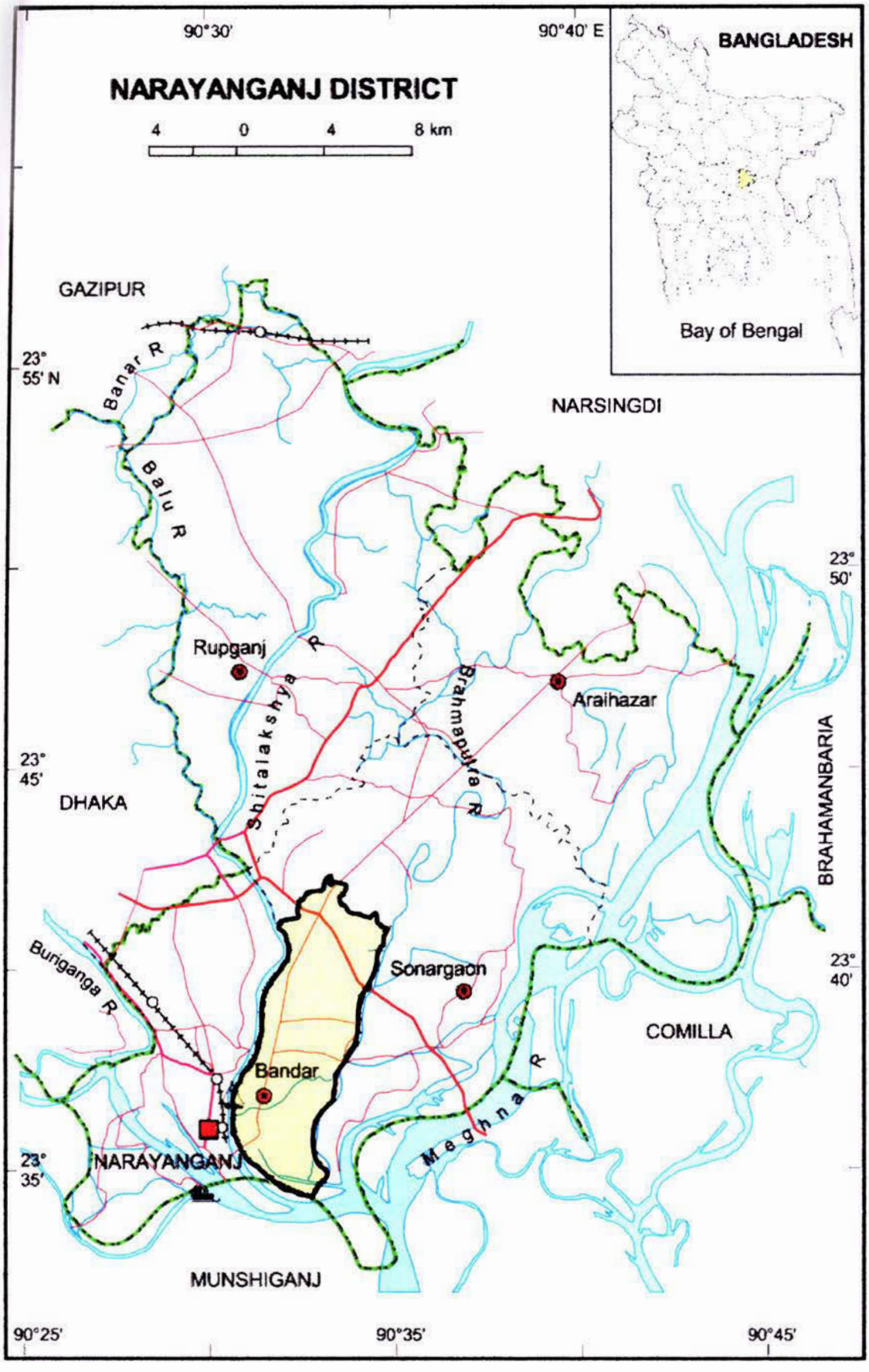


Figure 3.1 A map of Narayanganj district showing Bandar upazila

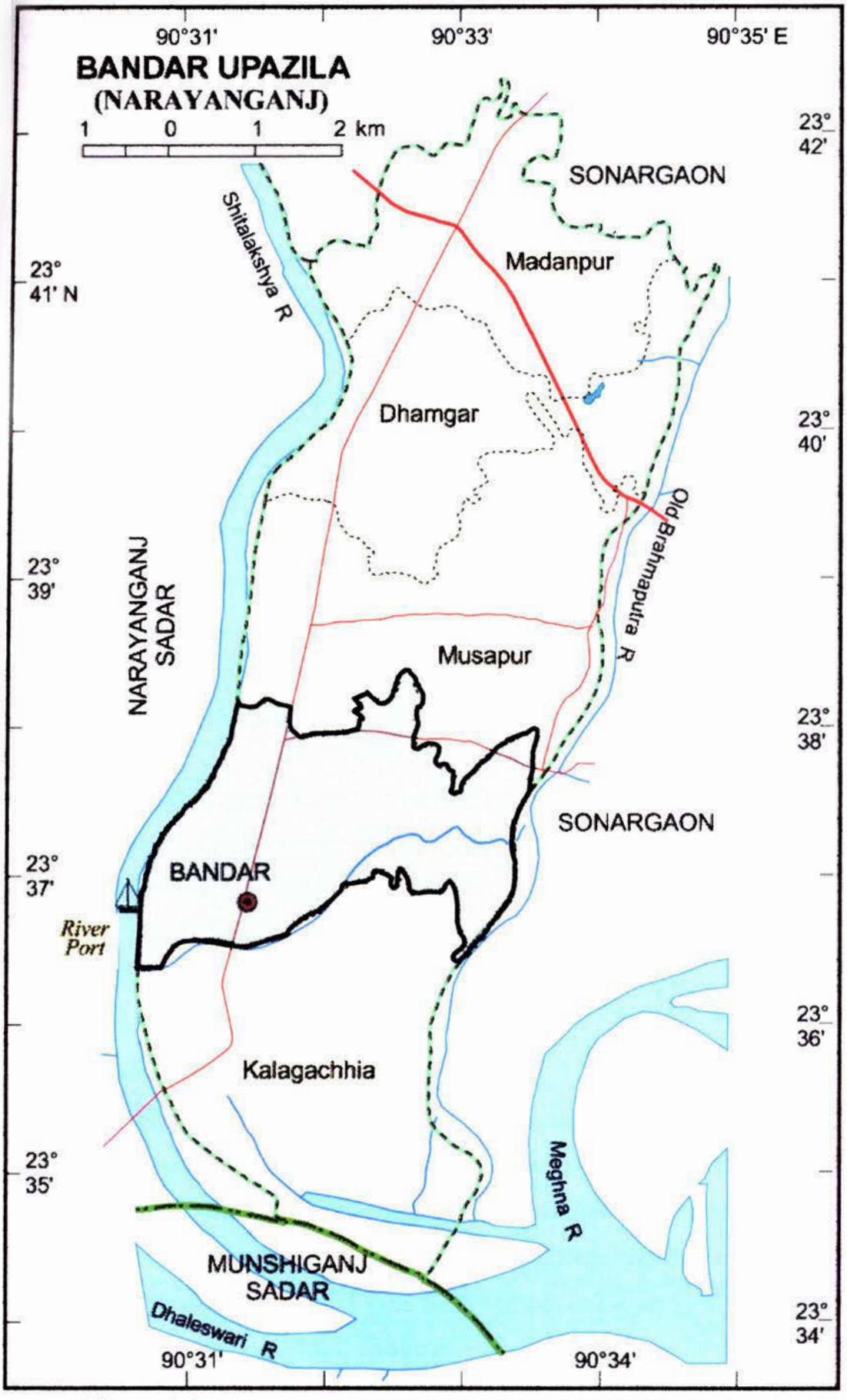


Figure 3.2 A map of Bandar upazila showing Bandar union

3.2 Design of the Study

The design of the study was a descriptive survey research. It was designed to describe the relationship between selected characteristics of the farmers and their extent of adoption of wheat production technologies. Efforts were also made to assess the problems of the farmers in adopting the wheat cultivation.

3.3 Population and Sampling Design

Simple random sampling method was used to select the respondents. However, Out of five unions' one union- Bandar was selected randomly. From this union Tingaon village was purposively selected because farmers of this village have been cultivating wheat in large scale. Then a list of farmers of this village was made by the help of the Sub-Assistant Agriculture Officer of that area. The number of wheat grower families of this village was 241. Only heads of these 241 families constituted the population. Forty percent of the farmers were selected from this village by using random sampling method. As a result 96 farmers constituted the sample size.

In addition to that, 2 percent of the population was selected randomly. Thus, the additional sample, so drawn stood 5 growers, which were included in the reserve list. In case, the individuals included in the original sample were not available or not found suitable at the time of data collection, the growers of the reserve list were used for the purpose.

3.4 Instruments for Data Collection

In order to collect relevant data from the respondents an interview schedule was prepared keeping the objectives of the study in mind. Both open and closed form questions were used in collecting data. Simple and direct questions were included in the schedule to ascertain dependent and independent variables. The interview schedule was pre-tested with 10 farmers of the study area. On the test experiences, necessary additions, corrections and modifications of the schedule were done. Valuable suggestions and comments were received from the

research supervisor and co-supervisor. Appropriate scales were developed to operationalize some characteristics of the farmers. The interview schedule was prepared in Bangla. A copy of the interview schedule in English version is presented in the Appendix-I.

3.5 Collection of Data

Data were collected personally by the researcher himself through face to face interview from selected respondents. But to familiarize researcher with the study area and for getting local support and establishing rapport during conducting the interview with the farmers. Interviews were usually conducted with the respondents in their houses. While starting interview with any respondent the researcher took all possible care to establish rapport with him so that he did not hesitate to furnish proper responses to the questions and statements in the schedule. However, if any respondent failed to understand any question the researcher took care to explain the issue. He received excellent co-operation from the respondents and others concerned during the time of interview. The entire process of collecting data took place during 05 August to 15 September 2007.

3.6 Data Processing and Analysis

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

Data was transferred to coding sheet with numerical scores given to each question. Simple statistics like frequency, percentage, range, mean, standard deviation and rank order were used to perform the data analysis. Correlation coefficients were to determine the relationships between selected characteristics of the farmers and adoption of wheat cultivation technologies.

3.7 Selection of the Variables of the Study

Selection of inappropriate and inconsistent type of variables may lead to the misleading and unfruitful results. The researcher keeping all these in mind took adequate measurement in selecting the dependent and independent variables of the study. Before setting the variable of the study, the researcher himself visited the study area and talked to the farmers and he was able to observe the selected characteristics of the farmers (in the study area) which might have influence on the adoption of wheat production technology. Based on this experience, review of literature, discussion with the relevant experts and academicians and also with the research supervisor, the researcher selected the dependent and independent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables (Townsend, 1953).

The dependent variable is often called 'criterion or predicted variable' whereas independent variable is called 'treatment, experimental or antecedent variable'. Ezekiel and Fox (1959) stated variable as any measurable characteristics, which can assume varying or different values in successive individual cases.

3.7.1 Independent variables

The Research Advisory Committee and the researcher were selected eleven characteristics of the farmers as independent variables of the study. These were age, education, family size, farm size, annual income, organizational participation, extension media contact, cosmopoliteness, knowledge on agriculture, attitude towards wheat cultivation and innovativeness.

3.7.2 Dependent variable

A dependent variable is that factor which appears, disappears or varies as the experimenter introduces, removes or varies the independent variables. Adoption of wheat production technologies was selected as dependent variable.

3.8 Measurement of Variables

In order to conduct the study in accordance with the objectives, it was necessary to measure the selected variables. This section contains procedures for measurement of both independent as well as dependent variables of the study. The procedures followed in measuring the variables are presented here.

3.8.1 Measurement of independent variables

The selected characteristics of the respondent growers constituted the independent variables of the study. To keep the research within the manageable sphere, eleven independent variables were selected for the study. The procedures of measurement of the selected variables were as follows.

3.8.1.1 Age

The age of individual is one of the important factors pertaining to his personality make up (Smith and Zope, 1970) which can play an important role in his adoption behavior. The age of respondent growers was measured by counting the actual years from his birth to the time of interview on the basis of his statement. It was measured in terms of actual years. No fraction of year was considered. A score of one (1) was assigned for each years of age. Age was placed in item no.1 of the interview schedule (Appendix-I).

3.8.1.2 Education

Education was measured in terms of grades of formal education (school/college) completed by an individual. It was expressed in terms of years of schooling. A score of one (1) was assigned for each year of schooling completed (item no. 2, Appendix-I). For example, if the respondent passed the S.S.C. examination, his education score was given as 10, if he passes the final examination of class Seven, his education score was given as 7. If the respondent did not know how to read and write, his education score was given as '0' (zero). A score of 0.5 (half) was given to that respondent who could sign his name only.

3.8.1.3 Family size

Family size of a wheat grower referred to the total number of members in his family including the respondent himself, his wife, sons, daughters and other members fully or partially dependent on him. The total numbers of family members were considered as the family size score of a respondent. For example, if a respondent has 6 members in his family, then his family size score was 6. This variable has been presented in item no. 3 of Appendix-I.

3.8.1.4 Farm size

Farm size of the respondent was measured as the size of his farm (including wheat and others crops) on which he continued his farm practices during the period of study. Each respondent was asked to mention the homestead area, the land under his own cultivation, land given to others on borga (share cropping) system, land taken from others on borga system, land given to others on lease system, land taken from others on lease system, own pond, own garden and miscellaneous fallow land. The area was estimated in terms of full benefit to the growers or his family. The following formula was used in measuring the farm size:

$$\text{Farm size} = A_1 + A_2 + \tfrac{1}{2}(A_3 + A_4) + (A_5 \times 0) + A_6 + A_7 + A_8 + A_9$$

Where,

A_1 = Homestead area

A_2 = Own land under own cultivation

A_3 = Own land given to others on borga system

A_4 = Land taken from others on borga system

A_5 = Land given to others on lease system

A_6 = Land taken from others on lease system

A_7 = Own pond

A_8 = Own garden

A_9 = Miscellaneous fallow land

The unit of measurement was in hectare (item no. 4, Appendix-I).

3.8.1.5 Annual income

Annual income refers to the total earnings in taka of the respondent and all family members of a farm family from agriculture, livestock, fisheries and other sources (service, business etc.) during the previous year. The methods of ascertaining income from different sources were involved three phases. In the first phase, the yields of all the crops in the previous year were noted. Then all the yields were converted into cash income according to the prevailing market price. In the second phase, the prices of other enterprises (livestock, poultry, fisheries etc.) were also added to the price of crops. In the third phase, earning of each respondent himself or other members of his family from different sources (like service, business, and labour) were also included in calculating the income. Yearly earning from farming and other sources were added together to obtain total family annual income of a respondent. In case of business or service their monthly income was multiplied by twelve to determine annual income. Annual income of an individual was expressed in 1,000 Taka. A score of one was given for each Tk. 1000 to compute the annual income scores of the respondents. Data obtained in response to item no. 5 of the interview schedule were used to determine the family income of the respondents.

3.8.1.6 Organizational participation

Organizational participation of the respondent was measured in two-dimension status of his participation and duration of participation in different organizations during the time of interviewing. Organizational participation score was determined by the following formula:

$$OPS = O_1 \times 1 + O_2 \times 2 + O_3 \times 3$$

Where,

OPS= Organizational participation score

O_1 = Total duration (year) of participation as ordinary member

O_2 = Total duration (year) of participation as executive committee member

O_3 = Total duration (year) of participation as executive committee officer

Organizational participation score of the respondent was computed on the basis of his participation in different organizations as shown in item no. 6 on the interview schedule (Appendix-I). Scores were assigned for participation of a respondent in an organization in the following manner.

Nature of participation	Score assigned
No involvement	0
General member	1
Executive member	2
Chairman	3

Organizational participation score of a respondent was determined by adding his scores for participation in all organizations.

3.8.1.7 Extension media contact

It was measured as one's extent of exposure with different information sources. It was assumed that the more contact an individual would have with different information sources, the more he becomes educated and knowledgeable. An extension contact score was computed for each respondent on his extent of contact with 17 selected media (item no. 7, Appendix-I). Each respondent was asked to mention the frequency of his contact with each of the 17 selected media. Here the score was assigned as 0 for no contact, 1 for rarely, 2 for occasionally, 3 for frequently and 4 for regularly of the contact respectively. Extension media contact score of the respondents could range from 0 to 68, where 0 indicating no extension media contact and 68 indicating very high extension media contact. Respondent's extension contact score was obtained by adding the weights for his responses to all the sources listed in the instrument.

3.8.1.8 Cosmopoliteness

Cosmopoliteness of a respondent was measured in terms of his nature of visits to the seven different places external to his own social system and as shown in

item number 8 in the interview schedule (Appendix-I). The respondents indicated whether they visited those places regularly, frequently, occasionally, rarely and not at all. Weights assigned to these visits were 4, 3, 2, 1 and 0 respectively. A respondent's cosmopoliteness score was obtained by adding the weights for his visits to all the places listed in the instrument. The cosmopoliteness score of the respondents could range from 0 to 28, where 0 indicating no cosmopoliteness and 28 indicating high cosmopoliteness.

3.8.1.9 Agricultural knowledge

To measure the agricultural knowledge of a respondent 17 questions were constructed in the interview schedule. Each respondent was asked to answer all the 17 questions. Out of assigned scores against each question, the summation of obtained scores against 17 questions represented the agricultural knowledge of a respondent. Agricultural knowledge was measured by the total knowledge score about agriculture. The total assigned score was 50 (item no. 9, Appendix-I). But, the score of each question was not equal; it was determined according to the extent of difficulty. Full score was assigned for each correct answer and zero (0) for the wrong answer. However, for correct responses to all questions, a respondent could get a total score of 50, while wrong responses to all questions he could get 0 (zero). 0 indicating no agricultural knowledge and 50 indicates very knowledge.

3.8.1.10 Attitude towards wheat cultivation

An attitude may be defined as predisposition to act towards an object in a certain manner. Attitude of a grower towards wheat cultivation was used to refer to his belief, feelings and action towards the various aspects of wheat cultivation. It was measured by constituting 12 statements (six positive and six negative). A statement was considered positive if it possessed an idea favorable towards the wheat cultivation. On the other hand, a statement was considered negative if it was unfavorable towards the wheat cultivation. The respondents were asked to express their opinion in the form of 'strongly agree' or 'agree' or 'undecided' or 'disagree' or 'strongly disagree'. A score of 5 was given to

'strongly agree', 4 to 'agree', 3 to 'undecided', 2 to 'disagree' and 1 to 'strongly disagree', if the statement was positive. A reverse scoring method was followed in case of statements considered negative. This variable appears in the item number 10 (Appendix-I). Attitude score of a respondent was determined by summing the scores obtained by him for all the items in the scale. The index scores of respondents could range from 12 to 60 where 12 indicating unfavorable and 60 for favorable attitude towards wheat cultivation.

3.8.1.11 Innovativeness

Innovativeness of a wheat grower was measured by computing an "innovativeness score" on the basis of his adoption of 12 selected wheat production technologies. Innovativeness is the degree to which an individual adopts an innovation relatively earlier than other members in a social system (Rogers, 1995). Scores were assigned on the basis of time required by an individual to adopt each of the technology in the following manner (item no. 11, Appendix-I):

Period of Adoption	Assigned Score
Within one year	5
Within two years	4
Within three years	3
Within four years	2
Within five years or above	1
Not at all	0

The scores for all the 12 selected wheat production technology were added together to constitute the innovativeness score of a respondent. Innovativeness score of a respondent growers could range from 0 to 60, where, 0 indicating no innovativeness and 60 indicating very high innovativeness.

3.8.2 Measurement of dependent variable

Adoption of wheat production technologies by the farmers was the only dependent variable of the present study. It was measured from area coverage percentage multiplied by weight of duration (years) of wheat cultivation with the following formula:

$$A = \frac{\text{Area used for wheat production technologies}}{\text{Area suitable for wheat production technologies}} \times 100 \times D$$

Where,

A = Adoption of wheat production technologies

D = weight of duration of wheat production technologies

Weight of duration of wheat production technologies was measured as following manner:

Duration of wheat cultivation	weight
Never cultivation	0
Cultivation up to 3 years	1
Cultivation above 3 to 7 years	2
Cultivation above 7 to 10 years	3
Cultivation above 10 years	4

Thus adoption of wheat cultivation score ranged from 0 to 400, where, 0 indicating no adoption and 400 indicated highest adoption. This variable has been placed in item number 12 of the interview schedule (Appendix-I).

Attempt was also made to determine the trend of adoption of wheat cultivation by the farmers of the selected village. Total land area of each of the respondents was asked during the year from 2003 to 2007 (item no. 13, Appendix-I). Total area under cultivation by all the respondents in different years was calculated to determine the trend of wheat cultivation.

3.9 Measurement of Problems Faced by the Farmers

Farmers in the study area might have faced various types of problems in the way of adopting wheat cultivation. But the investigator gained an experience through personal contact regarding common problems faced by the respondents before collection of data. Besides, the researcher gained experience through consultation with experts, pre-testing experience and reviewing previous research findings. Finally, he prepared a list of nine possible problems in this regard. A scale was prepared to indicate the extent to which each of the nine problems was applicable in the case of a respondent. The responses were obtained through a 4-point scale: 'high', 'medium', 'low' and 'not at all' and weights were assigned to these responses as, 3, 2, 1 and 0 respectively (item no. 14, Appendix-I).

Extent of Problems	Scoring System
High	3
Medium	2
Low	1
Not at all	0

In order to determine the comparative importance of the nine problems, a problem facing index (PFI) was computed for each of the problems by summing up the weights assigned for responses of all the respondents against each problem. Problem facing index of any problem could range from 0 to 27, where, 0 indicated no problem and 27 indicated high problem. Extent of PFI was computed by using the following formula:

Extent of Problem Facing Index (PFI) = Ph×3 + m×2 + Pl×1 +Pn×O

Where, Ph = Number of respondent with "high problem"

Pm = Number of respondent with "medium problem"

Pl = Number of respondent with "low problem"

Pn = Number of respondent with "not at all problem"

Problem facing index of any problem could range from 0 to 27, where, 0 indicated no problem and 27 indicated high problem.

3.10 Statement of Hypothesis

According to Kerlinger (1973), a hypothesis is a conjectural statement of the relation between two or more variables. Hypotheses are always in declarative sentence form and they relate either generally or specifically variables to sentence form and they relate either generally or specifically variables to variables. Hypothesis may be broadly divided into two categories, namely, research hypothesis and null hypothesis.

3.10.1 Research hypothesis

The following research hypothesis was put forward to know the relationships between each of the eleven selected characteristics of the farmers and their adoption of wheat production technologies:

Hypothesis: "Each of the twelve selected characteristics of the farmers will have significant relationships with their adoption of wheat production technologies."

3.10.2 Null hypothesis

A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis was undertaken for the present study:

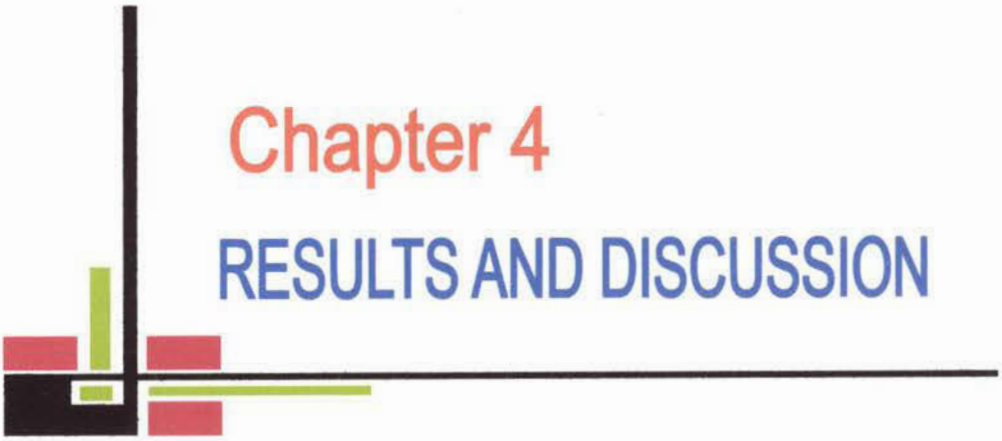
H_0: There is no relationship between the selected characteristics of farmers and their adoption of wheat production technologies.

If a null hypothesis is rejected on the basis of a statistical tests, it is assumed, that there is a relationship between the concerned variables.

3.11 Statistical Treatment

Data collected were compiled, coded, tabulated and analyzed in accordance with the objectives of the study. Qualitative data were quantified by means of suitable scoring techniques. The statistical measures such as range, mean, standard deviation, percentage distribution and rank order were used to describe both the independent and dependent variables. Tables were also used in presenting data for clarity of understanding.

In order to explore the relationships of the selected characteristics of the growers with their adoption of wheat cultivation, the Pearson's Product Moment Correlation Co-efficient was computed. Correlation matrix was also figured out to determine the interrelationships among the variables. At least five percent (0.05) level of significance was used as the basis of rejecting any null hypothesis. If the calculated value of co-efficient of correlation 'r' was equal to or greater than tabulated value at designated level of significance for the relevant degrees of freedom, the null hypothesis was rejected and it was concluded that there was a significant relationship between the concerned variables. However, when the calculated value of co-efficient of correlation was found to be smaller than the tabulated value at the designated level of significance for the relevant degrees of freedom, it was concluded that the null hypothesis was accepted and hence, there was no relationship between the concerned variables.



Chapter 4

RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

In this Chapter, the findings of the study and interpretation of the results have been presented. Data obtained from respondents through interview were measured, analyzed, tabulated and statistically treated according to the objectives of the study. These are presented in four sections according to the objectives of the study. The first section deals with the selected characteristics of the wheat farmers, the second section deals with the extent of adoption of wheat production by the farmers, the third section, relationships between the extent of adoption of wheat production of the farmers and their characteristics have been discussed. The fourth section deals with the problem confrontation by the farmers in wheat production.

4.1 Selected Characteristics of the Farmers

This section deals with the classification of the farmers according to their various characteristics. Behavior of an individual is largely determined by his characteristics. These characteristics of an individual contribute to a great extent in the matter of shaping of his behavior. In this section, findings on the farmers' eleven selected characteristics have been discussed. The selected characteristics were age, education, family size, farm size, annual income, organizational participation, extension media contact, cosmopoliteness, agricultural knowledge, attitude towards wheat production and innovativeness. Therefore, the major hypothesis of the study was that the adoption of wheat production would also be influenced by various characteristics of the farmers. Range, mean and standard deviations of these characteristics of the farmers have been described in the following sub-sections. Table 4.1 gives a summary profile of the farmer's characteristics.

Table 4.1 Characteristics profile of the respondents (n = 96)

Selected characteristics (measuring unit)	Range		Respondents			Mean	SD
	Possible	Observed	Category	No.	%		
Age (year)	-	27-70	Young (≤35)	3	3.1	51.05	9.27
			Middle-aged (36-50)	23	24.0		
			Old (>50)	70	72.9		
Level of education (years of schooling)	-	0.5-14	Can sign only (0.5)	20	20.8	4.50	3.78
			Primary (1-5)	59	61.5		
			Secondary (6-10)	4	4.2		
			Above secondary (>10)	13	13.5		
Family size (number)	-	2-10	Small (≤4)	32	33.3	5.66	2.00
			Medium (5-6)	27	28.2		
			Large (>6)	37	38.5		
Farm size (hectare)	-	0.12-2.70	Marginal (0.02-0.2)	12	12.5	0.53	0.49
			Small (0.21-1.0)	80	83.3		
			Medium (1.1-3.0)	4	4.2		
Annual income ('000' Tk.)	-	18-198.3	Low (≤50)	62	64.6	54.09	45.49
			Medium (51-100)	22	22.9		
			High (>100)	12	12.5		
Organizational participation (score)	-	0-6	Not at all (0)	16	16.7	2.25	1.51
			Low (1-5)	76	79.1		
			Medium (6-10)	4	4.2		
			High (>10)	0	0		
Extension media contact (score)	0-68	17-36	Low (≤23)	44	45.8	24.84	5.25
			Medium (24-36)	52	54.2		
			High (>36)	0	0		
Cosmopoliteness (score)	0-28	0-10	Not at (0)	24	25	1.97	1.95
			Low (1-5)	69	71.9		
			Medium (6-10)	3	3.1		
			High (>10)	0	0		
Agricultural knowledge (score)	0-50	25-49	Poor (≤17)	0	0	33.27	5.69
			Fair (18-33)	58	60.4		
			Good (>33)	38	39.6		
Attitude towards wheat cultivation (score)	12-60	25-48	Unfavorable (≤32)	3	3.1	36.00	3.83
			Neutral (33-42)	88	91.7		
			Favorable (>42)	5	5.2		
Innovativeness (score)	0-72	13-48	Less (≤20)	18	18.8	26.31	6.65
			Moderate (21-40)	76	79.1		
			High (>40)	2	2.1		

4.1.1 Age

Age of the farmers ranged from 27 to 70 years, the average being 51.05 years and the standard deviation 9.27 (Table 4.1). On the basis of their age, the farmers were classified into three categories: young (up to 35), middle-aged (36-50) and old (above 50). The highest proportion 72.9 percent of the farmers fell in the old category, while 24 percent of them fell in the middle-aged category and only 3.1 percent in the young category.

The findings indicate that almost all (96.9 percent) of the farmers were middle-aged to old category. The heads of the farm families were selected as the respondents. Therefore, the young farmers of the study area had not gotten yet the authority of the families. However, the older growers because of their longer farm experience might have valuable opinions in regard to adoption of wheat production. The extension agents can make use of these views and opinion in designing their extension activities.

4.1.2 Education

The education scores of the farmers ranged from 0.5 to 14. The average was 4.50 and the standard deviation was 3.78. On the basis of their educational scores, the farmers were classified into four categories: can sign only (0.5), primary (1-5), secondary (6-10) and above secondary (above 10). The majorities (61.5 percent) of the farmers were educated up to primary level, 20.8 percent could sign their names only, 4.2 percent had education up to secondary level and the rest 13.5 percent had above secondary level of education (Table 4.1).

The findings reveal that education of an individual is likely to be more receptive to the modern facts and ideas; they have much mental strength in deciding on a matter related to problem solving. This observation is very much similar the rural areas of Bangladesh where most of the people had primary level of education. Possession of some education by the farmers is a positive

aspect in the context of the adoption of wheat production. Education helps the farmers to gain knowledge on the improved methods of cultivation by reading books, leaflets, bulletins and other printing materials. Thus, farming community in the study area may be well considered as a suitable ground for the adoption of wheat production.

4.1.3 Family size

The family size of the farmers ranged from 2 to 10 members. The average was 5.66 with a standard deviation of 2.00. On the basis of their family size the farmers were classified into the following three categories: small family (up to 4), medium family (5-6) and large family (above 6). Information in the Table 4.1 indicates that 38.5 percent of the farmers had large family while 33.3 percent and 28.2 percent of them had small and medium family size.

The family size of the respondents was more or less equally distributed among the three categories. Therefore, farmers adopt wheat production technologies irrespective of their family size. Adoption of wheat production is actually needed by all of the farmers to continue their livelihoods.

4.1.4 Farm size

The farm size of the respondents varied from 0.12 to 2.70 hectares. The average farm size was 0.53 hectare with a standard deviation of 0.49. The respondents were classified into the following three categories based on their farm size: marginal farm (0.02-0.2 ha), small farm (0.21-1.0 ha) and medium farm (1.1 -3.0 ha) (Table 4.1). More than three- forth (83.3 percent) of the farmers possessed small farms compared to 12.5 percent of them having marginal farms and only 4.2 percent medium farms. Thus, the overwhelming majority 95.8 percent of the farmers were the owners of marginal to small farms.

The land area is being divided continually due to population pressure from generation to generation. Moreover, Bandar union is densely populated. Hence, almost all of the farmers possessed marginal to small farm size.

4.1.5 Annual income

The observed annual family income of the respondents ranged from 18 to 198.3 thousand Tk., the mean being 54.09 thousand Tk and standard deviation 45.49. Based on their income group scores, the farmers were classified into three categories: low income (up to 50), medium income (51-100) and high income (above 100). From the above Table 4.1, it was observed that the highest portion (64.6 percent) of the respondents were in low income group, while 22.9 percent respondents were in medium income group and only 12.5 percent were in high income group.

Most of the farmers in the study area were in low to medium income group. The average income of the farmers was of the study area much higher than national average income of the country. This might be due to the fact that the farmers of the study area were not engaged in only agriculture. They earned form other sources, such as service, business, remittance etc.

4.1.6 Organizational participation

Organizational participation scores of the respondents ranged from 0 to 6 with an average of 2.25 and a standard deviation 1.51. On the basis of their organizational participation scores, the farmers were classified into four categories: not at all (0), low (1-5), medium (6-10) and high (above 10). From the above Table 4.1, it was observed that majority (79.1 percent) of the respondents had low organizational participation. A mentionable (16.7 percent) number of respondents had no organizational participation, while only 4.2 percent had medium participation. None of them was in high category of organizational participation.

Therefore, it was clearly indicated that maximum respondents were engaged only their own occupation. Thus, their participation in different organizations remained not at all to low.

4.1.7 Extension media contact

The computed extension media contact scores of the respondents ranged from 17 to 36 against the possible range of 0 to 68 (Table 4.1). The average score was 24.84 and standard deviation 5.25. On the basis of their extension media contact scores, the farmers were classified into three categories: low extension contact (up to 23), medium extension contact (24-36) and high extension contact (above 36). The majority (54.2 percent) of the farmers had medium extension media contact, while the rest 45.8 percent of them had low contact.

Findings indicate that none of the respondents had high extent of contact with different extension media. In real situation, they cannot afford with newspaper, dish channels, internet etc. modern type of communication media due to lack of their educational qualification and economic hardship. Moreover, they cannot maintain regular contact with the extension personnel for their scarcity of time. They remain busy especially in the cropping season. So, their extension media contact became low to medium.

4.1.8 Cosmopoliteness

Cosmopoliteness scores of the respondents could range from 0 to 28 but the observed range was from 0 to 10 with an average of 1.97 and standard deviation 1.95. On the basis of their cosmopoliteness scores, the farmers were classified into four categories: not at all (0), low cosmopolite (1-5), medium cosmopolite (6-10) and high cosmopolite (above 10). Among the farmers, majority (71.9 percent) were in low cosmopolite category compared to 3.1 percent in medium category and 25 percent in not at all category (Table 4.1).

None of the farmers were in high cosmopolite category. This was because they were used to be busy with diversified farming activities and other income generating activities. Due to lack of their time, they could not go outside of their premises.

4.1.9 Agricultural knowledge

Agricultural knowledge scores of the respondents ranged from 25 to 49 against the possible range of 0 to 50. The average and standard deviation were 33.27 and 5.69, respectively (Table 4.1). Based on the agricultural knowledge scores, the farmers were classified into the following three categories: poor knowledge (up to 17), fair knowledge (18 to 33) and good knowledge (above 33). The highest proportion (60.4 percent) of the farmers had fair knowledge compared to 39.6 percent of them having high agricultural knowledge, and none of them had low agricultural knowledge.

Thus, in general the agricultural knowledge level of the farmers of the study area was quite satisfactory. Possession of comparatively medium agricultural knowledge is likely to be contributory to the adoption of wheat production.

4.1.10 Attitude towards wheat cultivation

The scores of attitude towards wheat cultivation ranged from 25 to 48 against the possible scores 12 to 60 with an average of 36 and a standard deviation of 3.83. Based on the scores of attitude towards wheat cultivation the respondents were classified into three categories: unfavorable (up to 32), neutral (33-42) and favorable (above 42). Data presented in Table 4.1 show that the highest proportion (91.7 percent) of the farmers belonged to neutral attitude category as compared to 5.2 percent to favorable and 3.1 percent to unfavorable category of attitude towards wheat production.

This indicates that 94.8 percent of the respondent growers could not possess favorable attitude towards wheat production. This might be for their low access to quality seed of high yielding varieties of wheat, irrigation, fertilizer etc.

4.1.11 Innovativeness

The possible range of innovativeness score was 0 to 72 while the observed range was 13 to 48. The average score of the respondents was 26.31 and standard deviation 6.65. Based on their innovativeness scores, the respondents were classified into three categories: less (up to 20), moderate (21-40) and high (above 40). Data contained in Table 4.1 indicate that highest proportion (79.1 percent) of the growers were moderately innovative as compared to 18.8 percent less and 2.1 percent high innovative.

Data also revealed that majority (97.9 percent) of the respondent growers of the study area were innovative from less to moderate extent. This would help the extension planners to chalk out future extension program for transfer of technologies to the potential growers.

4.2 Adoption of Wheat Production Technologies

The adoption of wheat production technologies of the farmers ranged from 50 to 200 against the possible range of 0 to 400. The average adoption was 112.11 with a standard deviation of 37.85. Based on the adoption score, the farmers were classified into three categories: low adoption (up to 75), medium adoption (76-125) and high adoption (>125). The distribution of the respondent's according to their adoption of wheat production technologies is shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their adoption of wheat production technologies

Range of score		Respondents			Mean score	SD
Possible	Observed	Category	No.	%		
0-400	50-200	Low (≤75)	4	4.2	112.11	37.85
		Medium (76-125)	78	81.2		
		High (>125)	14	14.6		
		Total	96	100		

Data contained in Table 4.2 indicate that the highest proportion (81.2 percent) of the growers had medium adoption as compared to 14.6 percent high adoption and only 4.2 percent low adoption.

Data also revealed that majority (95.8 percent) of the respondent growers of the study area had medium to high level of adoption of wheat production technologies, though the average score (112.11) was much lower than the highest possible score (400). The status of adoption of wheat production technologies by the respondent farmers might be clearer through observing the individual technologies' adoption pattern. Table 4.3 presents the distribution of the respondents according to their earliness in adopting different technologies related to wheat production.

Table 4.3 Distribution of the respondents according to how they were earlier in adopting different technologies of wheat production

Technologies	Non-adoption	Adoption within time of being informed (year)					Total farmers
		1st	2nd	3rd	4th	5th	
Use of modern varieties (Ananda, Barkat, Akbar, Kanchon and Gourab)	0	0	8	25	19	44	96
Time of wheat seeding (last week of October to first weak of November)	72	11	6	3	0	4	96
Use of seed treatment chemicals (Vitavax-200, Captan etc.)	66	23	7	0	0	0	96
Seed rate (16 kg/bigha)	50	12	11	0	0	23	96
Irrigation	40	12	4	0	3	37	96
Use of fertilizers	21	0	4	0	0	71	96
Wheat cultivation in zero or low tillage	62	4	0	3	0	27	96
Split application of urea	40	4	0	4	7	41	96
Use of poison bait to control rat	51	0	4	4	11	26	96
Use of polythene and jute made sack, air proof jar to store seeds	47	8	8	0	7	26	96
IMP to control insect pest and diseases	76	8	4	0	0	8	96
Electrical or foot driven thresher	84	4	8	0	0	0	96
Average number of farmers	50.75	7.17	5.33	3.25	3.92	25.58	96
Percent farmers	52.86	7.47	5.56	3.39	4.08	26.65	100

Among the farmers only 7.47 percent adopted any of the different technologies within one year of being informed while 5.56 percent, 3.39 percent, 4.08 percent and 26.65 percent of them adopted within 2, 3, 4 and 5 years. More than half (52.86 percent) of the respondents did not adopt any of the different selected technologies of wheat production. However, this adoption picture of

the farmers is not so satisfactory but there is an increasing trend of adoption of wheat production (Figure 4.1).

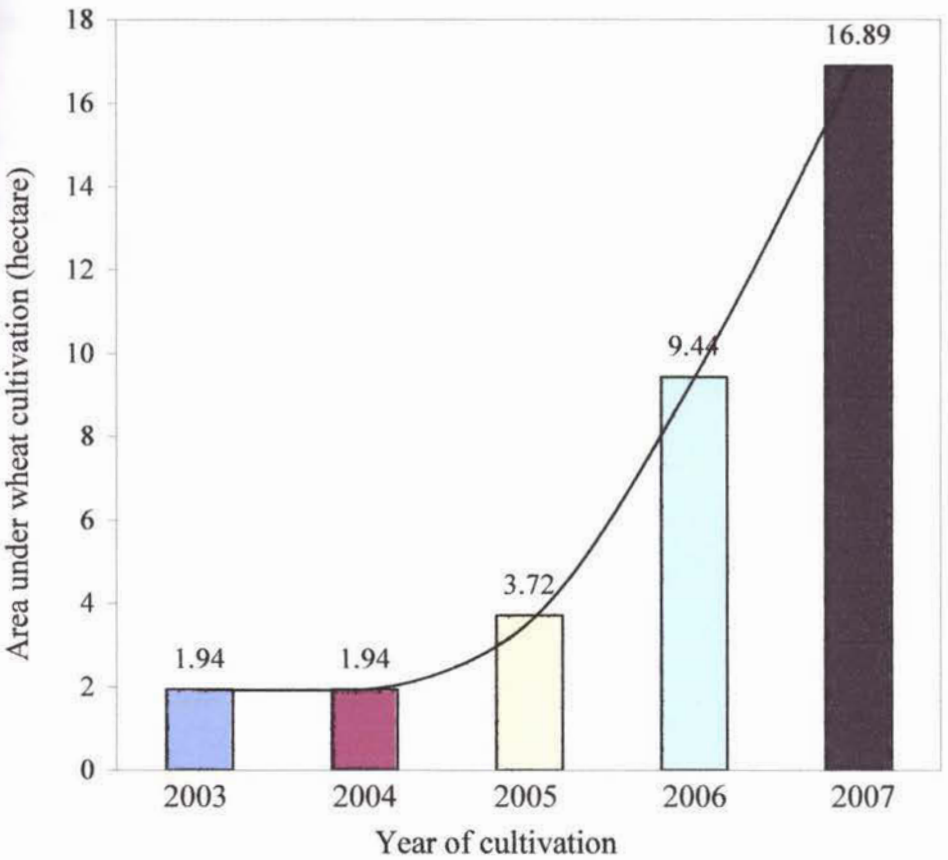


Fig. 4.1 Trend of wheat production by the farmers

To determine the trend of wheat production, data on cultivated land under wheat production by the farmers from 2003 to 2007 were computed. During the year 2003 only 1.94 hectares of land was under wheat production by the selected 96 farmers. It was unchanged until the next year (2004). Thereafter, it was gradually increased to 3.72 hectares of land in 2005 and further rapidly increased by 9.44 hectares in 2006 and 16.89 hectares in 2007. This increasing trend pays attention of the extension agent to keep it sustainable and viable throughout next of the years.

4.3 Relationships between the Selected Characteristics of the Farmers and Their Adoption of Wheat production

Pearson's correlation coefficient (r) was computed in order to explore the relationship between the selected characteristics of farmers and their adoption

of selected wheat production technologies. The selected characteristics constituted independent variables and adoption of wheat production technologies by the farmers constituted the dependent variable. Table 4.4 has been used for descriptive interpretation of the meaning of 'r'. The summary of the results of the correlation co-efficient between the selected characteristics of the respondent growers and their adoption of wheat production technologies is shown in Table 4.5. However, correlation matrix of the dependent and independent variables has been presented in Appendix-II in order to examine the inter-correlation between the dependent and independent variables.

Table 4.4 The Meaning of 'r' values

'r' value	Meaning
0.00 to 0.19	A very low correlation
0.20 to 0.39	Low correlation
0.40 to 0.59	A moderate correlation
0.60 to 0.79	A high correlation
0.80 to 1.00	A very high correlation

Source: Cohen and Holliday (1982)

4.3.1 Relationship between age of the farmers and their adoption of wheat production

The relationship between age of the farmers and their adoption of wheat production technologies was examined by testing the following null hypothesis: "There is no relationship between age of the farmers and their adoption of wheat production technologies." As shown in the Table 4.5 the co-efficient of correlation between the concerned variables was computed and found to be 'r' = -0.503 which led to the following observation.

- Firstly, the relationship showed a negative trend.
- Secondly, a moderate relationship was fond to exist between the two variables.

- The computed value of 'r' (-0.503**) was greater than the table value (r = ± 0.262) with 94 degrees of freedom at 0.01 level of probability.
- Hence, the concerned null hypothesis was rejected.
- The correlation co-efficient between the two concerned variables was significant.

Table 4.5 Relationships between the dependent and independent variables

Selected characteristics of the farmers	Correlation coefficient (r) value with adoption of wheat production technologies
Age	-0.503**
Education	0.581**
Family size	0.002^{NS}
Farm size	0.400**
Annual income	0.451**
Organizational participation	0.334**
Extension media contact	0.233*
Cosmopoliteness	0.108^{NS}
Agricultural knowledge	0.398**
Attitude towards wheat cultivation	0.206*
Innovativeness	0.231*

** Correlation is significant at 1% level of probability
* Correlation is significant at 5% level of probability
^{NS} Non-significant

The findings imply that the age of the farmers had significant negative relationship with their adoption of wheat production technologies practice. Hossain (1991), Haque (1993), Ali (1993), Khan (1993), Pal (1995) and Hasan (1996) found similar relationships in their respective studies. Generally older farmers are stereotypic in nature. They tend to be stick to the traditional cultivation. Their adoption behavior is mostly late majority to laggard category. Therefore, age had negative influence on the adoption of wheat production technology.

4.3.2 Relationship between the education of the farmers and their adoption of wheat production

The relationship between the education of the farmers and their adoption of wheat production technologies practice was examined by testing the following null hypothesis: "There is no relationship between education of the farmers and their adoption of wheat production technologies". The co-efficient of correlation between the concerned variables was found to be 'r' = 0.581 as shown in Table 4.5. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a tendency in the positive direction between the concern variables.
- The relationship between the concerned variables was moderate.
- The computed value of 'r' (0.581**) was greater then the table value (r = $\pm$ 0.262) with 94 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The correlation co-efficient between the two concerned variables was significant.

The findings indicate that education of the farmers had significant relationship with their adoption of selected wheat production technologies. Similar findings were also observed by Katarya (1989), Hossain (1991), Haque (1993), Khan (1993) and Hossain *et al.* (1997). Education enhances knowledge and broadens outlook. Thus, more educated respondents could utilize the opportunities they found. Therefore, their adoption was higher than that of less educated farmers.

4.3.3 Relationship between family size of the farmers and their adoption of wheat production

The relationship between family size of the farmers and their adoption of selected wheat production technologies the following null hypothesis was tested "There is no relationship between education of the farmers and their adoption of wheat production technologies". The co-efficient of correlation between the concerned variables was found to be 0.002 as shown in Table 4.5

this led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a tendency in the positive direction between the concerned variables.
- The relationship between the concerned variables was very low.
- The computed value of "r" (0.002) was smaller than the table value (r= $\pm$ 0.201) with 94 degrees of freedom at 0.05 level of probability.
- The co-efficient of correlation between the concerned variable was not significant at 0.05 level of probability.
- The null hypothesis was accepted.

The finding demonstrates that the family size of the farmers had not significant relationship with their adoption of selected wheat production technologies. Hossain (1991) and Ali (1993) observed the similar findings in his studies. It means that attaining food security through rice or wheat production is the aim of all farm families irrespective of their household size.

4.3.4 Relationship between farm size of the farmers and their adoption of wheat production

The relationship between farm size of the farmers and their adoption of wheat production technologies practice was examined by testing the following null hypothesis: "There is no relationship between farm size of the farmers and their adoption of wheat production technologies." Computed value of the co-efficient of correlation between farm size of the farmers and their adoption of wheat production technologies practice was found to be 'r' = 0.400^{**} as shown in Table 4.5. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a tendency in the positive direction between the concerned variables.
- A moderate relationship was found between the two variables.

- The computed value of 'r' (0.400^{**}) was found to be greater than the table value ($r = \pm 0.262$) with 94 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

The findings imply that the farm size of the farmers had a positive significant relationship with their adoption of wheat production technologies. The finding is quite rational because adoption of wheat production technologies practice is relatively costly. Hence, large growers get more scope than the small growers as they can invest more money for adoption of wheat production technologies. Many researchers Haque (1993), Khan (1993), Pal (1995), Chowdhury (1997), Muttaleb (1995), Islam (2002) and Rahman (2003) observed the similar findings in their studies.

4.3.5 Relationship between annual income of the farmers and their adoption of wheat production

The relationship between annual income of the farmers and their adoption of wheat production technologies was examined by testing the following null hypothesis: "There is no relationship between annual income of the farmers and their adoption of wheat production." Computed value of the co-efficient of correlation between annual income of the farmers and their adoption of wheat production technologies was found to be 'r' = 0.451^{**} as shown in Table 4.5. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a tendency in the positive direction between the concerned variables.
- A moderate relationship was found between the two variables.
- The computed value of 'r' (0.451^{**}) was found to be greater than the table value ($r = \pm 0.262$) with 94 degrees of freedom at 0.01 level of probability.

- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

Thus, it could be depicted that annual income of the farmers had a positive significant relationship with their adoption of wheat production. The findings are quite logical because wheat production was expensive. It needs more improved seed, fertilizer, insecticides, irrigation and more adoption of various intercultural practices for a long duration (3-3.5 months). Thus, availability of found or cash is essential to solve those financial issues for cultivation by the growers to a considerable extent. Hossen (2001) found that the annual income of the sugarcane growers had a positive significant relationship with their adoption of modern sugarcane cultivation practices. Khan (1993), Pal (1995), Chowdhury (1997) and Islam (2002) also found the similar findings.

4.3.6 Relationship between organizational participation of the farmers and their adoption of wheat production

The relationship between organizational participation of the farmers and their adoption of cultivation practices the following null hypothesis was tested "There is no relationship between organization participation of the farmers and their adoption of wheat production technologies." The co-efficient of correlation between the concerned variables was found to be 0.334** as shown in Table 4.5 this led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a tendency in the positive direction between the concerned variables.
- The relationship between the concerned variables was low.
- The computed value of "r" (0.334**) was greater than the table value ($r = \pm 0.262$) with 94 degrees of freedom at 0.01 level of probability.
- The co-efficient of correlation between the concerned variable was significant at 0.05 level of probability.
- The null hypothesis was rejected.

The finding demonstrates that the organizational participation of the farmers had significant and positive relationship with their adoption of wheat production technologies. It means that farmers with larger organization participation were more likely to high adoption. Haque (1984), Mostafa (1999) and Rahman (2001) stated similar relationships in their respective studies.

4.3.7 Relationship between extension media contact of the farmers and their adoption of wheat production

The relationship between extension media contact of the farmers and their adoption of wheat production technologies was examined to the following null hypothesis: "There is no relationship between extension media contact of the farmers and their adoption of wheat production." The co-efficient of correlation between the concerned variables was found to be 'r' = 0.233^{*} as shown in Table 4.5. This led to the following observations were recorded regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- A low relationship was found between the concerned variables.
- The computed value of 'r' (0.233^{*}) was greater then the table value ($r = \pm 0.201$) with 94 degrees of freedom at 0.05 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.05 level of probability.

Thus, it could be concluded that the extension contact of the farmers had positive significant relationship with their adoption of wheat production. The extension contact strengthened the base of their knowledge. The knowledge definitely acts as motivator towards adoption of new technologies. Hussen (2001) found that extension contact of the growers had significant relationship with their adoption of modern sugarcane cultivation practices. Bashar (1993), Sarker (1997), Pal (1995), Chowdhury (1997) also found the similar findings. Sardar (2002) found that extension contact of the farmers had positive

significant relationship with their adoption of IPM (Integrated Pest Management) practices.

4.3.8 Relationship between cosmopoliteness of the farmers and their adoption of wheat production

The relationship between cosmopoliteness of the farmers and their adoption of wheat production technologies was examined to the following null hypothesis: "There is no relationship between cosmopoliteness of the farmers and their adoption of wheat production." The co-efficient of correlation between the concerned variables was found to be 'r' = 0.108 as shown in Table 4.5. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- A very low relationship was found to exist between the two variables.
- The computed value of 'r' (0.108) was smaller than the table value ($r = \pm 0.201$) with 94 degrees of freedom at 0.05 level of probability.
- Hence, the concerned null hypothesis was accepted.
- The co-efficient of correlation between the concerned variable was not significant at 0.05 level of probability.

The researcher concluded that cosmopoliteness of the farmers had so significant relationship with their adoption of wheat production. Hossain (1991) and Islam (1996) also found similar relationships in their respective studies. Most of the farmers in the study area were less cosmopolite, even one-fourth of them non-cosmopolite in nature. Moreover, they used to go outside of their locality for the purposes other than to meet the need of wheat production technologies. Thus, the findings seem to be logical at least for the present study.

4.3.9 Relationship between agricultural knowledge of farmers and their adoption of wheat production

The relationship between agricultural knowledge of the farmers and their adoption of wheat production technologies was examined by testing the following null hypothesis: "There is no relationship between agricultural knowledge of the farmers and their adoption of wheat production." Computed value of the co-efficient of correlation between agricultural knowledge of the farmers and their adoption of wheat production technologies was found to be 'r' = 0.398^{**} as shown in Table 4.5. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A low relationship was found between the two variables.
- The computed value of 'r' (0.398^{**}) was found to be greater than the table value ($r = \pm 0.262$) with 94 degrees of freedom at 0.01 level of probability.
- The concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.01 level of probability.

From the findings, it could be understood that the agricultural knowledge of the farmers had positive significant relationship with their adoption of wheat production technologies. This finding indicates that adoption of wheat production technologies increases with the increase of knowledge of the growers. It helps the farmers to grow crops by using environmentally friendly cultivation practices. Sardar (2002) studied, adoption of IPM practices by the farmers under PETRRA Project of BDRS. He found that agricultural knowledge had positive significant relationship with their adoption of IPM practices. Hoffer and Stangland (1958), Moulik *et al.* (1966), Ernest, (1973), Ramachandran (1974), Somasundaram and Singh (1978), Bezbora, (1980),

Grewal (1980), Ali and Chowdhury, (1983), Ali *et al.* (1986), Reddy, *et al.* (1987), Ali (1993) and Bashar (1993) found the similar findings.

4.3.10 Relationship between attitude towards wheat production of the farmers and their adoption of wheat production

The relationship between attitude towards wheat production of the farmers and their adoption of wheat production technologies as examined to the following null hypothesis: "There is no relationship between attitude towards wheat production of the farmers and their adoption of wheat production." Computed value of the co-efficient of correlation between attitude towards wheat production of the farmers and their adoption of wheat production technologies was found to be 'r' = (0.206^{*}) as shown in Table 4.5. The following observations were recorded regarding the relationship between the two variables on the basis of the co-efficient of correlation:

- The relationship showed a positive trend.
- A low relationship was found between the concerned variables.
- The computed value of 'r' (0.206^{*}) was found to be greater than the table value ($r = \pm 0.201$) with 94degrees of freedom at 0.05 level of probability.
- Hence, the concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.05 level of probability.

Thus, it was concluded that the attitude towards wheat production of the farmers had positive significant relationship with their adoption of wheat production technologies. It could influence directly to adopt wheat production. Innovative farmers are more dynamic, conscious and have more eagerness towards innovation. Adoption of wheat production technologies among the innovative farmers is probably due to the manifestation of their aforesaid behavioral aspects. Mostafa (1999) and Islam M.S (2002) also found the similar significant and positive relationship between these two variables.

4.3.11 Relationship between the innovativeness of the farmers and their adoption of wheat production

The relationship between innovativeness of the farmers and their adoption of wheat production technologies was examined to the following null hypothesis: "There is no relationship between innovativeness of the farmers and their adoption of wheat production." The co-efficient of correlation between the concerned variables was found to be 'r' (0.230*) as shown in Table 4.5. This led to the following observations regarding the relationship between the two variables under consideration:

- The relationship showed a positive trend.
- The relationship between the concerned variables was a low correlation.
- The computed value of 'r' (0.231*) was greater than the table value (r = $\pm$ 0.201) with 94 degrees of freedom at 0.05 level of probability.
- Hence, the concerned null hypothesis was rejected.
- The co-efficient of correlation between the concerned variable was significant at 0.05 level of probability.

Considering the findings, it could be mentioned that innovativeness of the farmers had significant and positive relationship with their adoption of wheat production technologies. Hossain (1999) found a positive significant relationship between innovativeness of the farmers and their adoption of fertilizer and also observed no relationship with adoption of pesticides. Kashem and Halim (1991) also found the similar significant and positive relationship between these two variables.

4.4 Problems Faced by the Farmers in Adopting of Wheat Production Technologies

Problem scores of the respondents were determined by using 9 selected problems. Computed scores of the respondents ranged from 15 to 22 against the possible range of 0 to 27 with the average being 18.05 and the standard deviation was 1.84 (Table 4.6). Based on problem facing index (PFI), the

farmers were classified into three categories: low (up to 9), medium (10-18) and high (above 18).

Table 4.6 Distribution of the farmers according to their PFI

Range of PFI		Respondents			Mean PFI	SD
Possible	Observed	Category	No.	%		
0-27	15-22	Low (≤9)	0	0	18.05	1.84
		Medium (10-18)	57	59.4		
		High (>18)	39	40.6		
		Total	96	100		

Most (59.4 percent) of the farmers faced medium extent of problems regarding wheat production technologies and the rest 40.6 percent faced high extent of problems. It could be worthy to mention that none of the respondents faced low extent of problems. It indicates that the farmers are intermingled with diversified problems in adopting wheat production technologies.

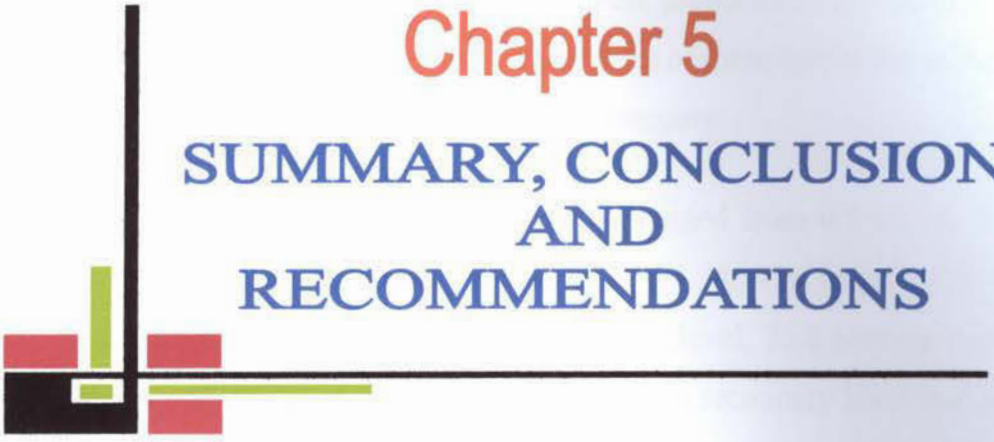
In order to measure the problems regarding wheat cultivation open and closed questionnaire were used. The purpose of this section was to have an understanding on the problems faced by the farmers in adopting wheat production technologies. However, nine selected problems in this regard were investigated and they have been ranked in Table 4.7 according the descending order of problem facing index (PFI).

Data contained in Table 4.7 indicate that "inadequate irrigation in dry season" ranked first with PFI value of 261. Cultivation of wheat requires several light irrigation but in that time farmers do not have access to the required irrigation water. The second most important problem of the growers was "inadequate knowledge about wheat production" with the PFI of 250. The growers of the study area did not get sufficient training and other related information

regarding wheat cultivation. However, lack of accurate price, lack of sufficient machineries and tools for wheat cultivation, scarcity of modern variety of seed, fertilizer and pesticides when they are needed, lack of cash money, high cost involvement for adoption of modern technologies and inadequate help from SAAO were also some important problems which are needed to pay attention. No program for the farmers cannot be successful unless these problems are not properly addressed and triggered to be eliminated or at leas diminished.

Table 4.7 Ranking of the problems according to descending order of PFI

Rank order	Problems	PFI
1	Inadequate irrigation in dry season	261
2	Inadequate knowledge about wheat production	250
3	Lack of accurate price	240
4	Lack of sufficient machineries and tools for wheat cultivation	224
5	Scarcity of modern variety of seed, fertilizer and pesticides when they are needed	224
6	Lack of cash money	211
7	High cost involvement for adoption of modern technologies	192
8	Inadequate help from SAAO	115
9	Others (lack of subsidy, less access to market etc.)	16



Chapter 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This Chapter presents the summary of findings, conclusions and recommendations of the study.

5.1 Summary of Findings

5.1.1 Selected characteristics of the farmers

Eleven individual characteristics of the farmers were selected for investigation in this study. The findings of their characteristics are summarized below:

Age: Age of the farmers ranged from 27 to 70 years, the average being 51.05 years and the standard deviation 9.27. The highest proportion 72.9 percent of the farmers fell in the old category, while 24 percent of them fell in the middle-aged category and only 3.1 percent in the young category.

Education: The education scores of the farmers ranged from 0.5 to 14. The average was 4.50 and the standard deviation was 3.78. The majority (61.5 percent) of the farmers was educated up to primary level, 20.8 percent could sign their names only, 4.2 percent had education up to secondary level and the rest 13.5 percent had above secondary level of education.

Family size: The family size of the farmers ranged from 2 to 10 members. The average was 5.66 with a standard deviation of 2.00. Among the farmers 38.5 percent had large family while 33.3 percent and 28.2 percent of them had small and medium family size.

Farm size: The farm size of the respondents varied from 0.12 to 2.7 hectares with an average of 0.53 hectares and standard deviation 0.49. More than three-forths (83.3 percent) of the farmers possessed small farms compared to 12.5 percent of them having marginal farms and only 4.2 percent medium farms.

Annual family income: The observed annual family income of the respondents ranged from 18 to 198.3 thousand Tk., the mean being 54.09 thousand Tk and standard deviation 45.49 thousand Tk. It was observed that the highest portion (64.6 percent) of the respondents were in low income group, while 22.9 percent respondents were in medium income group and only 12.5 percent were in high income group.

Organizational participation: Organizational participation scores of the respondents ranged from 0 to 6 with an average of 2.25 and a standard deviation 1.51. Majority (79.1 percent) of the respondents had low organizational participation. A mentionable (16.7 percent) number of respondents had no organizational participation, while only 4.2 percent had medium participation. None of them was in high category of organizational participation.

Extension media contact: The computed extension media contact scores of the respondents ranged from 17 to 36 against the possible range of 0 to 68. The average score was 24.84 and standard deviation 5.25. The majority (54.2 percent) of the farmers had medium extension media contact, while the rest 45.8 percent of them had low contact.

Cosmopoliteness: Cosmopoliteness scores of the respondents could range from 0 to 28 but the observed range was from 0 to 10 with an average of 1.97 and standard deviation 1.95. Among the farmers, majority (71.9 percent) were in low cosmopolite category compared to 3.1 percent in medium category and 25 percent in not at all category.

Agricultural knowledge: Agricultural knowledge scores of the farmers ranged from 25 to 49 against the possible range of 0 to 50 with average and standard deviation of 33.27 and 5.69, respectively. The highest proportion (60.4 percent) of the farmers had fair knowledge compared to 39.6 percent of them having high knowledge, and none of them had low agricultural knowledge.

Attitude towards wheat cultivation: The scores of attitude towards wheat production technologies ranged from 25 to 48 against the possible scores 12 to 60 with an average of 36 and a standard deviation of 3.83. The highest proportion (91.7 percent) of the farmers belonged to neutral attitude category as compared to 5.2 percent to favorable and 3.1 percent to unfavorable category of attitude towards wheat production.

Innovativeness: The possible range of innovativeness score was 0 to 72 while the observed range was 13 to 48. The average score of the respondents was 26.31 and standard deviation 6.65. Data contained in Table 4.1 indicate that highest proportion (79.1 percent) of the growers were moderately innovative as compared to 18.8 percent less and 2.1 percent high innovative.

5.1.2 Adoption of wheat production technologies

The scores of adoption of wheat production technologies by the farmers ranged from 50 to 200 against the possible range of 0 to 400. The average adoption was 112.11 with a standard deviation of 37.85. The highest proportion (81.2 percent) of the growers had medium adoption as compared to 14.6 percent high adoption and only 4.2 percent low adoption. During the year 2003 only 1.94 hectares of land was under wheat production by the selected 96 farmers. It was unchanged until the next year (2004). Thereafter, it was gradually increased to 3.72 hectares of land in 2005 and further rapidly increased by 9.44 hectares in 2006 and 16.89 hectares in 2007. Thus, the trend of wheat production was increasing.

5.1.3 Relationship between the selected characteristics of the farmers with their adoption of wheat production

Pearson's product moment correlation coefficient (r) was calculated to explore the relationship between the selected characteristics of the farmers and their adoption of wheat production technologies. Among eleven selected characteristics, age was significantly and negatively correlated with the adoption of wheat production technologies at 0.01 level of probability.

Farmers' level of education, farm size, annual income, organizational participation and agricultural knowledge had significant positive relationship with the adoption of wheat production technology at 0.01 level of probability but extension media contact, attitude towards wheat production and innovativeness had significant positive relationship with the adoption of wheat production technologies at 0.05 level of probability. However, family size and cosmopoliteness of the farmers were not significantly related with their adoption of wheat production technologies.

5.1.4 Problem faced by the farmers adopting wheat production technologies

Computed scores of the respondents ranged from 15 to 22 against the possible range of 0 to 27 with the average being 18.05 and the standard deviation was 1.84 Most (59.4 percent) of the farmers faced medium extent of problems regarding wheat production technologies and the rest 40.6 percent faced high extent of problems. As many as 9 problems were mentioned by the farmers and ranked based on problem facing index. The problems were as follows according to rank order:

1. Inadequate irrigation in dry season
2. Inadequate knowledge about wheat production
3. Lack of accurate price
4. Lack of sufficient machineries and tools for wheat production
5. Scarcity of modern variety of seed, fertilizer and pesticides when they are needed
6. Lack of cash money
7. High cost involvement for adoption of modern technologies
8. Inadequate help from SAAO
9. Others (lack of subsidy, less access to market etc.)

5.2 Conclusions

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

- The adoptions of wheat cultivation practice of the farmers were moderate, as nearly 81.2 percent of the farmers had medium adoption. If we want to solve food problem of the country its adoption must be increase. However, to meet the ever-growing demand of food, there is a need to further enhance the rate and extent of adoption of wheat production technologies among the farmers. It may be concluded that the adoption of wheat cultivation practice is moderate and needs further improvement. There was an increasing trend of wheat production by the farmers and it needs to be sustainable.

- Age of the farmers had negative significant relationship with their adoption of wheat production technologies. It may, therefore be concluded that for adoption of wheat production technologies by the farmers, the extension workers should concentrate their works with young to middle-aged farmers.

- Education of the farmers showed positive significant relationship with their adoption of wheat production. It could influence to adopt wheat production technologies. Education has no alternative. So, the extension agents always have to play the role to educate people and motivate them to cultivate wheat.

- Family size of the farmers had no significant relationship with their adoption of wheat production technologies. It may, therefore be concluded that for adoption of wheat production technologies by the farmers, the extension workers should concentrate their efforts to irrespective of small, medium and high sized family.

- Farm size of the farmers had a significant and a positive relationship with their adoption of wheat production technologies. The farmers having large farms are generally economically solvent and they always try to avoid laborious and labor intensive technology due to labor scarcity. Sometimes large farmers become engaged in professions other than agriculture. However, small size of farms acted as both direct and indirect barrier to the adoption of new ideas. But it was the fact that 83.3 percent of the farmers had medium farms. Considering the above facts, it may be concluded that the adoption of wheat production technologies among medium farmers can be encouraged.

- Annual income of the farmers showed positive and significant relationship with their adoption of wheat cultivation practice. It is an important factor for the adoption of improved seeds, balanced fertilizer, IPM (Integrated Pest Management) and irrigation practices by the farmers for getting increased yield. It may be concluded that the availability of money is more essential to reduce financial hardship of the farmers to a considerable extent for the adoption of improved farming practices.

- Organizational participation of the farmers had significant relationship with their adoption of wheat production technologies. Besides, most of the farmers had low extent of organizational participation. So it was also considered as the important factor for this study and there is ample scope to improve their organizational participation.

- Extension media contact of the farmers had a positive significant relationship with their adoption of wheat production technologies. It can be concluded that any attempt to increase the extension contact of the farmers would be helpful to increase the level of adoption of improved farming practices.

- Cosmopoliteness increases the outlook of the farmers, which lead them to adopt cultivation practice. There was a significant positive relationship between farmers' cosmopoliteness and their adoption of wheat cultivation. Hence, the higher the cosmopoliteness of the farmers the higher was their adoption of wheat cultivation. Besides, 69 percent of the farmers had low to medium cosmopoliteness. So, it is possible to increase their cosmopoliteness.

- Agricultural knowledge of the farmers had a significant positive relationship with their adoption of wheat cultivation practice. Having more agricultural knowledge, an individual farmer becomes aware of the recent information on the various aspects of wheat cultivation. So, it can be concluded that agricultural knowledge is an important factor for higher adoption of wheat production technologies by the farmers.

- Attitude towards wheat cultivation of the farmers had a significant and positive relationship with their adoption of wheat production technologies. Besides, 94.8 percent of the farmers did not have favorable attitude towards wheat cultivation. Therefore, it could be concluded that there is a great opportunity to make their attitude favorable for wheat production technologies.

- Innovativeness of the farmers had a significant and positive relationship with their adoption of wheat production technologies. It can be concluded that any attempt to increase the innovativeness of the farmers would be helpful to increase the level of adoption of improved farming practices.

- The farmers' medium to high extent of problems in adopting wheat production technologies. Through reducing their identified problems adoption of wheat production technologies would be increased to a desirable proportion.

5.3 Recommendations

5.3.1 Recommendations for policy implications

Based on the findings and conclusions of the study, the following recommenddations could be made:

- It may be recommended that agricultural extension agencies especially the DAE and relevant NGOs should critically review their training programmes and make sound provisions so that the farmers understand the benefit of adoption of wheat cultivation. The DAE and other non-governmental organizations should strengthen their extension services to the growers and farmers to motivate them for adoption of wheat production technologies. The farmers should be encouraged to take proper care of their wheat production.

- It is recommended that the extension workers should work with the farmers of young to middle-aged category to promote adoption of wheat production technologies.

- It may be recommended that special attention should be given by the extension providers to the illiterate and primary educated farmers, so that they become aware about the benefit of adoption of wheat production technologies.

- Extension workers should work with the all category farmers so as to increase the adoption of wheat production technologies on a high significant scale.

- Extension services should provide adequate farm management advice to the growers for increasing their farm income. In this connection government should come forward to launch various income generating activities for the rural people and encourage them to involve with those activities in order to enhance their income.

- The DAE should take necessary steps to increase the opportunities for the growers to visit demonstration plots and establish farmers' organization in the rural areas in order to make them more cosmopolite and organizationally involved.

- The concerned authorities should take necessary steps to increase the extension media contact of the farmers. For this, the Sub-Assistant Agriculture Officers (SAAOs) should frequently visit the farmers and advice them on wheat production technologies. Other print, electronic and inter-personal information media should be used extensively to create awareness and encourage for adoption wheat production technologies. Particularly, both the Government Organization and Non-Government Organization workers should provide appropriate technical and management related information to the farmers through continued extension services.

- There is an urgent need for an effective educational programme to increase the agricultural knowledge for developing favorable attitude of the farmers towards the adoption of wheat production technologies. Hence, it may be recommended that arrangements should be made by the relevant authorities to increase the agricultural knowledge of the farmers through increased extension contact, training program and so on.

- Both GOs and NGOs should take steps to organize the farmers is cooperative society so that they can control irrigation in dry season, market prices as well as to address other problems themselves. Necessary inputs such as seedling, chemical fertilizers, insecticides, quality seeds to be made available to the respondents at right time and at fair prices. In this regard, extension agencies should realize the existing problems of the wheat cultivation and take necessary steps to minimize these problems.

5.3.2 Recommendations for further study

A small piece of study as has been conduced can not provide all information for the proper understanding of the adoption of wheat production technologies. Therefore, the following suggestions are made for further study.

- The present investigation explored the relationships of the eleven characteristics of the farmers with their adoption of wheat production technologies. Further research may be conducted by taking other characteristics to observe relationships with their adoption of wheat production technologies.

- The present study was conducted in Tingaon village of Bandar union at Bandar upazila of Narayanganj district. So, similar studies may be undertaken in other parts of the country to verify the findings of the present study.

- The present study has been carried out among the male farmers only. So, a similar study may be conducted with the farm women to examine their views and opinions regarding the adoption of wheat production technologies.

- The present study was concerned only with the extent of adoption of wheat production technologies. It is therefore, suggested that future studies should include attributes of innovations, adopter categories and use of information sources in relation to adopter stages and adopter categories.

- The study was confined among the farmers only. Further study needs to be conducted among the general farmers and determine the extent of adoption of wheat production technologies.

- Research studies can be undertaken to identify the problems of the farmers in adopting improved technologies of wheat cultivation as well as to determine their abilities and opportunities to triumph over these constraints.

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APPENDICES

APPENDIX-I

(English version of the interview schedule)

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Sher-e-Bangla Agricultural University
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An Interview schedule

Adoption of Wheat Production Technologies by the Farmers of Tingaon Village at Bandar Upazila under Narayanganj District

Name of the respondent: ..... Sl. No: .....

Fathers name: .....

Village: .....

Union: .....

Upazila: .....

District: .....

Please answer the following questions. Your information must be keep secret and only used for the research purpose.

1. Age

How old are you? .....years

2. Education

Please mention your educational back ground.

a) Can not read and write (.....)

b) Can sign only (.....)

c) I read up to class .....

3. Family Size

How many members are there in your family?.....persons

4. Farm Size

Please mention your farm size

Sl. No.	Types of land	Land area	
		Local unit	Hectare
1	Homestead area (A_1)		
2	Own land under own cultivation (A_2)		
3	Own land given to others' on borga (A_3)		
4	Own land given to others' on lease(A_4)		
5	Land taken from others' on borga (A_5)		
6	Land taken from others' on lease (A_6)		
7	Own pond (A_7)		
8	Own garden (A_8)		
9	Other fallow land (if any) (A_9)		
	Total (A)= $A_1+A_2+1/2(A_3+A_5)+A_6+A_7+A_8+A_9$		

5. Annual Income

Please particulars about your annual income from the following sources

(A) Income from agricultural crops

Sl. No.	Name of crops	Production (Kg or Mound)	Value Per Kg or Mound (Tk)	Total Value (Tk)
1	Wheat			
2	Paddy			
3	Potato			
4	Maize			
5	Jute			
6	Pulse crops			
7	Oil crops			
8	Spices			
9	Vegetables			
10	Fruits			
11	Others			
	Sub-total			

(B) Income from domestic animals and fisheries

Sl. No.	Sources of income	Total production (Kg or Mound)	Value per unit element (TK)	Total Value (TK)
1	Livestock			
2	Poultry			
3	Fisheries			
	Sub-total			

(C) Income from Non-agricultural sources

Sl. No.	Sources of income	Total income (TK)
1	Service	
2	Business	
3	Day labour	
4	Other family members	
5	Others	
	Sub-total	

Total income = (A+ B+ C) = ...Taka

6. Organizational Participation

Please state your frequency of participation of the following organization. Please tick mark in right space or allude the year.

Sl. No.	Name of organization	Duration of participation (year)			
		No participation	Ordinary member	Executive committee member	President/ Secretary
1	NGO co-operative				
2	Mosque committee				
3	School committee				
4	Madrasa committee				
5	Farmers co-operative				
6	Market somity				
7	Others (if any)				

7. Extension Media Contact

Please mention the frequency of communication of the following persons and agriculture related media.

Sl. No.	Communication media	Extent of communication				
		Regularly	Often	Occasionally	Rarely	Not at all.
		Personal media contact				
1	SAAOs	7-8times/ year ( )	5-6times/ year ( )	3-4 times/ year ( )	1-2 times /year ( )	0 ( )
2	Agril. Extension Officer	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
3	Upazila Agriculture Officer	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
4	Local leader	7-8 times/ month ( )	5-6 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	0 ( )
5	Neighbors	7-8 times/ month ( )	5-6 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	0 ( )
6	NGO workers	4 time/ month ( )	3 times/ month ( )	2 times/ month ( )	1 times/ month ( )	0 ( )
7	Seed/Fertilizer dealer	4 times/ month ( )	3 times/ month ( )	2 times/ month ( )	1 times/ month ( )	0 ( )
		Group Media contact				
8	Group discussion	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
9	Field day	4 times/ year ( )	3 times/ year ( )	2 times/ year ( )	1 times/ year ( )	0 ( )
10	Result demonstration	2 times/ year ( )	1 times/ year ( )	1 times/2 year ( )	1 times/3 year ( )	0 ( )
11	Participation in agrill. Training course	4-5 times/ life ( )	3 times/ life ( )	2 times/ life ( )	1 times/ life ( )	0 ( )
		Mass Media Contact				
12	Daily Paper	5-7 times/ week ( )	4-5 times/ week ( )	3-4 times/ week ( )	1-2 times/ week ( )	0 ( )
13	Radio	Regularly ( )	4-5 times/ week ( )	2-3 times/ week ( )	1 times/ week ( )	0 ( )
14	Television	Regularly ( )	4-5 times/ week ( )	2-3 times/ week ( )	1 times/ week ( )	0 ( )
15	Poster	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
16	Agril. Related Book/Magazine	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
17	'Krishimela'	2 times/ year ( )	1 times/ year ( )	1 times/ 2 year ( )	1 times/ 3 year ( )	0 ( )

8. Cosmopoliteness

Please mention the frequency of communication of the following places. (Please tick mark in right space)

Sl. No.	Name of visit	Frequency of visit				
		Regularly	Often	occasionally	Rarely	Not at all
1	Others village	7-8 times/ month ( )	5-6 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	0 ( )
2	Others union	7-8 times/ month ( )	5-6 times/ month ( )	3-4 times/ month ( )	1-2 times/ month ( )	0 ( )
3	Upazila sadar	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
4	Others upazila sadar	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
5	Own district	7-8 times/ year ( )	5-6 times/ year ( )	3-4 times/ year ( )	1-2 times/ year ( )	0 ( )
6	Others district	4 times/ year ( )	3 times/ year ( )	2 times/ year ( )	1 times/ year ( )	0 ( )
7	Regional agril. Research institute	4 times/ year ( )	3 times/ year ( )	2 times/ year ( )	1 times/ year ( )	0 ( )

9. Agricultural Knowledge

Please answer the following question

Sl. No.	Questions	Score	
		Weighted	Obtained
1	Mention the name of two varieties of wheat	2	
2	How much seed required for wheat cultivation per bigha	2	
3	Mention the name of two diseases of wheat	4	
4	Mention the name of two animals of wheat	2	
5	State two methods of controlling rat in wheat field.	4	
6	Mention two major functions of TSP on wheat cultivation.	2	
7	State two major Functions of MP on wheat cultivation.	2	
8	Mention the name of three crops cultivated in winter season	3	
9	Mention benefit of vegetable cultivation in homestead area	3	
10	Mention the name of three things by the made of jute	3	
11	Mention the name of three pulse crops	3	
12	Mention the name of three crops cultivated for green manure.	3	
13	How much fertilizer required for wheat cultivation per bigha	4	
14	Mention benefit of irrigation in wheat cultivation	2	
15	Mention benefit of wheat	3	
16	Mention the weed controlling of wheat cultivation	4	
17	How much cowdung required for wheat cultivation per bigha	4	
	Total	50	

10. Attitude towards Wheat Cultivation

Please indicate your agreement with the following statement

Sl. No.	Statements	Extent of agreement/disagreement				
		Strongly agreed	Agreed	Unde-cided	Disa-greed	Strongly disagreed
1(+)	Less influences of diseases in wheat cultivation					
2(-)	High cost in wheat cultivation					
3(+)	No harmful effect from insect in wheat cultivation					
4(-)	I do not like to cultivate wheat as the late sowing of wheat causes reduction in yield					
5(+)	I support wheat production because it contains a lot of protein					
6(-)	Wheat cultivation is complex					
7(+)	Less irrigation required for wheat production					
8(-)	I do not like bread so I avoid cultivation					
9(+)	Wheat can be grown under less or zero tillage, so I want to cultivate wheat					
10(-)	Wheat threshing is difficult					
11(+)	Wheat is cultivated to mitigate the food crisis caused by flood					
12(-)	I do not like to cultivate wheat as the attack of rodent is intense here					

11. Innovativeness

Please give your information about the use of following wheat production technologies

Sl. No.	Technology	Don't use	Adoption within time of being informed (year)					
			1st	2nd	3rd	4th	5th	More
1	Cultivation of new variety							
2	Use of green manure							
3	Applying crop rotation							
4	Intercropping							
5	Use of disease free and healthy seeds							
6	Use of organic manure							
7	Use of power tiller							
8	Homestead vegetable cultivation							
9	Using weedicides							
10	Road side tree plantation							
11	Tree plantation in roof of the houses							
12	Use of pesticides							

12. Adoption of wheat cultivation

Please give your information about the use of following wheat production technologies

Sl. No.	Technologies	Non-adoption	Adoption within time of being informed (year)					Duration (year)
			1st	2nd	3rd	4th	5th/more	
1	Use of modern varieties (Ananda, Barkat, Akbar, Kanchon and Gourab)							
2	Time of wheat seeding (last week of October to first weak of November)							
3	Use of seed treatment chemicals (Vitavax-200, Captan etc.)							
4	Seed rate (16 kg/bigha)							
5	Irrigation							
6	Use of fertilizers							
7	Wheat cultivation in zero or low tillage							
8	Split application of urea							
9	Use of poison bait to control rat							
10	Use of polythene and jute made sack, air proof jar to store seeds							
11	IMP to control insect pest and diseases							
12	Electrical or foot driven thresher							

13. Trend of Wheat Cultivation

Please mention the land area under wheat cultivation during the following years.

Year	Land area under wheat cultivation
2003	
2004	
2005	
2006	
2007	

14. Problems in adopting wheat production technologies

Please mention the extent of problems that you faced during use and application of wheat production technologies.

Sl. No.	Problems	Extent of Problem			
		High	Medium	Low	Not at all
1	Lack of sufficient machineries and tools for wheat cultivation				
2	Inadequate knowledge about wheat production				
3	Inadequate irrigation in dry season				
4	Lack of accurate price				
5	High cost involvement for adoption of modern technologies				
6	Inadequate help from SAAOs				
7	Lack of cash money				
8	Scarcity of modern variety of seed, fertilizer and pesticides when they are needed				
9	Others				

Thanks for your kind cooperation.

Dated.....

.....

Signature of interviewer

Appendix-II

Correlation matrix of the dependent and independent variables

Variables	Age	Education	Family size	Farm size	Annual income	Organizational participation	Extension media contact	Cosmopoliteness	Agricultural knowledge	Attitude towards wheat cultivation	Innovativeness	Adoption of wheat production technologies
Age	1	-.414**	-.001	-.310**	-.426**	-.227*	-.075	-.189	-.315**	-.014	-.159	-.503**
Education	-.414**	1	.227*	.314**	.634**	.592**	.427**	.394**	.410**	.210*	.198	.581**
Family size	-.001	.227*	1	.027	-.030	.374**	.225*	.234*	.052	-.182	.053	.002
Farm size	-.310**	.314**	.027	1	.344**	.358**	.273**	.134	.263**	.077	.186	.400**
Annual income	-.426**	.634**	-.030	.344**	1	.334**	.413**	.295**	.233*	.171	.237*	.451**
Organizational participation	-.227*	.592**	.374**	.358**	.334**	1	.345**	.363**	.316**	.117	.390**	.334**
Extension media contact	-.075	.427**	.225*	.273**	.413**	.345**	1	.310**	.075	.170	.284**	.233*
Cosmopoliteness	-.189	.394**	.234*	.134	.295**	.363**	.310**	1	.329**	-.021	.394**	.108
Agricultural knowledge	-.315**	.410**	.052	.263**	.233*	.316**	.075	.329**	1	.144	.448**	.398**
Attitude towards wheat cultivation	-.014	.210*	-.182	.077	.171	.117	.170	-.021	.144	1	.143	.206*
Innovativeness	-.159	.198	.053	.186	.237*	.390**	.284**	.394**	.448**	.143	1	.231*
Adoption of wheat production technologies	-.503**	.581**	.002	.400**	.451**	.334**	.233*	.108	.398**	.206*	.231*	1

** Correlation is significant at 1% level of probability

* Correlation is significant at 5% level of probability