HINDRANCE AND PROSPECTS OF WATERMELON CULTIVATION IN BANGLADESH FROM THE PERSPECTIVES OF FARMERS IN KOTALIPARA UPAZILA UNDER GOPALGANJ DISTRICT

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DHAKA-1207

DECEMBER, 2016

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REGISTRATION NO. 15-06984

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

MASTER OF SCIENCE
IN
AGRICULTURAL EXTENSION

SEMESTER: JULY-DECEMBER, 2016

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This is to certify that thesis entitled, **HINDRANCE AND PROSPECTS OF WATERMELON CULTIVATION IN BANGLADESH FROM THE PERSPECTIVES OF FARMERS IN KOTALIPARA UPAZILA UNDER GOPALGANJ DISTRICT** *submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE (MS) IN* AGRICULTURAL EXTENSION, *embodies the result of a piece of bona-fide research work carried out by SUDIP BARAI, Registration no. 15-06984 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

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

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ACKNOWLEDGEMENTS

All praises to Almightly and Kindfull trust on to 'God' for His never-ending blessing, the author deems it a great pleasure to express his profound gratefulness to his respected parents, who entiled much hardship inspiring for prosecuting his studies, receiving proper education.

The author likes to express his deepest sense of gratitude to his respected Supervisor **M. Zahidul Haque**, Professor, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh for his scholastic guidance, support, encouragement, valuable suggestions and constructive criticism throughout the study period and gratuitous labor in conducting and successfully completing the research work and in the preparation of the manuscript writing including data analysis.

The author also expresses his gratefulness to his respected Co-Supervisor Dr. **Mohummed Shofi Ullah Mazumder**, Associate Professor, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka for his scholastic guidance, helpful comments and constant inspiration, inestimatable help, valuable suggestions throughout the research work and in preparation of the thesis.

The author also wishes to express sincere appreciation and heartfelt gratitude to **Md. Mahbubul Alam, Ph.D,** Associate Professor and Chairman, Department of AEIS, SAU, for his valuable suggestions, constant cooperation, inspirations and sincere advice to improve the quality of the thesis..

The author expresses his sincere appreciation to his brother, sisters, relatives, well wishers and friends for their inspiration, help and encouragement throughout the study period.

The Author

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ABBREVIATIONS

BBS = Bangladesh Bureau of Statistics

et al. = All others

et cetera, and the other

HYV = High Yielding Variety

HFI = Hindrance Faced Index

PAI= Prospects Appearance Index

SAAO = Sub-Assistant Agricultural Officer

DAE = Department of Agricultural Extension

BARI = Bangladesh Rice Research Institute

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SUDIP BARAI

ABSTRACT

The main purpose of this study was to assess the hindrance and prospects of watermelon cultivation in Bangladesh from the perspectives of farmers in Kotalipara upazila under Gopalganj district. Data were gathered from 121 watermelon farmers of selected villages of Kotalipara upazila under Gopalganj district by using a semi structured interview schedule during the period from 15 April to 15 May, 2017. Descriptive statistics, Pearson Product Moment Correlation Co-efficient were used for data analysis. The findings reveal that more than half (64.5%) of the respondents faced medium hindrance in watermelon cultivation, while 18.2 percent faced low hindrance and 17.3 percent faced high hindrance. Majority (57.9%) of the respondents perceived medium level prospects of watermelon cultivation, while 23.1 percent found low level prospects of watermelon cultivation and only 19 percent respondents confirmed high level of prospects for watermelon cultivation. The statistical analysis exposed that age, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon, microfinance received, agricultural training exposure and input availability had significant negative relationship with the hindrance faced by the farmers in watermelon cultivation where age, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon, agricultural training exposure, agricultural extension media contact and input availability had significant positive relationship with the prospects of watermelon cultivation.

CHAPTER 1

INTRODUCTION

1.1: General Background

Agriculture is the largest employment sector in Bangladesh. As of 2016, it employs 47% of the total labor force and comprises 16% of the country's GDP. The performance of this sector has an overwhelming impact on major macroeconomic objectives like employment generation, poverty alleviation, raising standard of living and increasing export earnings human resources development and food security. A plurality of Bangladeshis earns their living from agriculture. Like different sector of agriculture, Fruits and vegetables production can help farmers to generate income which eventually alleviate poverty.

Watermelon (*Citrullus lanatus*) is one of the most widely cultivated crops in the world at large. According to FAO (2011) statistics, China is the world's leading producer of watermelon. The top twenty leading producers of watermelon produced a collective volume of approximately 92.7 million metric tons in 2011, of which China produced 75%. Turkey, Iran and Brazil commanded a production share (of the 20 leading producers) of 4.7%, 3.5% and 2.4% respectively in 2011.

In Bangladesh, like many other parts of the world watermelon is highly relished as a fresh fruit because of its thirst-quenching attribute in addition to many other identified characteristics like size, color, sweetness, nutritional values and advantages. Farmers of the Bangladesh, especially in sandy lands of coastal islands, are getting encouraged to cultivate watermelon on more areas of land as the popular summer fruit brings more profit than traditional crops including paddy. In Bangladesh, Panchagar, Thakurgaon, Natore, Patuakhali, Gopalganj, Khulna, Barishal, Noakhali and Rangamati are well known as watermelon cultivation area. In Patuakhali, 13,368 hectares of land in seven upazilas under the district has been brought under watermelon cultivation. The district's total production may cross six lakh tons, the value being Tk. 110 crore. Land of Rangabali, Galachipa and Kalapara upazilas see large areas of watermelon fields as those are very suitable for watermelon cultivation due to soil, weather condition, availability of irrigation water.

According to DAE (2016), in Patuakhali, Rangabali upazila, the highest 4,510 hectares of land under watermelon cultivation in the year of 2014. According to Department of

Agricultural Extension (DAE), Gopalganj, a total of 1200 hectare of land have been brought under watermelon cultivation with a production target of 33,600 metric tons (DAE, Gopalganj, 2015) and Panchagar, 1,000 hectares of land in five upazilas of the district brought under the watermelon cultivation. The DAE further said that the total production might cross 40,000 tons during the current season. At present in Nator 204 hectares with production around 2075 tons, Noakhali 850 hectares, Rangamati 700 hectares with production around 1500 tons and Barishal around 750 hectares of land is brought under watermelon cultivation.

On an average, around 20,000 hectares of land is brought under watermelon cultivation every year with the production standing at around 9.5 lakh tons (BBS, 2012).

Now-a-days farmers are facing a lot of problem especially in cultivation procedure, technology uses, harvesting, transportation system and marketing sectors of watermelon cultivation in Bangladesh. Besides these natural calamities are one of the most burning problem for watermelon cultivation. For the reasons of concept and benefits of the modern technologies should be disseminated to the farmers in a convincing and attractive manner, so that farmers response quickly to adopt those technologies. This is undoubtedly an educative process and it is possible through extension education system, concerned mainly with increasing agricultural production and improving living standards of the farmers. Gopalganj district is considered as watermelon surplus production zone of the country. Therefore, the Gopalganj district is considered as the most suitable location to study the phenomenon of hindrance and prospects of watermelon cultivation.

From the economic point of view, watermelon should be cultivated for higher farm income, increasing cropping intensity, improvement of socio-economic condition and protection of environmental pollution, development of healthy and efficient manpower, higher export potential, reducing import and enhancement of industrialization, employment generation, less consumption of cereals, which leads to overcome food storage.

1.2 Justification of the Study

The major focus of the study is to determine the extent of hindrance and prospects of the farmers towards watermelon cultivation. Now-a days, BARI has released different watermelon varieties. Government and non-government organizations are currently putting effort and allocating resources for production oriented research and also encouraging the rural people to undertake watermelon cultivation for demand in summer season because of its thirst-quenching attribute plus other nutritional values. So, evaluation of hindrance and prospects of the concerned farmers is necessary.

Considering the above findings, the researcher became interested to undertake a study to determine hindrance and prospects of the farmers towards watermelon cultivation.

1.3 Statement of the Problem

Watermelon is one of the most significant tropical fruit produced in Bangladesh. The watermelon cultivation is many centuries old and the farmers are unaware of the modern improved cultivation practices. They have many hindrances relating to cultivation, harvesting and marketing. In the cultivation stage, they have problem with decrease in rainfall, natural calamities cause fluctuation in production and frequent drought conditions hampered the development of agriculture. In the harvesting stage perishable nature of fruits are wasted due to lack of storage facilities and lack of effective processing or preservation techniques, leads to high wastage. The pest and disease problem also results low output and poor quality of fruits. In the marketing stage, they have many problems relating price fluctuation and lack of marketing problems. In Bangladesh is far from tapping the potential of processing and exporting watermelon processors and exporters currently not available. Among all pre-and postharvest practices, loss of watermelon is the main problem and after that marketing system for commercialization is mainly responsible for losses of watermelon. So, hindrance and prospects of watermelon cultivation have been taken as present research topic.

In order to minimize farmers' hindrance and maximize prospects of watermelon cultivation, the researcher undertook the investigation entitled "Hindrance and prospects of watermelon cultivation" in selected areas of Gopalganj districts in order to have an understanding of the extent of losses of watermelon cultivation by the farmers. Research information is required which could be helpful to the

policy maker, regarding supply of inputs, technological knowledge and problem being encountered on watermelon processing.

The purpose of the study was to assess the losses of watermelon as supposed by the farmers regarding production, harvesting and marketing and to explore the relationship of the selected characteristics of the farmers with the hindrance and prospects of watermelon cultivation by them. In order to make the study manageable, the following research questions were taken into consideration. regarding the following queries:

1. What are the features of the watermelon growers?
2. What is the extent of hindrance of farmers in watermelon cultivation?
3. What is the extent of propects of farmers in watermelon cultivation?
4. Is there any hindrance for losses of watermelon production, harvesting and marketing as faced by the watermelon growers?
5. Is there any relationship between each of the farmers' selected characteristics i) hindrance and ii) prospects of watermelon cultivation as perceived by them?

1.4: Specific Objectives:

The following specific objectives were undertaken for the study:

1) To determine the extent of hindrance involved in watermelon cultivation;
2) To assess the prospects of watermelon cultivation;
3) To describe following selected personal and socio-economic characteristic of the watermelon growers:

   a) Age
   b) Level of education
   c) Watermelon cultivation experience
   d) Watermelon covering area
   e) Annual family income
   f) Income from watermelon
   g) Microfinance received
   h) Agricultural training exposure
   i) Agricultural extension media contact
   j) Input availability and

4. To explore the relationship between each of the selected characteristics of the watermelon farmers and the i) hindrance and ii) prospects of watermelon cultivation.

1.5 Assumption of the Study

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

1. The respondents included in the sample for this study were component to furnish proper responses to the questions set up in the interview schedule.
2. The responses furnished by the respondents were valid and reliable.
3. Information furnished by the respondents included in the sample was the representative opinion of the whole population of the study area.
4. The researcher who acted as interviewer was well adjusted to social and environment condition of the study area. Hence, the data collected by him from the respondents were free from bias.
5. All the data concerning the variables of the study were normally and independently distributed with their respective means and standard deviation.
6. The information thought by the researcher revealed the real situation to satisfy the objectives of the study.

1.6 Limitation of the Study

The objective of the study was to make an understanding of the hindrance and prospects in watermelon cultivation by the watermelon farmers. However, from the research point of view, it was necessary to impose certain limitations as follows:

1. The study was confined to the watermelon growers of four selected village of kotalipara upazila under Gopalganj district.
2. Farmers have many varied characteristics but only 10 were selected to complete this study as stated in the objectives.
3. The researcher relied on the data furnished by the watermelon farmers from their memory during the time interview.
4. For some cases, the researcher faced unexpected interference from the over interested side-talkers while collecting data from the target populations.

However, the researcher tried to overcome the problem as far as possible with sufficient tact and skill.

5. Various problems in watermelon cultivations are likely to be faced by the farmers. However, only ten problems have been considered for investigation in this study.

1.7 Definition of Related Terms

A researcher needs to know the meaning and contents of every term that he/she uses. It should clarify the issue as well as explain the fact to the investigator and readers. However, the terms which have been frequently used throughout the research work are defined and interpreted below:

Respondents:

Person who provided data for analysis by responding to interview schedule. Randomly selected people considered to be representative of the population are known as respondents. They are the people from whom a social research worker usually gets most data required for his research. In this study, the respondents were the village level watermelon farmers.

Farmers:

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. In this study watermelon growers were treated as farmers.

Age:

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

Education:

Education referred to the development of desirable change in knowledge, skill, attitude and ability in an individual through reading, writing, working, observing and other related activities. It was measured on the basis of classes a farmer has passed from formal educational institutions.

Annual family income:

Family income referred to the total annual earnings of all the family members of a respondent from agriculture, livestock, fisheries and other accessible sources (business, service, daily working etc.) during a year. It was expressed in Taka.

Training exposure:

It was used to refer to the completion of an activity by the farmers which were offered by the government, semi-govt. or non-government organization (s) to improve the knowledge and skills of farmers for better performing an agricultural job. It was measured by the number of days of training received by the respondent.

Extension media contact:

It referred to an individual's (farmer) exposure to or contact with different communication media, source and personalities being used for dissemination of new technologies.

Watermelon cultivation experience:

Watermelon cultivation experience referred to the total duration attained by a respondent on watermelon cultivation and it was expressed as total number of years.

Input availability

Some elements are essential for cotton cultivation but for successful cultivation farmers must need these elements in proper time. This is considered as input availability. It includes availability of modern variety, availability of fertilizers, availability of pesticides, availability of irrigation water, availability of seed treatment chemical, etc.

CHAPTER 2

REVIEW OF LITERATURE

This chapter comprises of four sections. In the first section literatures relating to concept of hindrance and prospects of the farmers in different agricultural aspects have been presented. The second section is in connection with the relationship of selected characteristics of individuals with their hindrance faced. The third section is in connection with the relationship of selected characteristics of individuals with their prospects. Finally, the fourth section of this chapter deals with the conceptual framework of the study. The researcher tried to review the available literature from different countries related to hindrance and prospects of the farmers in crop cultivation, livestock, fisheries and other related matters. Unfortunately, a few of the studies were directly related to the present study. As the researcher could not find any literature relating to hindrance and prospects of watermelon cultivation in Bangladesh. Therefore, he referred his review to other crops deduced the following:

2.1 Literatures on Hindrance and Prospects of the Farmers in Cultivating Various Crops

Biswas (1992) identified farmers' problems in cotton cultivation. Non- availability of quality seed in time, unfavorable and high cost of fertilizer and insecticides, lack of operating capitals, not getting fair weight and reasonable price according to grade, lack of technical knowledge, lack of storage facility, stealing from field, and late buying of raw cotton by Cotton Development Board were identified as major problems of cotton cultivation in Jessore District.

The most important problems identified by Kher and Halyal (1988) regarding cotton cultivation technology were an irregular and insufficient electricity supply, small size of holding for green manuring, inconvenience of intercropping due to weeds, high cost of farm fuel, scare irrigation facilities. absence of location specific recommendations for ear thing up, lack of drought resistant varieties and lack of technical knowledge about plant protection and chemical fertilizers.

Chander and Sharma (1990) revealed that the main problems of potato cultivation were ignorance about improved cultivars and cultivation practices, ignorance about scientific method of sowing, lack of guidance of marketing potato, high cost of improved

cultivars, high cost of fertilizers, pesticides and irrigation, lack of enough space for storing potatoes scientifically.13

Akanda *et al.* (1997) revealed that majority (80.95 percent) of the farmers had high problem confrontation compared to 16.19 percent having medium and 2.69 percent having low problem confrontation in crop cultivation.

Hassan *et al.* (1998) observed that almost two-thirds (64.15 percent) of the respondents had medium problem confrontation compared to 18.82 percent high and 1.98 percent low problem confrontation.14

Alam *et al.* (2005) conducted a survey on jute crop in seven districts of Bangladesh and found that scarcity of quality seeds; high labor wage and low market price of fiber were the major constraints of jute production.

Ismail (2001) conducted a study on problems faced by the farm youths of hoar area of Mohanganj upazila. Study revealed six top problems in rank order and these were (i) no arrangement of loan for the farm youth for fishery cultivation, (ii) lack of government programs in agriculture for the farm youth, (iii) absence of loan giving agencies for establishing farm in locality, (iv) general people face problem for fishery due to government leashing of Jalmohal, (v) lack of government programs for establishing poultry farm, and (vi) lack of agricultural loan for the farm youth.

Pramanik (2001) made an extensive study on twenty-four problems of farm youth in Mymensingh villages relating to different problems in crop cultivation. Out of twenty-four problems the top four problems in rank order were: (i) NGO take high rate of interest against a loan. (ii) lack of agricultural machinery and tools, (iii) lack of cash and (iv) financial inability to arrange improved seeds, fertilizers and irrigation.

Agnew *et al.* (2002) found several barriers to adoption of Harvesting Based Practice (HBP) have slowed progress. These include low sugar price, wet weather, orange rust disease, system of harvester payment, insufficient cane quality feedback mechanisms and physical, time and safety upon harvesting.

Salam (2003) in his study identified constraints in adopting environmentally friendly farming practices. Top six identified constraints according to their rank order were: (i) low production due to limited use of fertilizer, (ii) lack of organic matter in soil, (iii) lack of Govt. support for environmentally friendly farming practices, (iv) lack of capital

and natural resources for integrated farming practices, (v) lack of knowledge on integrated farm management and (vi) unavailability of pest resistant varieties of crops.

Balachandranath (2004) concluded that the main causes for the low economic performance of the farmers of rice based farming system were their marginal and small land holdings, negligence of the system, high wage rate, low labour productivity and non-availability of timely labour.

Thomas (2002) revealed the major problems of the paddy farm sector in Ramakari village of Kuttanad rice farming area of Kerala as labour shortage, small size of holdings and decline in the number of full time farmers, declining profitability for farmers, growing aversion in the new generation on paddy cultivation and high rate of crop failure.

Das and Stigter (2005) inferred the prospects of Pokkali field that its soil is inherently fertile with adequate organic carbon content (3% - 4%), potassium, other nutrients and beneficial microbial flora. The cultivation relies on clever biomass use. Therefore, no inputs other than seeds are needed in Pokkali Rice Farming in the form of manure, fertilizer, insecticide or other chemicals.

Nair *et al.* (2010) reported the declining trend of integrated rice – shrimp cultivation because of labour problems, low revenue and by other damages. The profitability of such farming is under question and largely people follow this for subsistence.

Suchitra and Venugopal (2005) concluded that unavailability of farm hands, especially for harvesting, is the main cause for the decline of Pokkali rice farming. They also found that Pokkali-prawn farming is also threatened by deteriorating soil and water quality. Most Pokkali tracts lie close to the Vembanad and Kochi backwaters, both are severely polluted by the indiscriminate effluent discharge from factories, by oil from overboard engines of boats, and also by all kinds of wastes from Alappuzha, Kottayam and Kochi cities and nearby towns.

Vijesh *et al.* (2006) found that despite the state government's direct intervention making the monoculture of prawn illegal, more area is being gradually brought under fallow-prawn and prawn-prawn systems, owing largely to the multitude of constraints associated with the labour intensive rice cultivation in Pokkali lands. This poses a challenge to the in-situ conservation of salinity-resistant indigenous rice varieties and cultivation practices.

2.2 Relationship between the selected characteristics of the farmers and their hindrance faced

2.2.1 Age and hindrance faced

Nahid (2005) conducted a study and found that there was no relationship between age of the cotton growers and their problem confrontation in cotton production.

Akanda (1993) found that there was no relationship between age of farmers and their problem faced in using quality rice (BR 11) seed.

Hasan (1995) found that there was no relationship between age of the block supervisors and their problem faced.

Rahman (1995) conducted a study and found negative relationship between age of the farmers and their problem faced.

Bhuyan (2002) in his study found a positive and significant relationship between age of the farmers and their constraint in banana cultivation.

Karim (1996) in his study and found that age had no significant relationship with problem faced.

Hossain (1985) in a study on landless laborers in Bhabakhali union of Mymensingh district found that there was no relationship between age of the landless laborers and their problem faced. Similar findings were obtained by Rahman (1995), Ali (1999), Rashid (1999), Parmanik (2001), Ahmed (2002), Hossain (2002) and Salam (2003) in their respective studies.

2.2.2 Level of education and hindrance faced

Nahid (2005) conducted a study and found that there was very high significant negative relationship between education of the cotton growers and their problem confrontation in cotton production.

Akanda (1993) in his study on problem confrontation of the farmers in respect of cultivating BR 11 rice found a significant negative relationship between education of the farmers and their problem faced.

Rahman (1995) found that the education of the farmers had significant negative effect on their faced constraint in cotton cultivation. The finding indicated that higher the

education of the farmers, the lower was their faced constraint Mansur (1989), Islam (1987), arid Kashem (1977) obtained similar findings.

Rahman (1995) in his study on problem faced by the pineapple growers found a significant negative relationship between education of the farmers and their problem faced.

Karim (1996) in his study found that education of the farmers had significant negative relationship with their problem faced.

Haque (2001) found a significant negative relationship between education and problem faced of the FFS farmers in practicing IPM.

Huque (2006) found that education of the farmers had highly significant negative relationship with their problem faced in using integrated plant nutrient management.

Basher (2006) found that education of the farmers had significant negative relationship with their problem confrontation in mashroom cultivation.

Aziz (2006) found that education of the farmers had very high significant negative relationship with their constraints faced in potato cultivation in Jhikargacha upazila under Jessore district.

The study of Ismail (2001) revealed that there was no significant relationship between education and problem faced of farm youth. Similar findings were obtained by Rashid (1975), Rahman (2006) and Raha (1989) in their respective studies.

2.2.3 Cultivation experience and hindrance faced

Rahman (2015) found that cultivation experience of the farmer had significant negative relationship with their problem faced in jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.2.4 Covering area and hindrance faced

Nahid (2005) conducted a study and found that there was a significant negative relationship between cotton farm size of the cotton growers and their problem confrontation in cotton production.

Basher (2006) found that cotton cultivation area of the farmers had significant negative relationship with their problem confrontation in cotton cultivation.

Rahman (1995) found a significant and negative relationship between area under cotton cultivation of the farmers and the constraints faced by them.

2.2.5 Annual family income and hindrance faced

Nahid (2005) conducted a study and found that there was a very high significant negative relationship between annual income of the cotton growers and their problem confrontation in cotton production.

Rashid (1975) in his study found that there was no relationship between annual family incomes the farmers and their agricultural problem confrontation. Though the relationship was not significant, relevant data indicated a considerable negative trend between income of the farmers and agricultural problem confrontation of the farmers.

Sarker (1983) in his study found that there was no relationship between the income of the farmers and their poultry problem confrontation.

Hossain (1985) in his study found a significant relationship between in come a problem confrontation of the landless laborers.

Rahman (1995) conducted a study and found negative significant relationship with their problem confrontation in cotton cultivation. Similar finding was obtained by Rahman (1995) and Islam (1987).

Karim (1996) found that the annual income of the farmers had significant negative relationship with their problem confrontation.

Haque (2001) found in his study that annual income of FFS farmers had a positive significant effect on their problem confrontation.

Haque (2006) found that annual family income of the farmers had no significant relationship with their problem faced in using integrated plant nutrient management.

Rahman (2006) found that annual family income of the farmers had very high negative significant relationship with their constraints faced in banana cultivation of Sonargaon upazila under Narayanganj district. Aziz (2006) found the same.

Bashar (2006) found that annual family income high significant negative relationship with problem confrontation in mushroom cultivation.

2.2.6 Income from watermelon and hindrance faced

No literature was found related to relationship between income from watermelon and hindrance faced in farmers. Rahman (2015) found that annual family income from jackfruit of the farmers had significant negative relationship with their problem faced in jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.2.7 Microfinance received and hindrance faced

Baten (2014) found that microfinance received had no significant relationship with their hindrance in cotton cultivation.

Islam (2008) found that microfinance received had negative significant relationship with their hindrance in sugarcane cultivation.

2.2.8 Agricultural training exposure and hindrance faced

Nahid (2005) conducted a study and found that there was no significant relationship between training exposure of the cotton growers and their problem confrontation in cotton production.

Saha (1997) found that training experience of the youth had no relationship the problem confrontation in relation to employment opportunity of youth. Similar findings were obtained by All in his study.

Ali (1999) found that training experience of the rural youth had no relationship with their anticipated problem confrontation in self-employment by undertaking selected agricultural income generating activities.

Ahmed (2002) showed that training experience of the farmers had a significant negative relationship with their problem confrontation in jute seed production.

Basher (2006) found that training exposure of the farmers had high significant negative relationship with their problem confrontation in washroom cultivation.

2.2.9 Agricultural extension media contact and hindrance faced

Nahid (2005) conducted a study and found that there was a very high significant negative relationship between extension media contact of the cotton growers and their problem confrontation in cotton production.

Akanda (1993) in his study conducted that extension contact of exerted significant negative influence on their faced constraints in cultivation.

Haque (1995) found in his study that extension contact of the members of Mohila Bittaheen Samabaya Samittee had no significant effect on their problem confrontation.

Rahman (1995) in his study conducted that extension contact of the farmers exerted significant negative influence on their faced constraints in cotton cultivation i.e. the higher the extension contacts of the farmers the lower was their constraints facing.

The study of Ismail (2001) revealed that there was no significant relation between farm youths' extension contact and their agricultural problem confrontation. Similar findings were obtained by Raha (1989) and Hogue in their respective studies.

Huque (2006) found that extension media contact of the farmers had high significant negative relationship with their problem faced in using integrated plant nutrient management.

Rahman (2006) found that extension media contact of the farmers had no significant relationship with their constraints faced in Banana cultivation of Sonargaon upazila under Narayanganj district.

Basher (2006) found that extension media contact of the farmers had significant negative relationship with their problem confrontation in mashroom cultivation.

Aziz (2006) found that extension media contact of the farmers had very high significant negative relationship with their constraints faced in potato cultivation in Jhikargacha upazila under Jessore district.

2.2.10 Input availability and hindrance faced

Conley and Udry (2002) look at pineapple in Ghtma to see whether an individual farmer's fertilizer user respondents to changes in information about the fertilizer productivity of this neighbors. They found that expected profit using more (less) fertilizer than he did, indicating the importance of social learning. Both these models, however, assume that input price share fixed. In addition, they ignore potential faced on the supply of inputs and other localized conditions. Although in some situations

these assumptions may not be empirically important, in the context of the adoption of HY varieties, input prices and availability may be critical factors in this situation (Website).

Baten (2014) found that input availability of the farmers had high significant negative relationship with their problems faced in cotton cultivation.

2.3 Relationship between the selected characteristics of the farmers and their prospects of different crops

2.3.1 Age and prospects of the farmers

Shyna and Joseph (2000) in their study on Pokkali ecosystem in Kerala stated that though many farmers are leaving this old age rice cultivation Pokkali field has a unique eco-system with rich bio-diversity and amazing capacity to generate organic paddy and shrimp alternatively. It enriches the soil and manages the farmers to get high revenue.

Rahman (2015) found that age of the farmer had no significant relationship with their prospects of jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.3.2 Level of education and prospects of the farmers

Biswas (1990) found that knowledge on prospects of rice production technology of the farmers are positively and significantly related with their education.

Samuel (1993) found that there is a positive and significant relationship between education and knowledge on prospects of rice production recommendation.

Rahman (2015) found that level of education of the farmer had no significant relationship with their prospects of jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.3.3 Cultivation experience and prospects of the farmers

Rahman (2015) found that cultivation experience of the farmer had significant positive relationship with their prospects of jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.3.4 Covering area and prospects of the farmers

Kamera (1994) studied on problems and prospects of tribal agriculture. He found that prospects of tribal agriculture are positively and significantly related to size of land.

Anothram (1996) in his study on constraints faced by farmers of Andaman district in paddy cultivation found that farmers perception on constraints of Paddy cultivation were positively and significantly related with land holding.

Balachandran (2007) in his study on paddy cultivation in Kerala reported that since mid-1970's, area under paddy cultivation has been declining at a rate of 4.3 percent per annum. At present, area under rice in Kerala is 2.8 lakh ha and production is only 6.8 lakh tones. Productivity of rice has been increasing at a very low average rate of 1.3 percent per annum. The decline in productivity and profitability is discouraging many farmers from pursuing rice farming. Rice cultivation in the state has been steadily shrinking in spite of the best efforts by the Government and various other agencies to boost it up.

Rahman (2015) found that farm size of the farmer had no significant relationship with their prospects of jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.3.5 Annual family income and prospects of the farmers

Biswas (1990) found that knowledge on prospects of rice production technology of the farmers are positively and significantly related with their annual income.

Anothram (1996) in his study on constraints faced by farmers of Andaman district in paddy cultivation found that farmers perception on constraints of Paddy cultivation were positively and significantly related with income.

2.3.6 Income from watermelon and prospects of the farmers

No literature was found related to relationship between income from watermelon and prospects of farmers. Rahman (2015) found that annual family income from jackfruit of the farmer had positively significant relationship with their prospects of jackfruit cultivation in Bhaluka Upazila under Mymensingh District.

2.3.7 Microfinance received and prospects of the farmers

No literature was found related to relationship between microfinance received and prospects of farmers.

2.3.8 Agricultural training exposure and prospects of the farmers

Biswas (1990) found that knowledge on prospects of rice production technology of the farmers are positively and significantly related with their training and information seeking behavior.

2.3.9 Agricultural extension media contact and prospects of the farmers

Biswas (1990) found that knowledge on prospects of rice production technology of the farmers are positively and significantly related with their possession of mass media.

Samuel (1993) found that there is a positive and significant relationship between extension contact knowledge on prospects of rice production recommendation.

2.3.10 Input availability and prospects of the farmers

Biswas (1990) found that knowledge on prospects of rice production technology of the farmers are positively and significantly related with their material possession.

Kamera (1994) studied on problems and prospects of tribal agriculture. He found that prospects of tribal agriculture are positively and significantly related to input availability.

2.4 Conceptual Framework of the Study

The conceptual framework of a study is the system of concepts, assumptions, expectations, beliefs, and theories that supports and informs the research which is a key part of research design (Miles & Huberman, 1994). Miles and Huberman (1994) defined a conceptual framework as a visual or written product, one that "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them."

This study is concerned with the farmers' hindrance and prospects of watermelon cultivation. Thus, the hindrance and prospects were the main focus of the study and 10 selected characteristics of the farmers were considered as those might have relationship with hindrance and prospects. Farmers' hindrance and prospects of watermelon cultivation may be influenced and affected through interacting forces of many factors. It is not possible to deal with all the factors in a single study. Based on this discussion and the review of literature the conceptual framework of this study has been formulated as shown in Figure 2.1.

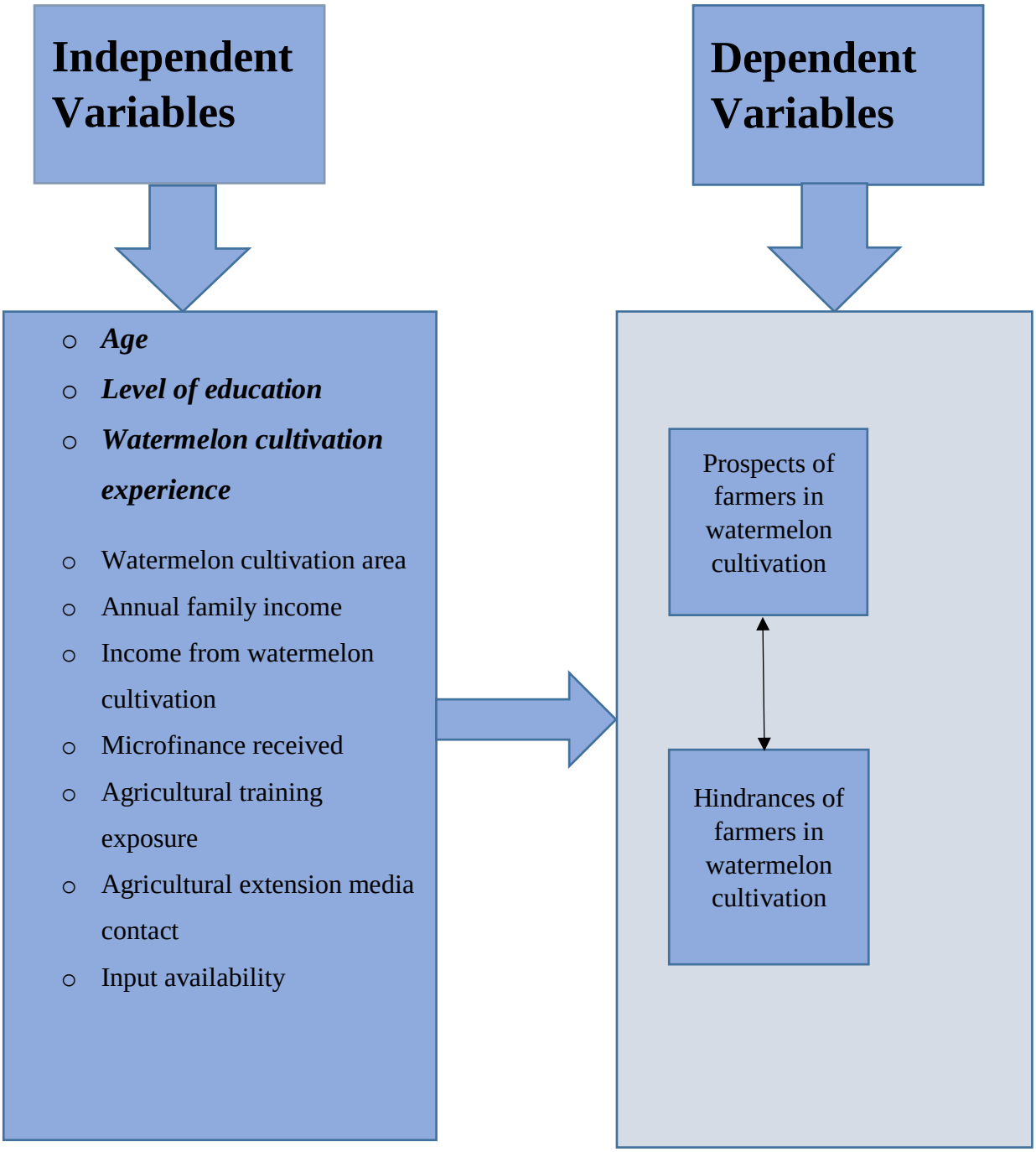

Figure 2.1 The Conceptual Framework of the Study

CHAPTER 3

MATERIALS AND METHODS

Methodology refers to the methods and procedures in the research work. In any scientific research, methodology plays an important role and requires a very careful consideration. More appropriate the methodology more accurate the research. The basic materials for conducting any research are the unbiased information and facts. Methodology should be appropriate so that the research will be able to collect necessary data and analyze them in a proper way, which will help him to reach correct decision. Building of research methodology requires a vast knowledge, experience and skill. Considering this, the researcher went through previous studies, obtained from supervisors and experts regarding all aspects of this piece of the study. A sequential description of the methodologies followed in conducting this research work has been presented in this chapter.

3.1 The locale of the study

The study was conducted at Kalabari union under Kotalipara upazila of Gopalganj district. Out of 15 villages of Kalabari union, four were selected purposively because watermelon is grown comparatively more in this area. The selected villages were Burua, Kumuria, Hijalbari and Baikanthapur. Selected villages were situated just near the Ghagar River. A map of Kotalipara upazila of Gopalganj District showing the study area is presented in Fig.3.1.

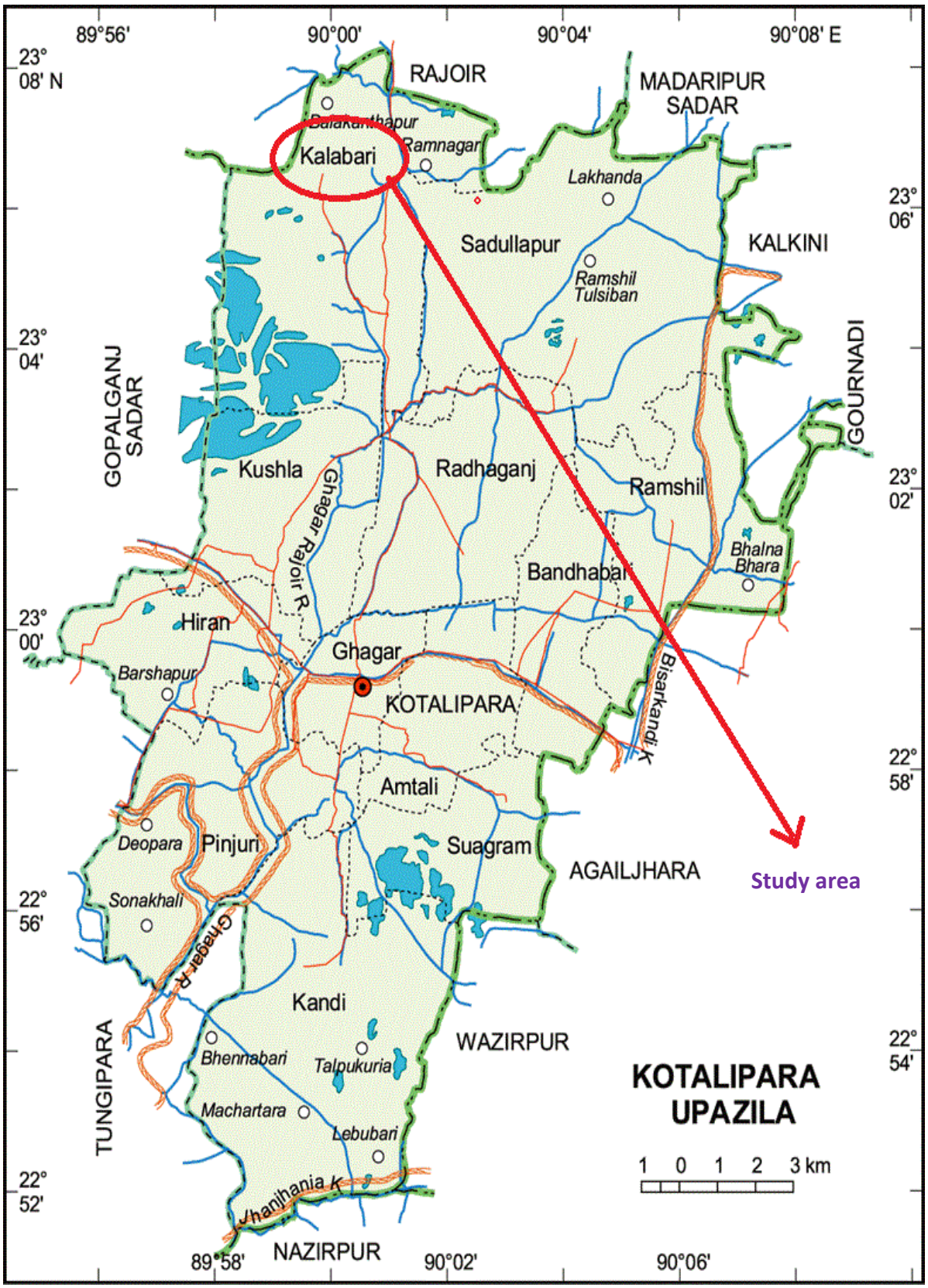

Fig. 3.1. A map of Kotalipara upazila of Gopalganj district showing the study area

3.2 Population and sample of the study

All of watermelon growers of selected four villages under Kalabari Union of Kotalipara upazila in Gopalganj district were considered as the population of the study. Four lists of watermelon farmers of four villages were prepared with the help of Sub-Assistant Agriculture Officers (SAAO) of the concerned areas. The list comprised of 631 farmers which served as population of the study. These farmers constituted the population of this study. To make a respective sample Kothari given formula (1967) was used and draw sample size was 121.

TThe Kothari (2004) formulae is-

$n = [Z^2 P QN] / [(N-1) e^2 + Z^2 P Q]$

Where,

n = Sample size

Z = Table value at 1df (1.96)

P = Probability (assume .5)

Q = Remaining from probability (1-P)

N = Total population

e = the level of precision (8%)

The study farmers (121) have been selected from each village using proportionate random technique. Beside this, 20 watermelon farmers were prepared taking 5 from each village as reserves who were supposed to be interviewed only when a respondent in the original sample list was unavailable during the data collection period. The distribution of the selected farmers along with reserve list on the selected villages is shown in Table 3.1

Table 3.1 Distribution of the population and sample of the watermelon farmers with reserve list of the selected villages of Kalabari union

Villages	Population (No. of total watermelon farmers)	Number of farmers included as sample	Reserve list
Burua	218	42	5
Kumuria	182	35	5
Hijalbari	120	23	5
Baikanthapur	111	21	5
Total	631	121	20

3.3 Instrument for data collection

In order to collect relevant information from the respondents, a structured interview schedule was prepared in Bengali considering the objectives of the study. The interview schedule was pre-tested in actual field situations before using the same for final data collection. This survey provided an opportunity to examine the effectiveness of the schedule which revealed some unforeseen defects associated with it. Necessary correction, modification and adjustment were made in the interview schedule on the basis of results of pre-test. The modified and corrected interview schedule was then printed in final form in English (*Appendix-A*). The schedule was then multiplied in its final form as per requirements to collect data from the respondents.

3.4 Survey

Data were collected through personal interviewing by the researcher himself through face to face interview. The study was purposively conducted in the Gopalganj district of Bangladesh. To familiarize researcher with the study area and for getting local support and establishing rapport during conducting the interview with the watermelon growers the researcher met with the Sub-Assistant Agriculture Officer of the respective blocks in order to explain the objectives of the study and requested him to provide necessary help and co-operation in collection of data. The local leaders of the area were also approached to render essential help. As a result, there was no problem to collect data. Before going to the respondent (watermelon growers) for interview, they were informed verbally to ensure their availability at the proper places as per schedule date and time. However, if any respondents failed to understand any questions, the researcher took great care to explain the issue. Excellent cooperation and coordination were obtained from all respondents. The interview was conducted confidentially. Collection of data took 30 days from 15 April to 15 May 2017.

3.5 Variable of the study

A variable is any characteristics which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). In a descriptive research, the selection and measurement of the variables are the important task. Based on relevant available literature, discussion with teachers, experts and research fellows in the relevant field and considering the time and resources available to the researcher,

variables were selected. The researcher selected ten characteristics of the watermelon growers as the variables.

The characteristics includes age, level of education, watermelon cultivation experience, watermelon covering area, annual family income, annual income from watermelon microfinance received, Agricultural training Exposure, agricultural extension media contact and input availability. On the other hand, problems and prospects of watermelon cultivation as perceived by the watermelon growers were the main focus of the study.

3.6 Measurement of 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 below:

3.6.1.1 Age

Age of a respondent was measured in terms of years from his/her birth to the time of interview which was found on the basis of response (Azad, 2004). A score of one (1) was assigned for each year of age. This variable appears in the question no. 1 in the interview schedule as presented in Appendix- I.

3.6.1.2 Level of education

The education of a watermelon farmer was measured by the number of years of schooling completed in an educational institution. A score of one (1) was assigned for each year of formal schooling completed by a respondent (Sharmin, 2005). If a grower could sign his/her name only a score of 0.5 was given to a watermelon farmer.

3.6.1.3 Watermelon cultivation experience

Watermelon cultivation experience of the respondent was measured by total number of years a respondent engaged in watermelon cultivation. The measurement included from the year of first watermelon cultivation till the year of data collection. For calculation, a score of one (1) was assigned for each year of experience.

3.6.1.4 Watermelon covering area

Watermelon covering area was measured by the area of land under his/her management only for cultivation. The unit of measurement was in hectare.

3.6.1.5 Annual family income

Annual income of Watermelon farmer was measured on the basis of total yearly earnings from agricultural and other sources (service, business, daily labor etc.) by the respondent himself and other family members. The value of all the agricultural products encompassing crops, livestock, fisheries, fruits, vegetables etc. were be taken into consideration. Thus, yearly earning from agricultural and non-agricultural sources were added together to obtain annual family income of a watermelon farmer. For calculation, a score of one was given for each Tk. 1,000 to compute the annual income scores of the respondents.

3.6.1.6 Annual income from watermelon cultivation

Annual income of a watermelon farmer from watermelon cultivation was also measured in Thousand Taka. It refers to the earning of the respondent from selling of watermelon fruits and sapling. For calculation, a score of one was given for each Tk. 1,000 to compute the annual income scores from watermelon of the respondents.

3.6.1.7 Microfinance received

Credit received of a respondent of watermelon growers was measured in terms of the amount of money received from different sources by themselves as loan. It was expressed by thousand taka only. This variable appears in question no.8 of the interview schedule as presented in Appendix-I.

3.6.1.8 Agricultural training exposure

Agricultural training exposure of watermelon farmer was determined by total number of days of training received by the respondent from different organization in his entire lifetime. If a respondent took 1-day training on any aspect from GO's, NGO's or any other organizations then his training received score was 1. A zero (0) score was assigned for no training.

3.6.1.9 Agricultural extension media contact

The term agricultural extension media contact refers to one’s becoming accessible to the influence of extension education through different extension media. This variable was measured by computing an extension contact score on the basis of a watermelon farmer extent of contact with 10 selected agrobased media as obtained in response to item no.8 of the interview schedule (Appendix A). Each farmer was asked to indicate

the frequency of his contact with each of the selected media. With four alternative responses such as ‘regularly’, ‘occasionally’, ‘rarely’ and ‘never’ basis and weights were assigned as 3, 2, 1 and 0 respectively. The extension contact score of a respondent was determined by summing up his/her scores for contact with all the selected media. Thus, possible extension contact score could range from zero (0) to 30, where zero (0) indicated no extension contact and 30 indicated the highest level of extension contact.

3.6.1.10 Input availability

Input availability refers to the availability of five selected inputs for watermelon cultivation, like modem varieties, fertilizers, insecticides, irrigation water and farm implements scores were assigned as 4, 3, 2, 1 and 0 for regular, oftenly, fair, seldom and not at all availability respectively. Thus, input availability score of the fanners could range from 0 to 20, where 0 indicated no input availability and 20 indicated highest input availability.

3.6.2.1 Hindrance faced in watermelon cultivation

Hindrance faced by the farmers in watermelon cultivation was the dependent variable of the study. A scale was used for measuring hindrance faced by the farmers in watermelon cultivation. The scale contained ten probable hindrances, which the farmers might face in respect of watermelon cultivation. Each respondent was asked to indicate the extent of difficulty faced by each of the hindrance by checking any one of the five alternative responses as "severe hindrance", "moderate hindrance ", "low hindrance " , "very low hindrance " and no hindrance. Weights were assigned to these responses as 4, 3, 2, 1 and 0 respectively. Weights for responses against all the 10 problem-items of a respondent were added together to obtain his hindrance faced score. Therefore, the hindrance faced score of the farmers could range from 0 to 40, where 0 indicated facing no hindrance and 40 indicated facing of sever hindrance.

To compare the severity among the hindrance, Hindrance Faced Index (HFI) was computed for each hindrance-item with help of the following formula:

$$HFI = (H_s \times 4) + (H_m \times 3) + (H_l \times 2) + (H_{vl} \times 1) + (H_n \times 0)$$

Where,

H_s = Number of respondents faced sever hindrance

H_m = Number of respondents faced moderate hindrance

H_l = Number of respondents faced low hindrance

Hvl= Number of respondents faced very low hindrance

H_n = Number of respondents faced no hindrance at all

HFI in watermelon cultivation of each item was computed by adding all the scores obtained by the responses from all the respondents. Thus, HFI could range from 0 to 484 where '0' indicated no hindrance at all and '484' indicated highest hindrance in watermelon cultivation.

3.6.2.2 Prospects of watermelon cultivation

A scale consisting of 5 items questions on prospects of watermelon cultivation was used to determine the prospect of watermelon cultivation score of the respondents. Each respondent was asked to response against 5 prospects items as strongly agreed, agreed, no opinion disagreed and strongly disagree and scores were assigned as 4, 3, 2, 1 and 0 respectively. Therefore, the prospects of watermelon cultivation score of the farmers could range from 0 to 20, where 0 indicated no prospects and 20 indicated high prospects.

To compare the watermelon growers' prospects of watermelon cultivation, Prospects Appearance Index (PAI) was computed for each prospects-item with help of the following formula:

$$PAI = (P_s \times 4) + (P_a \times 3) + (P_{no} \times 2) + (P_d \times 1) + (P_{sd} \times 0)$$

Where,

s = Number of respondent agreed strongly

a = Number of respondent agreed

no = Number of respondent had no opinion

d = Number of respondent disagreed

sd= Number of respondent strongly disagreed

PAI of each item was computed by adding all the scores obtained by the responses from all the respondents. Thus, PAI could range from 0 to 484 where '0' indicated no prospects at all and '484' indicated highest prospects of watermelon cultivation.

3.7 Hypothesis of the study

According to the Encyclopedia Britannica, "A hypothesis is a suggested solution for an unexplained occurrence that does not fit into current accepted scientific theory. The basic idea of a hypothesis is that there is no pre-determined outcome. For a hypothesis to be termed a scientific hypothesis, it has to be something that can be supported or refuted through carefully crafted experimentation or observation. This is called falsifiability and testability." Kerlinger (1973) defined as "a hypothesis is a conjectural statement of the relation between 2 or more variables". Hypothesis may be broadly divided into two categories, namely, research hypothesis and null hypothesis. In studying differences between variables, research hypothesis was formulated which state anticipated differences between the variables. However, for statistical test it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the concerned variables. If a null hypothesis is rejected on the basis of a statistical test, it is assumed that there is a difference between the concern variables.

3.7.1 Research hypothesis:

The following research hypothesis was put forward to know the relationships between each of the 10 selected characteristics of the watermelon farmers and their i) hindrance and ii) prospect of watermelon cultivation.

Each of the 10 selected characteristics on watermelon farmers has significant relationship with their i) hindrance and ii) prospects of watermelon cultivation.

3.7.2 The null hypothesis:

The following null hypothesis was formulated to examine the relationships between the nine selected characteristics of the farmers and their hindrance and prospects of watermelon cultivation.

There is no relationship between each of the selected characteristics of watermelon farmers and their i) hindrance and ii) prospects of watermelon cultivation.

3.8 Data collection

The researcher himself collected data from the selected samples through personal interview. The interview schedule prepared earlier by the researcher was used to gather information. All possible efforts were made to explain the purpose of the study to the

respondents in order to get valid and pertinent information from them. Interviews were conducted with respondents in their homes. While starting interview with any respondent, the researcher was willing and took possible care to establish rapport with them so that they did not feel hesitation to furnish proper responses to the questions and statements in the schedule. The questions were explained and clarified whenever any respondent felt difficulty in understanding properly.

3.9 Data processing and statistical procedures

After completion of field survey, all the data were coded, compiled tabulated and analyzed in accordance with the objectives of the study. Local units were converted into standard units. All the individual responses to questions of the interview schedule were transferred in to a 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 wherever necessary.

The statistical measures such as range, means, standard deviation, number and percentage distribution were used to describe the variables. Correlation analysis (Y) was used in order to explore the relationships between the concerned variables. Five percent (0.05) level of significance was the basis for rejecting any null hypothesis throughout the study. The SPSS computer package was used to perform all those process.

CHAPTER 4

RESULTS AND DISCUSSION

Results and discussion is the central point of whole research work. The purpose of this chapter is to describe the findings of the study. Procedures of using data for the measurement needed some discussion for clarity of understanding. Data obtained from respondents by interview were measured, analyzed, tabulated and statistically treated according to the objectives of the study. This chapter has been discussed in three sections such as (1) selected characteristics of the watermelon growers (2) Hindrance of watermelon cultivation as distinguished by farmers and prospects of watermelon cultivation as perceived by the watermelon growers and (3) relationship of the selected characteristics of the watermelon growers and hindrance and prospects of watermelon cultivation as distinguished by farmers.

4.1 Selected Characteristics:

Ten characteristics of the watermelon growers were selected for the study to find out their relationships with the hindrances faced and prospects of watermelon cultivation. These selected characteristics were age, level of education, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon, microfinance received, agricultural training exposure, agricultural extension media contact, input availability. The noticeable topographies of the ten characteristics of the watermelon growers, each of which constituted an independent variable. The salient features of the selected ten characteristics of the farmers are presented in Table 4.1

Table 4.1 Salient features of the selected characteristics of the farmers (n=121)

Sl. no.	Characteristics	Unit of measurement	Possible range	Observed range	Mean	Standard Deviation
1.	Age	Year	Unknown	21-60	41.57	9.32
2.	Level of education	Year of successful schooling	Unknown	0.5-18	8.54	3.20
3.	Watermelon cultivation experience	Year	Unknown	4-18	9.95	3.29
4.	Watermelon cultivation area	Hectare	Unknown	0.21-1.05	0.61	0.20
5.	Annual family income	'000' Taka	Unknown	115-525	220.87	68.35
6.	Annual income from watermelon cultivation	'000' Taka	Unknown	35-210	107.75	36.84
7.	Microfinance received	'000'	Unknown	0-150	46.37	31.15
8.	Training exposure	No. of day	Unknown	0-12	2.56	3.48
9.	Extension media contact	Score	0-30	9-16	11.71	1.96
10.	Input availability	Score	0-20	9-17	12.67	1.86

4.1.1 Age

Age of the watermelon farmers ranged from 21 to 60 years, the average being 41.57 years and the standard deviation was 9.32. The respondents were classified into three categories on the basis of their age (Table 4.1) following 'Ministry of youth'. "young aged" (up to 35), "middle aged" (36-50) and "old aged" (above 50 years). Table 4.1 contains the distribution of the respondents according to their age.

Table 4.2 Distribution of the farmers according to their age

Categories	Basis of categorization (year)	Respondents		Mean	**Standard deviation**
		Numbers	Percent		
Young	Up to 35	34	28.1	41.57	9.32
Middle aged	36-50	65	53.7		
Old	Above 50	22	18.2		
Total		121	100		

Data presented in Table 4.2 indicated that the highest proportion (53.7 percent) of the watermelon farmers were middle aged compared to 28.1 percent young and 18.2 percent old. It reveals that the major proportion (81.8 percent) of the respondents in the study area were young and middle aged which implies that they are more involved in watermelon cultivation than the aged respondents. Dhali (2013), Islam (2009), and Salam (2013) reported similar findings.

4.1.2 Level of education

The level of education of the respondents ranged from 0.5-18. The average education score was 8.54 with a standard deviation of 3.20. On the basis of their education, the farmers were classified into five categorie: “can sign only” (0.5), "Primary education" (1-5), "Secondary education" (6-10), “Higher secondary education” (11-12) and “above secondary education” (above 12).

Table 4.3 Distribution of the farmers according to their level of education

Categories	**Basis of categorization schooling years**	**Respondent**		**Mean**	**Standard deviation**
		Number	**Percent**		
Can sign only	0.5	4	3.3	8.54	3.20
Primary	1-5	17	14.0		
Secondary	6-10	78	64.5		
Higher secondary	11-12	15	12.4		
Above higher secondary	Above 12	7	5.8		
Total		121	100		

The information of Table 4.3 indicated majority (64.5 percent) of the respondent had secondary level of education, compare to 14 percent and 12.4 percent had primary level and higher secondary level of education. Only 3.3 percent of the respondent could sign their name without the ability of reading and writing. Nobody was illiterate in the study area. It means that most (82.7 percent) of the respondents had education above primary level.

4.1.3 Watermelon cultivation experience

Watermelon cultivation experience of the respondents could range from 4 to 18 years. The average was 9.95 and the standard deviation was 3.29. Based on watermelon cultivation experience, the respondents were classified into three categories and shown in Table 4.4. The highest proportion (72.7%) of the farmers had medium cultivation experience compared to 14% low and 13.3% had high watermelon cultivation experience.

Table 4.4 Distribution of the farmers according to their watermelon cultivation experience

Categories	Basis of categorization (year)	Respondents		Mean	**Standard deviation**
		Numbers	Percent		
Low	Up to 6 (<mean-1sd)	17	14.0	9.95	3.29
Medium	>6-13 (mean±1sd)	88	72.7		
High	Above 13 (>mean+1sd)	16	13.3		
Total		121	100		

From the findings, it was again found that overwhelming majority of the respondents (86.7%) had low to medium watermelon cultivation experience. Dhali (2013), Kahn (2005) and Salam (2013) found similar findings. It is logical that experienced farmers could minimize their hindrance in watermelon cultivation.

4.1.4 Watermelon covering area

Watermelon covering area of the farmers varied from 0.21 to 1.05 hectare. The average Cotton cultivation area was 0.61 hectare with the standard deviation of 0.20. Based on Cotton cultivation area, the farmers are classified into three categories as shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their watermelon covering area

Categories	Basis of categorization (ha)	Respondents		Mean	Standard deviation
		Number	Percent		
Small area	Up to 0.4 (<mean-1sd)	12	9.9	0.61	0.196
Medium area	0.41-0.81 (mean±1sd)	87	71.9		
Large area	Above 0.81 (>mean+1sd)	22	18.2		
Total		121	100		

Data contained in Table 4.5 indicates that the largest proportion (71.9 percent) of farmers had medium watermelon covering area compared to 18.2 percent having large and 9.9 percent had small watermelon covering area. It was again found that most (90.1 percent) of the farmers had medium to large watermelon covering area. Aziz (2006) found similar findings. Therefore, it could be said that the farmers were cultivated watermelon in medium to large size farm.

4.1.5 Annual family income

Annual family income of the watermelon farmers ranged from Taka 115-525 thousand, the mean being 220.87 thousand and standard deviation of 68.35 thousand. On the basis of their annual income scores, the watermelon farmers were divided three categories- "low income" (up to 150) "medium income" (151- 289) and "high income" (above 289). The distribution of the watermelon farmers according to their annual family income is shown in Table 4.6.

Table 4.6 Distribution of the farmers according to their Annual family income

Categories	Basis of categorization ('000' tk.)	Respondents		Mean	Standard deviation
		Number	Percent		
Low	Up to 151 (<mean-1sd)	14	11.6	220.87	68.35
Medium	152-289 (mean±1sd)	96	79.3		
High	Above 289(>mean+1sd)	11	9.1		
Total		121	100		

The majority (79.3 percent) of the watermelon farmers had medium annual income compared to 11.6 percent low income and 9.1 percent high annual income. It is indicating that watermelon cultivation is usually practiced by the farmers having

comparatively medium to higher economic condition. Aziz (2006), Islam (2003) and Nahar (2000) found more or less similar findings in their respective studies. Generally higher income gives an individual better status in the society. Therefore, the higher income increases the risks taking capacity of the farmers in watermelon cultivation.

4.1.6 Income from watermelon cultivation

Annual income from watermelon of the respondents was measured in `thousand taka' per year and in the present study that ranged from 35 to 210 with an average of 107.75 and standard deviation of 36.84. On the basis of annual family income from watermelon, the respondents were divided into three categories (Mean ± Standard Deviation) as shown in Table 4.7.

Table 4.7 Distribution of the farmers according to their income from watermelon cultivation

Categories	Basis of categorization (‘000’ tk.)	Respondents		Mean	Standard deviation
		Number	Percent		
Low	Up to 70 (<mean-1sd)	19	15.7	107.75	36.84
Medium	71-145(mean±1sd)	86	71.1		
High	Above 145 (>mean+1sd)	16	13.2		
Total		121	100		

The majority (71.1 percent) of the watermelon fanners had medium income compared to 17.7 percent low income and 13.2 percent high income from watermelon cultivation. Thus, the overwhelming majority (86.8 percent) of the farmers had low to medium annual income from watermelon cultivation. Islam (2003) and Nahar (2000) found more or less similar findings in their respective studies.

4.1.7 Microfinance received

Microfinance received of the respondents ranged from 0 to 150 thousand taka. The average and standard deviation were 31.15 and 46.37 respectively. Based on microfinance received, the respondents were classified into four categories such as no microfinance receive, low, medium and high and shown in Table 4.8.

Table 4.8 Distribution of the farmers according to microfinance received

Categories	Basis of categorization ('000' tk.)	Respondents		Mean	Standard deviation
		Number	Percent		
No credit received	0	13	10.7	46.37	31.15
Low	1-50	71	58.7		
Medium	>50-100	31	25.6		
High	Above 100	6	5.0		
Total		121	100		

The highest proportion (58.7%) of the farmers received low amount of microfinance, where 10.7% did not receive any microfinance compared to 13.7% medium and 4.6% received high amount of microfinance. The watermelon farmers of the study area received microfinance mainly from local lenders, different types of NGOs and banks. Ali (2012), Naznin (2011), Sharif (2011), Kawsar (2009), Islam (2009) and Salam (2013) found similar results.

4.1.8 Agricultural training exposure

The agricultural training exposure score of the watermelon farmers ranged from 0 to 12 with a mean of 2.56 and standard deviation of 3.48. Based on the agricultural training exposure scores, the watermelon farmers were classified into four categories: "no agricultural training " (0), "low agricultural training " (1-5), "medium agricultural training" (6-10) and "high agricultural training" (above 10). The distribution of the watermelon farmers according to their training experience is presented in table 4.9

Table 4.9 Distribution of the farmers according to their training exposure

Categories	Basis of categorization (no. of day)	Respondents		Mean	Standard deviation
		Number	Percent		
No training	0	59	48.8	2.56	3.48
Low training	1-5	49	40.5		
Medium training	6-10	6	4.9		
High training	Above 10	7	5.8		
Total		121	100		

About 48.8 percent of the watermelon farmers did not receive any training while 40.5 percent received low training, 4.9 percent receive medium training and 5.8 percent receive high training. Training increases knowledge and skills of the watermelon farmers in a specific subject matter area. Individuals who gain high training experiences are likely to be more competent in performing in different farming activities. But the fact that overwhelming majority of the watermelon fanners do not receive any training. Providing adequate training on watermelon cultivation is likely to increase the knowledge, attitude and practice of the farmers. Ali (2012), Shanto (2011) found similar result.

4.1.9 Agricultural extension media contact

The observed extension contact scores of the watermelon farmers ranged from 9 to 16 against the possible range from 0 to 30 with an average of 11.71 and standard deviation of 1.96. According to this score, the watermelon farmers were classified into three categories as shown in Table 4.10.

Table 4.10 Distribution of the farmers according to their agricultural extension media contact

Categories	Basis of categorization (score)	Respondents		Mean	Standard deviation
		Number	Percent		
Low contact	Up to 9 (<mean-1sd)	22	18.2	11.71	1.96
Medium contact	>9-13 (mean±1sd)	72	59.5		
High contact	Above 13 (>mean+1sd)	27	22.3		
Total		121	100		

The majority (59.5 percent) of the watermelon farmers had medium agricultural extension contact compared to 22.3 percent of them had high agricultural extension media contact and 18.2 percent of them had low agricultural extension media contact Thus, overwhelming majority (81.8%) of the watermelon farmer had medium to high agricultural extension media contact. Agricultural extension media contact is a very effective and powerful source of receiving information about various new and modem technologies. So, extension contact should be increased in the watermelon cultivation

area because it is a demandable fruit crop and farmers required more cultivation information about it. Ali (2012), Shanto (2011) found similar result.

4.1.10 Input availability

The observed input availability scores of the farmers ranged from 9 to 17 against the possible range of 0 to 20, the average being 12.67 and standard deviation of 1.86. On the basis of the observed scores of the input availability scores, the farmers were classified into three categories as shown in Table 4.11.

Table 4.11 Distribution of the farmers according to their input availability

Categories	Basis of categorization (score)	Respondents		Mean	Standard deviation
		Number	Percent		
Low	Up to 11 (mean-1sd)	15	12.4	12.67	1.86
Medium	>11-15 (mean±1sd)	87	71.9		
High	Above 15 (>mean+1sd)	19	15.7		
Total		121	100		

Data contained in Table 4.11 indicated that 71.9 percent of the farmers had medium input availability compared to 12.4 percent having low input availability and 15.7 percent of the farmers had high input availability.

4.2 Hindrance and Prospects of the Farmers Regarding Watermelon Cultivation

4.2.1 Hindrance faced in watermelon cultivation

The respondents' hindrance faced scores in all 10 selected items ranged from 16-34 against the possible range of 0 to 40 with an average of 24.69 and standard deviation of 4.71. Based on their overall problems faced scores, the respondents were classified into three categories as shown in Table 4.12.

Table 4.12 Distribution of the watermelon farmers according to their hindrance faced in watermelon cultivation

Categories	Basis of categorization (score)	Respondents		Mean	Standard deviation
		Number	Percent		
Low hindrance	Low (Up to 20) (mean-1sd)	22	18.2	24.69	4.71
Medium hindrance	Medium (>20-29) (mean±1sd)	78	64.5		
High hindrance	High (above 29)	21	17.3		
Total		121	100		

About 64.5 percent of the watermelon farmers faced medium hindrance compared to 18.2% of them faced low hindrance and 17.3% farmers had high hindrance. From the above table 4.12, watermelon farmers faced high hindrance due to lack of experience, proper media contact, extension training exposure etc. In spite of all these hindrances, farmers cultivate watermelon for its high demand in consumer level and high profit. Similar findings were obtained by Rahman (2004) and Salam (2013) in the study.

4.2.2 Prospects of watermelon cultivation

The scores of prospects of watermelon cultivation of the respondents ranged from 9 to 19 against the possible range of 0 – 20 with an average of 15.40 and standard deviation of 2.37. Based on the observed scores, prospects of watermelon cultivation, the respondents were classified into three categories (Mean ± Standard Deviation) i.e. low, medium and high Prospects of watermelon cultivation. The distribution has been shown in Table 4.13

Table 4.13 Distribution of the watermelon farmers according to their prospects in watermelon cultivation

Categories	Basis of categorization (score)	Respondents		Mean	Standard deviation
		Number	Percent		
Low	Low (Up to 13) (mean -1sd)	28	23.1	15.40	2.37
Medium	Medium (>13-17) (mean±1sd	70	57.9		
High	High (above 17)	23	19.0		
Total		121	100		

Majority of the respondents (57.9 %) perceived medium level prospect of watermelon cultivation, while 23.1 percent found low level Prospects of watermelon cultivation and only 19.0 percent respondents confirmed high level of Prospects for watermelon cultivation. Findings again revealed that overwhelming majority (81.0%) of the farmers observed low to medium level prospects of watermelon cultivation. It is quite consistent that farmers are watching in future, watermelon cultivation has great prospect though having severe problems of its cultivation.

4.3 Comparative severity among the hindrance faced by the farmers in watermelon cultivation

The observed Hindrance Faced Index of the hindrance ranged from 182 to 437 against the possible range of 0-484. Hindrance Faced Index (HFI) of the selected hindrance are shown in Table 4.14. On the basis of HFI, it was observed that "High Production Cost" ranked first followed by "Insect and disease attack", "Heavy rain and sunlight", " Lack of money/credit", " Degeneration of watermelon cultivar ", " Inadequate training facilities ", " Short shelf life of watermelon ", " Lack of proper marketing facilities ", " Lack of storehouse " and " Poor transportation system".

Table 4.14 Hindrance Faced Index (HFI) with Rank Order

Problems	Extent of hindrances					HFI	Rank Order
	Severe (4)	Moderate (3)	Low (2)	Very low (1)	Not at all (0)		
Degeneration of watermelon cultivar	7	42	60	12	0	286	5
High production cost	82	31	8	0	0	437	1
Short shelf life of watermelon	0	61	35	15	10	268	7
Lack of storehouse	5	22	50	26	18	212	9
Lack of money/credit	21	52	30	18	0	318	4
Inadequate training facilities	23	28	35	27	8	273	6
Insect and disease attack	65	38	16	2	0	408	2
Heavy rain and sunlight	39	57	9	11	5	356	3
Lack of proper marketing facilities	5	34	51	24	7	248	8
Poor transportation system	0	23	37	39	22	182	10

4.4 Prospects Appearance Index (PAI)

The observed prospect appearance index regarding watermelon cultivation ranged from 324 to 409 against the possible range of 0 to 484. The formula for determining PAI has been shown in chapter 3. The selected five prospects observed by the respondents which were arranged in rank order according to their prospects appearance index (PAI) are shown in Table 4.15.

On the basis of PAI, considering prospects of watermelon cultivation 'available of HYV seed, fertilizers, and pesticides' ranked first followed by 'government may facilities more for commercial production of watermelon', 'marketing facilities of watermelon are available' and 'increase supply of watermelon is possible if consumers demand is increased that was ranked 2nd, 3rd and 4th. The prospect of 'storage facility may develop then the farmers gets more profit than the present' was ranked last.

Table 4.15 Prospects Appearance Index (PAI) with Rank Order

Sl. No	Farmers opinion on	Strongly agreed (4)	Agreed (3)	No opinion (2)	Disagreed (1)	Strongly Disagreed (0)	PAI	Rank Order
1	If marketing facilities of watermelon are available then farmers are more interested on watermelon cultivation	38	67	13	3	0	382	3
2	If HYV seed, fertilizers and pesticides are easily available then increase watermelon cultivation	65	38	17	1	0	409	1
3	Government may facilitate more for commercial production of watermelon	72	21	15	13	0	395	2
4	If Storage facility may develop then farmers gets more profit than the present	22	55	29	13	2	324	5
5	Increase supply of watermelon is possible if consumers demand is increased	31	57	27	4	2	353	4

4.5 Relationship between the Selected Characteristics of the Farmers and their Hindrance Faced in Watermelon Cultivation

Coefficient of correlation was computed in order to explore the relationship between the selected characteristics of the farmers and their hindrance faced in watermelon cultivation. In order to determine the relationship of each of 10 selected characteristics of the farmers (age, level of education, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon, microfinance received, agricultural training exposure, agricultural extension media contact and input availability) with hindrance faced by the farmers in watermelon cultivation. Pearson's Product Moment Correlation was used. Co-efficient of correlation (r) has been used to test the null hypothesis concerning the relationship between the concerned variables. Five percent level of significance was used as the basis for rejection of any null hypothesis. The summery of the results of the Co-efficient of Correlation indicating the relationship between each of the selected characteristics of the farmers and their hindrance faced in watermelon cultivation are shown in Table 4.16.

Table 4.16 Results of Co-efficient of Correlation Showing Relationship between each of the Selected Characteristics of the Farmers and their Hindrance Faced in Watermelon Cultivation (n=121)

	Selected characteristics	**Computed 'r' values**
Hindrance faced by the farmers in watermelon cultivation	Age	-.680**
	Level of education	-.038Ns
	Watermelon cultivation experience	-.453**
	Watermelon cultivation area	-.349**
	Annual family income	-.237**
	Income from Watermelon cultivation	-.345**
	Microfinance received	-.214*
	Agricultural training exposure	-.553**
	Agricultural extension media contact	-.125Ns
	Input availability	-.454**

** Correlation is significant at 0.01 level of probability (table value 0.233) with 119 df.

* Correlation is significant at 0.05 level of probability (table value 0.179) with 119 df

NS Not significant

4.5.1 Relationship between age of the farmers and their hindrance faced in watermelon cultivation

Relationship between age of the farmers and their hindrance faced in watermelon cultivation was determined by testing the null hypothesis: "There is no relationship between age of the farmers and their hindrance faced in watermelon cultivation". The computed value of the co-efficient of correlation (r) between the concerned variables was -0.680 as shown in Table 4.16. The following observations were made regarding the relationship between the two variables on basis of the Coefficient of correlation (r).

- The computed value of "r" (-0.680^{**}) was found larger than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

The findings indicated that the age of the watermelon farmers was negatively significant. So, there is negative relationship at age of the farmers with their hindrance in watermelon cultivation. Rahman (2015), found that age of the farmer had no significant relationship with their problem faced in jackfruit commercialization. Baten (2014), found the similar result on his study about problem faced in cotton cultivation.

4.5.2 Relationship between level of education of the farmers and their hindrance faced in watermelon cultivation

Computed value of the co-efficient of correlation between education of the farmers and their hindrance faced in watermelon cultivation was found to be -0.038. The following observation was recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" (-0.038^{NS}) was found smaller than that of the tabulated value (0.179) with 119 df at 0.05 level of probability.
- The relationship between the concerned variables was negatively insignificant.
- The null hypothesis was accepted.

Based on the above findings, it can be concluded that education of the watermelon farmers had insignificant and negative relationship with their hindrance faced in watermelon cultivation. Mortuza (2015), found that education of the farmers was negatively and insignificant related with problem faced in his research work. Islam

(2008), found that negatively significant relationship of the farmers with their level of education on problem faced in sugarcane cultivation.

4.5.3 Relationship between watermelon cultivation experience of the watermelon farmers and their hindrance faced in watermelon cultivation

Computed value of the co-efficient of correlation between farming experience of the farmers and their hindrance faced in watermelon cultivation was found to be -0.453. The following observation was recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" (-0.453^{**}) was found larger than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

Based on the above findings, it can be concluded that the respondent having negative and significant relationship between farming experience in watermelon cultivation with their hindrance faced in watermelon cultivation. Rahman (2015), found that similar result on his research work.

4.5.4 Relationship between watermelon covering area of the watermelon farmers and their hindrance faced in watermelon cultivation

Computed value of the co-efficient of correlation between watermelon covering area of the farmers and their hindrance faced in watermelon cultivation was found to be -0.349. The following observation was recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" ($-0.349^{**)}$ was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

Based on the above findings, it can be concluded that watermelon covering area of the farmers had a significant and negative relationship with their hindrance faced in watermelon cultivation. Islam (2008), was found same result that sugarcane cultivation area had a negative and insignificant relationship with problem faced in sugarcane cultivation.

4.5.5 Relationship between annual family income of the watermelon farmers and their hindrance faced in watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be -0.237 as shown in Table 4.16. This led to the following observations regarding the relationship between the two variables under consideration.

- The computed value of "r" ($-0.237^{**)}$ was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

Based on the above findings, it can be concluded that the annual family income of the watermelon farmers had significant and negative relationship with their hindrance faced in watermelon cultivation. Baten (2014), found that income of the contact and non-contact farmers had insignificant negative contribution of their problem faced in cotton cultivation.

4.5.6 Relationship between income from watermelon cultivation of the watermelon farmers and their hindrance faced in watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be -0.345 as shown in Table 4.16. This led to the following observations regarding the relationship between the two variables under consideration.

- The computed value of "r" ($-0.345^{**)}$ was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

Based on the above findings, it can be concluded that the farmers having more income from watermelon cultivation tend to more opportunity to overcome hindrance faced in watermelon cultivation for more watermelon production. It indicates that the income from watermelon cultivation of the farmers had significant and negative relationship with their hindrance faced in watermelon cultivation. Rahman (2015), was found that income from jackfruit cultivation had a negative and substantial significant relationship with problem faced in his research work.

4.5.7 Relationship between microfinance received of the watermelon farmers and their hindrance faced in watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be -0.214 as shown in Table 4.16. This led to the following observations regarding the relationship between the two variables under consideration

- The computed value of "r" (-0.214*) was found larger than that of the tabulated value (0.179) with 119 df at 0.05 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

The findings indicated that the microfinance received of the watermelon growers had significant and negative relationship with their hindrance faced in watermelon cultivation. Islam (2008), found that credit availability of sugarcane farmers had a significant and negatives relationship with their problem faced.

4.5.8 Relationship between agricultural training exposure of the watermelon farmers and their hindrance faced in watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be -0.533 as shown in Table 4.16. This led to the following observations regarding the relationship between the two variables under consideration:

- The computed value of "r" (-0.533**) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

This means that farmers who were more trained they have less hindrance in watermelon cultivation and that helped the watermelon farmers to increase the watermelon production. Baten (2014), and Islam (2008), found that training exposure of the farmers had a negative significant relationship with their problem faced.

4.5.9 Relationship between agricultural extension media contact of the watermelon farmers and their hindrance faced in watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be -0.125 as shown in Table 4.16. This led to the following observations regarding the relationship between the two variables under consideration:

- The computed value of "r" (-0.125^{NS}) was found smaller than that of the tabulated value (0.179) with 119 df at 0.05 level of probability.
- The relationship between the concerned variables was negatively insignificant.
- The null hypothesis was accepted.

According to the above findings it indicates that more agricultural extension media contact helped the watermelon farmers to expose him toward different source of information through direct contact with different persons which helped him to decrease his hindrance. Baten (2014), observed in his study extension contact of farmers had negative significant relationship with problem faced in cotton cultivation. Rahman (2015), also found same result in jackfruit cultivation.

4.5.10 Relationship between input availability of the watermelon farmers and their hindrance faced in watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be -0.454 as shown in Table 4.16. This led to the following observations regarding the relationship between the two variables under consideration:

- The computed value of "r" (-0.454**) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

The findings demonstrate that input availability of the farmers had high significant negative relationship with their hindrance faced in watermelon cultivation. This meant that the farmers having more input availability face fewer problems in watermelon cultivation. Lack of proper input in time is a serious hindrance. This was might be the reason for the negative relationship of the input availability of the farmers with their hindrance faced in watermelon cultivation. Baten (2014), found that the same result on his research work.

4.6 The relationships between selected characteristics of the watermelon farmers and prospect of watermelon cultivation

Coefficient of correlation was computed in order to explore the relationship between the selected characteristics of the farmers and their prospects of watermelon cultivation. In order to determine the relationship of each of 10 selected characteristics of the farmers (age, level of education, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon, microfinance received,

agricultural training exposure, agricultural extension media contact and input availability) with prospects by the farmers in watermelon cultivation. Pearson's Product Moment Correlation was used. Co-efficient of correlation (r) has been used to test the null hypothesis concerning the relationship between the concerned variables. Five percent level of significance was used as the basis for rejection of any null hypothesis. The summery of the results of the Co-efficient of Correlation indicating the relationship between each of the selected characteristics of the farmers and their prospects of watermelon cultivation are shown in Table 4.17.

Table 4.17 Relationship between each of the Selected Characteristics of the Farmers and their Prospects of Watermelon Cultivation (n=121)

	Selected characteristics	**Computed 'r' values**
Prospects of watermelon cultivation as perceived by the watermelon farmers	Age	0.643^{**}
	Level of education	0.053^{NS}
	Watermelon cultivation experience	0.394^{**}
	Watermelon cultivation area	0.308^{**}
	Annual family income	0.247^{**}
	Income from Watermelon cultivation	0.305^{**}
	Microfinance received	0.139^{NS}
	Agricultural training exposure	0.399^{**}
	Agricultural extension media contact	0.258^{**}
	Input availability	0.685^{**}

** Correlation is significant at 0.01 level of probability (table value 0.233) with 119 df.

* Correlation is significant at 0.05 level of probability (table value 0.179) with 119 df

^{NS} Not significant

4.6.1 Relationship between age of the farmers and their prospects of watermelon cultivation

Computed value of the co-efficient of correlation between age of the farmers and their prospects of watermelon cultivation was found to be 0.643. The following observations were recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" (0.643^{**}) was found larger than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was positively significant.
- The null hypothesis was rejected.

The findings indicated that the age of the watermelon farmers was positively significant. So, there is significant relationship of age of the farmers with their prospects of watermelon cultivation. Rahman (2015), observed in his study age of farmers in jackfruit cultivation had no significant relationship with their prospects of jackfruit cultivation.

4.6.2 Relationship between level of education of the farmers and their prospects of watermelon cultivation

Computed value of the co-efficient of correlation between level of education of the farmers and their prospects of watermelon cultivation was found to be 0.053. The following observation was recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" (0.053^{NS}) was found smaller than that of the tabulated value (0.233) with 119 df at 0.05 level of probability.
- The relationship between the concerned variables was positively insignificant.
- The null hypothesis was accepted.

Based on the above findings, it can be concluded that formal education of the watermelon farmers had no significant but positive relationship with their prospects of watermelon cultivation. Rahman (2015), in prospects of jackfruit cultivation also found that has no relationship with their level of education.

4.6.3 Relationship between watermelon cultivation experience of the watermelon farmers and their prospects of watermelon cultivation

Computed value of the co-efficient of correlation between watermelon cultivation experience of the farmers and their prospects of watermelon cultivation was found to be 0.394. The following observation was recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" (0.394^{**}) was found smaller than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was positively significant.

- The null hypothesis was rejected.

Based on the above findings, it can be concluded that the respondent having significant and positive relationship between watermelon cultivation experiences in watermelon cultivation with their prospects of watermelon cultivation. Rahman (2015), observed in his study experience of farmers in jackfruit cultivation had positive and significant relationship with their prospects of jackfruit cultivation.

4.6.4 Relationship between watermelon covering area of the watermelon farmers and their prospects of watermelon cultivation

Computed value of the co-efficient of correlation between watermelon covering area of the farmers and their prospects of watermelon cultivation was found to be 0.308. The following observation was recorded regarding the relationship between the two variables under consideration:

- The computed value of "r" ($.308^{**)}$ was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was positively significant.
- The null hypothesis was rejected.

Based on the above findings, it can be concluded that watermelon cultivation area of the farmers had a significant and positive relationship with their prospects of watermelon cultivation. The findings indicated that the farmers having large watermelon cultivation area need more information for increasing watermelon production**.** Kamera (1994)), found that prospects of tribal agriculture are positively and significantly related to size of land.

4.6.5 Relationship between annual family income of the watermelon farmers and their prospects of watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be 0.247 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration.

- The computed value of "r" ($0.247^{**)}$ was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was significant.
- The null hypothesis was rejected.

Based on the above findings, it can be concluded that the farmers having more annual family income tend to more opportunity to having more prospects of watermelon cultivation for more watermelon production. It indicates that the annual family income of the farmers had significant and positive relationship with their prospects of watermelon cultivation. Biswas (1990), found same result in his research work.

4.6.6 Relationship between income from watermelon cultivation of the watermelon farmers and their prospects of watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be 0.305 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration.

- The computed value of "r" (0.305^{**}) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was positively significant.
- The null hypothesis was rejected.

Based on the above findings, it was concluded that annual income from watermelon of the famers had a significant positive relationship with the prospects of watermelon cultivation. This represent that annual income from watermelon of the farmers was an important factor for prospects of watermelon cultivation but with the increase of prospects of watermelon cultivation, annual income from watermelon of the farmers will increased. Rahman (2015), found the same result in his research work.

4.6.7 Relationship between microfinance received of the watermelon farmers and their prospects of watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be 0.139 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration

- The computed value of "r" (0.139) was found smaller than that of the tabulated value (0.179) with 119 df at 0.05 level of probability.
- The relationship between the concerned variables was insignificant.
- The null hypothesis was accepted.

The findings indicated that the microfinance received of the watermelon growers had positive insignificant relationship with their prospects of watermelon cultivation.

4.6.8 Relationship between agricultural training exposure of the watermelon farmers and their prospects of watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be 0.399 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The computed value of "r" (0.399**) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was significant.
- The null hypothesis was rejected.

This means that farmers who were more trained they have more prospects of watermelon cultivation and that helped the watermelon farmers to increase the watermelon production. Biswas (1990) found that knowledge on prospects of rice production technology of the farmers are positively and significantly related with their training and information seeking behavior.

4.6.9 Relationship between agricultural extension media contact of the watermelon farmers and their prospects of watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be 0.258 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration:

- The computed value of "r" (0.258^{**}) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was significant.
- The null hypothesis was rejected.

According to the above findings it indicates that more agricultural extension media contact helped the farmers to expose him toward different source of information through direct contact with different persons which helped him to increase his prospects. Biswas (1990), also found significant and positive relationship with extension contact and prospects of rice production technology.

4.6.10 Relationship between input availability of the watermelon growers and their prospects of watermelon cultivation

The co-efficient of correlation between the concerned variables was found to be 0.685 as shown in Table 4.17. This led to the following observations regarding the relationship between the two variables under consideration

- The computed value of "r" (0.685^{**}) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was positively significant.
- The null hypothesis was rejected.

The findings indicated that the input availability of the watermelon growers had positively significant relationship with their prospects of watermelon cultivation. Kamera (1994), studied on problems and prospects of tribal agriculture. He found that prospects of tribal agriculture are positively and significantly related to input availability.

4.7 The Inter-Relationship between Farmers' Hindrance and Prospects of Watermelon Cultivation

Co-efficient of correlation was computed in order to explore the inter-correlation between the focus variables of the study. The inter-correlation between farmers' hindrance and prospects of watermelon cultivation has been presented in Table 4.17.

Table 4.18 The Value of Inter-Correlation Co-efficient (r) between Farmers' Hindrance and Prospects of Watermelon Cultivation

	Hindrance faced in watermelon cultivation	Prospects of watermelon cultivation
Hindrance faced in watermelon cultivation	-	
Prospects of watermelon cultivation	-0.604^{**}	-

** Correlation is significant at 0.01 level of probability (table value 0.233) with 119 df

* Correlation is significant at 0.05 level of probability (table value 0.179) with 119 df

^{NS} Not significant

The co-efficient of correlation between the concerned variables was found to be -0.604 as shown in Table 4.18. This led to the following observations regarding the relationship between the two variables under consideration:

- The computed value of "r" (-0.604**) was found greater than that of the tabulated value (0.233) with 119 df at 0.01 level of probability.
- The relationship between the concerned variables was negatively significant.
- The null hypothesis was rejected.

Form the correlation analysis it was found that there was a significant and negative relationship between hindrance and prospect of watermelon cultivation at 119 df. Rahman (2015) observed in his study that problem of farmers had significant relationship with prospects of jack commercialization.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

The major findings of the study arc summarized below:

5.1.1 Selected characteristics of the watermelon farmers

Age: The highest proportion (53.7 percent) of the watermelon farmers were middle aged compared to 28.1 percent young and 18.2 percent old.

Level of education: A large proportion (64.5 percent) of the watermelon farmers had secondary level of education compared to 14 percent had primary education, 12.4 percent had higher secondary level of education, 5.8 percent had above higher secondary level of education and 3.3 percent could sign their name only.

Watermelon cultivation experience: The highest proportion 72.7 percent of the watermelon farmers had medium experience on watermelon cultivation, while 14 percent of the farmers had low and the rest 13.3 percent of them had high watermelon cultivation experience. From the findings, it was again found that an overwhelming majority of the respondents (86.7%) had low to medium watermelon cultivation experience.

Watermelon covering area: The majority of the farmers (71.9 percent) had medium watermelon cultivation area, compared to 18.2 percent large area, and 9.9 percent small cultivation area for watermelon cultivation.

Annual family income: The majority (79.3 percent) of the watermelon farmers had medium annual income compared to 11.6 percent low income and 9.1 percent had high annual income. It is indicating that watermelon cultivation is usually practiced by the farmers of comparatively low to medium economic conditions.

Income from watermelon cultivation: The majority (71.1 percent) of the watermelon farmers had medium income compared to 15.7 percent low annual income and 13.2 percent high annual income from watermelon cultivation. Thus, the overwhelming 86.8 percent of the farmers had low to medium annual income from watermelon cultivation. So, watermelon cultivation is profitable for the farmers.

Microfinance received: The highest proportion (58.7 percent) of the watermelon farmers received low microfinance (1-50) compared to 25.6 percent (>50-100 thousand taka) medium microfinance receivers, 10.7 percent was no microfinance receivers, and only 5 percent was high microfinance receivers. Thus, the overwhelming 84.3 percent of the farmers was low to medium microfinance receivers.

Agricultural training exposure: About 48.8 percent of the watermelon farmers did not receive any training compared to 40.5 percent of farmers had received low (1-5 days) duration of training, while 5.8 percent had high (>10 days) training and 4.9 percent had received medium (>5-10 days) duration of training.

Agricultural extension media contact: Majority of the farmers' (59.5 percent) of the watermelon farmers had medium agricultural extension media contact compared to 22.3 percent of them having high media contact and 18.2 percent of them had low media contact.

Input availability: About 71.9 percent of the watermelon farmers had medium input availability compared to 15.7 percent had high input availability and 12.4 percent of them had low input availability.

5.1.2 Hindrance and prospects of the farmers regarding watermelon cultivation

Hindrance faced in watermelon cultivation: Majority (64.5 %) of the farmers faced medium hindrance, while 18.2 percent faced low and 17.3 percent of the farmers faced high hindrance. Data reveals that 82.7% of the farmers faced low to medium hindrance in watermelon cultivation.

Prospects of watermelon cultivation: Majority (57.9 percent) of the watermelon farmers had medium prospects, while 23.1 percent of farmers had low prospects and 19 percent of farmers had high prospects of watermelon cultivation. It means that overwhelming majority (81%) of the farmers had low to medium prospects of watermelon cultivation.

5.1.3 Relationship of each of the selected characteristics of the watermelon farmers with their hindrance in watermelon cultivation

Age, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon cultivation, microfinance received, agricultural training exposure, and input availability of the farmers had significant negative

relationship with their hindrance faced in watermelon cultivation. Level of education and agricultural extension media contact of the farmers had negatively insignificant relationships with their hindrance in watermelon cultivation.

5.1.5 Relationship of each of the selected characteristics of the watermelon farmers with their prospects of watermelon cultivation

Age, watermelon cultivation experience, watermelon covering area, annual family income, income from watermelon cultivation, agricultural training exposure, agricultural extension media contact and input availability of the farmers had significant positive relationship with their prospects of watermelon cultivation. Level of education and microfinance received of the farmers had no significant relationships with their prospects of watermelon cultivation.

5.1.6 The Inter-Relationship between Farmers' Hindrance and Prospects of Watermelon Cultivation

Hindrance and prospects of watermelon cultivation of the farmers had significant and negative inter-correlation with each other.

5.2 Conclusion

Based on findings of the study and the researcher's interpretations, the following conclusions were drawn:

1. Hindrance and prospects of the farmers had significant negative inter-correlation with each other. An overwhelming majority (82.7%) of the farmers faced low to medium hindrance in watermelon cultivation. Overwhelming majority (81.0%) of the watermelon farmers found low to medium prospects of watermelon cultivation. Therefore, it may be concluded that hindrance and prospects regarding watermelon cultivation were negatively inter correlated.
2. There was a negative significant relationship of age of the farmers with their hindrance in watermelon cultivation. Therefore, it can be concluded that old age farmers faced low hindrance in watermelon cultivation than the middle and young farmers.
3. Experience in watermelon cultivation of the famers had a significant negative relationship with the hindrance of watermelon cultivation as perceived by them.

So, it can be concluded that with the increase of experience in watermelon cultivation, hindrance of watermelon cultivation decreased.

4. There was a negative significant relationship of watermelon covering area of the farmers with their hindrance in watermelon cultivation. Therefore, it can be concluded that farmers with medium to large watermelon covering area were likely to face less hindrance because of more option of technology used in watermelon cultivation.
5. Annual family income and income from watermelon cultivation of the farmers had negative significant relationship with their hindrance faced in watermelon cultivation. So, it may be concluded that the high annual income and income from watermelon of the watermelon farmers significantly contributes to decreasing the hindrance in watermelon cultivation.
6. Agricultural training exposure and input availability of the farmers had negative significant relationship with their hindrance faced in watermelon cultivation. Therefore, it may be concluded that agricultural training exposure and input availability of the farmers significantly contributes to decrease the hindrance in watermelon cultivation.
7. Microfinance received by the watermelon farmers had negative significant relationship with their hindrance in watermelon cultivation. Thus, it may be concluded that if the farmers can be provided with microfinance by different Bank and NGOs will decrease the hindrance in watermelon cultivation.
8. Age and watermelon cultivation experience had positive significant relationship with their prospects of watermelon cultivation. Therefore, it can be concluded that increase of age and experience of the farmers in watermelon cultivation, prospect of watermelon cultivation is increased.
9. There was a positive significant relationship of watermelon covering area of the farmers with their prospects watermelon cultivation. Therefore, it can be concluded that farmers with medium to large watermelon covering area were likely to gain more prospects because of more options of technology used in watermelon cultivation.
10. Annual family income and income from watermelon of the famers had a significant positive relationship with the prospects of watermelon cultivation. So, it can be concluded that with the increase of prospects of watermelon

cultivation, annual income and income from watermelon of the farmers increased.

11. Agricultural training exposure and agricultural extension media contact of the farmers had positive significant relationship with their prospects of watermelon cultivation. Therefore, it may be concluded that agricultural training exposure and agricultural extension media contact of the farmers significantly contributes to increase the prospects of watermelon cultivation.
12. Input availability of the farmers had positive significant relationship with their prospects of watermelon cultivation. Therefore, it may be concluded that input availability of the farmers significantly contributes to increase the prospects of watermelon cultivation.

5.3 Recommendations

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

5.3.1 Recommendation for policy implication

I. The findings indicated that an overwhelming majority (82.7%) of the watermelon farmers faced low to medium hindrance. So, it may be recommended that necessary steps should be taken by concerned departments like DAE to remove those hindrances so that they could make their watermelon cultivation profitable by increasing watermelon yield with less production cost.

II. Age, watermelon cultivation area, annual family income, income from watermelon cultivation, agricultural training exposure, microfinance received and input availability of the farmers had significant negative relationship with their hindrance faced in watermelon cultivation. Therefore, it may be recommended that concerned authorities should increase more contact with the watermelon growers so that they could increase their area under watermelon cultivation, their annual income from watermelon. So that they could ultimately decrease their hindrance and increase their prospects towards watermelon cultivation.

III. Watermelon cultivation experience of the farmers had significant and negative relationship with their hindrance faced in watermelon cultivation. Overwhelming majority (86.7%) of the farmers had low to medium experience in watermelon cultivation. It is logical that experienced farmers could minimize

their hindrance in watermelon cultivation. Therefore, it may be recommended that proper extension providers like Department of Agricultural Extension (DAE) and NGOs should take necessary action to increase their experience providing necessary training and motivational campaign.

5.3.2 Recommendations for Further Study

A small and limited research work cannot provide unique and universal information related to actual impact of improving socio-economic status of the farmers. Further studies should be undertaken on related matters. On the basis of scope and limitations of the present study and observation made by the researcher, the following recommendations are made for further study:

I. The present study was carried out in only Gopalganj district in Bangladesh. Similar studies should be conducted in other parts of the country to get a clear picture of the whole country which will be helpful for effective policy formulation.

II. The present study was undertaken to explore contribution of ten selected characteristics of the farmers with their extent of hindrance and prospects of watermelon cultivation as perceived by them. Therefore, it could be recommended that further studies should be designed considering other agricultural and non-agricultural activities and including other characteristics of the farmers that might affect the concerned term.

III. The present research was conducted on hindrance and prospects of watermelon cultivation only. Similar research should also be undertaken on other crops.

IV. Further research is necessary to find out the effective ways and means which would contribute in developing watermelon cultivation.

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APPENDIX-I
ENGLISH VERSION OF THE INTERVIEW SCHEDULE
Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University
Dhaka-1207

An Interview Schedule for the Study Entitled

HINDRANCE AND PROSPECTS OF WATERMELON CULTIVATION IN BANGLADESH FROM THE PERSPECTIVES OF FARMERS IN KOTALIPARA UPAZILA UNDER GOPALGANJ DISTRICT

Serial No: ……..……..
Name of the respondent: ……
Village: ……...
Union: ……..……..…..
Mobile No: ……..…
(Please provide following information. Your information will be kept confidential and will be used for research purpose only)

1. Age: How old are you? _____years.

2. Level of Educations: Please mention your level of education.
a) I can't read and write ( )
b) I can sign only ( )
c) I have passed…….class.
d) I took……class equivalent non-formal education.

3. Watermelon cultivation experience
Mention your experience in watermelon cultivation ……. Year (s)

4. Watermelon covering area
Please indicate your land under watermelon cultivation……Bigha (Local unit) .....decimal.

5. Annual family income

Mention your annual family income from the fallowing sources

Income sources			Income in '000' Tk.
A.	Agricultural sources		
1)	Watermelon		
2)	Other crops		
3)	Livestock		
4)	Poultry		
5)	Fisheries		
B.	Non-Agricultural sources		
	i)	Business	
	ii)	Job	
	iii)	Laborer	

	iv)	Others	
Total			

6. Microfinance received

Have you received any credit for watermelon cultivation? Yes ---------- No ---------- ----------

If yes, please give the following information:

Sl. No.	Sources of Credit	Year of credit received	Amount of credit received "ooo" Tk.
1	NGO		
2	Bank		
3	Village money lenders		
4	Friends/Relatives/Neighbors		
5	Others		
Total			

7. Agricultural Training Exposure

Have you received any training on watermelon cultivation? Yes ---------- No ---------- ----

If yes, please give the following information:

Sl. No.	Subject of training	Offering Organization	Duration of training (Days)
1			
2			
Total			

8. Agricultural Extension media contact

Please state the extent of your contact with the following communication media

Sl. No.	Categories of farmers	Extent of participation			
		Regularly (3)	Occasionally (2)	Rarely (1)	Never (0)
1	Model farmers (per month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
2	Agricultural input dealer (per month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
3	NGO worker (per month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
4	Sub-Assistant Agriculture Officer (SAAO) (per month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
5	Agricultural Extension Officer (AEO) (per 3 month)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )

6	Farm radio talk/ program (per week)	>5 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
7	Agricultural program in Tv (per week)	>4 times ( )	3 times ( )	1-2 times ( )	0 times ( )
8	Agricultural news from publications like newspaper, poster, leaflet etc. (per 3 month)	>6 times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
9	FGD on agricultural issue/events (per year)	>6times ( )	3-4 times ( )	1-2 times ( )	0 times ( )
10	Meeting on agricultural issue (per year)	>3 times ( )	2 times ( )	1 times ( )	0 times ( )
Total					

09. Input availability

Please give your information about following inputs availability

Sl. No.	Inputs	**Extent of input availability**				
		Regular (4)	Ofenly (3)	Fair (2)	Seldom (1)	Not at all (0)
1	Availability of modern varieties					
2	Availability of fertilizers					
3	Availability of insecticides					
4	Availability of irrigation water					
5	Availability of farm implements					
Total						

10. Hindrance faced in watermelon cultivation

Please state the extent of the following hindrance faced in watermelon cultivation

Sl. No.	**Problems**	**Extent of hindrances**				
		Severe (4)	**Moderate (3)**	**Low (2)**	**Very low (1)**	**Not at all (0)**
1	Degeneration of watermelon cultivar					
2	High production cost					
3	Short shelf life of watermelon					
4	Lack of storehouse					

5	Lack of money/credit					
6	Inadequate training facilities					
7	Insect and disease attack					
8	Heavy rain and sunlight					
9	Lack of proper marketing facilities					
10	Poor transportation system					
Total						

11. Farmer's opinions on prospects of watermelon cultivation [Put (√) marks]

Sl. No	Farmers opinion on	Strongly agreed (4)	Agreed (3)	No opinion (2)	Disagreed (1)	Strongly Disagreed (0)
1	If marketing facilities of watermelon are available then farmers are more interested on watermelon cultivation					
2	If HYV seed, fertilizers and pesticides are easily available then increase watermelon cultivation					
3	Government may facilitate more for commercial production of watermelon					
4	If Storage facility may develop then farmers gets more profit than the present					
5	Increase supply of watermelon is possible if consumers demand is increased					
Total						

Thank you for your kind cooperation

Signature of the interviewer

Date:

Appendix-II

Correlation matrix

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}	Y_1	Y_2
V_1	-											
V_2	-.026	-										
V_3	.748**	.019	-									
V_4	.083	.285**	.055	-								
V_5	-.033	.138	-.010	.590**	-							
V_6	.088	.287**	.062	.969**	.593**	-						
V_7	.021	.169	.061	.555**	.580**	.554**	-					
V_8	.471**	.025	.281**	.345**	.394**	.321**	.455**	-				
V_9	.150	.132	.073	.204*	.058	.178	.176	.217*	-			
V_{10}	.523**	.041	.299**	.318**	.254**	.309**	.146	.308**	.306**	-		
Y_1	-.680**	-.038	-.453**	-.349**	-.237**	-.345**	-.214*	-.553**	-.125	-.454**	-	
Y_2	.643**	.053	.394**	.308**	.247**	.305**	.139	.399**	.258**	.685**	-.604**	-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

$V_{1=}$	Age	$V_{7=}$	Microfinance received
$V_{2=}$	Level of education	$V_{8=}$	Agricultural training exposure
$V_{3=}$	Watermelon cultivation experience	$V_{9=}$	Agricultural extension media contact
$V_{4=}$	Watermelon covering area	$V_{10=}$	Input availability
$V_{5=}$	Annual family income	$Y_{1=}$	Hindrance faced in watermelon cultivation
$V_{6=}$	Income from watermelon	$Y_{2=}$	Prospects of watermelon cultivation