

**USE OF MODERN ONION CULTIVATION PRACTICES BY THE
FARMERS OF PABNA DISTRICT**

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JUNE, 2021

**USE OF MODERN ONION CULTIVATION PRACTICES BY THE FARMERS OF
PABNA DISTRICT**

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

MASTER OF SCIENCE (MS)
IN
AGRICULTURAL EXTENSION
SEMESTER: JANUARY-JUNE, 2021

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CERTIFICATE

This is to certify that the thesis entitled “**USE OF MODERN ONION CULTIVATION PRACTICES BY THE FARMERS OF PABNA DISTRICT**” submitted to the department of Agricultural Extension and Information System, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (M.S.) in Agricultural Extension, embodies the result of a piece of bona fide research work carried out by **MOST. KANIZ FATIMA, Registration No. 19-10067** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

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DEDICATED

TO

MY BELOVED

PARENTS

ACKNOWLEDGEMENT

At first the author expresses her gratefulness to almighty Allah who has helped him to pursue his higher education in agriculture and for giving the potency of successful completion of this research work.

*With deepest emotion the author wish to express her pious gratitude, indebtedness, felicitation, sincere appreciation to her research Supervisor **Md. Abul Bashar**, Professor, Department of Agricultural Extension and Information System, Sher-E-Bangla Agricultural University, Dhaka, Bangladesh for his discursive guidance, intense supervision and continuous encouragement during the entire period of research work.*

*The author also highly grateful and obliged to her research Co-Supervisor **M. Zahidul Haque**, Professor, Department of Agricultural Extension and Information System, Sher-E-Bangla Agricultural University, Dhaka, Bangladesh for his continuous encouragement, innovative suggestions, and affectionate inspiration throughout the study period.*

*The author expresses her sincere respect **Prof. Dr. Mohammad Zamshed Alam**, **Chairman**, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka for providing valuable advice and sympathetic consideration regarding to the research.*

The author is also grateful to her all the teachers of Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh for their continuous encouragement and innovative suggestions.

The Author

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ABBREVIATIONS

Ag. Ext. Ed.	Agricultural Extension Education
AEIS.	Agricultural Extension and Information System
β	Multiple Regression
BBS	Bangladesh Bureau of Statistics
GDP	Gross Domestic Product
DAE	Department of Agricultural Extension
et al.	All Others
USA	United Nations of America
FAO	Food and Agriculture Organization
HYV	High Yielding Varieties
GoB	Government of Bangladesh
MoA	Ministry of Agriculture
UNO	The United Nations
MoYS	Ministry of Youth and Sports
MoP	Muriate of Potash
TSP	Triple Super Phosphate
IPM	Integrated Pest Management
BINA	Bangladesh Institute of Nuclear Agriculture
BADC	Bangladesh Agricultural Development Corporation
STW	Shallow Tube-well
DTW	Deep Tube-well
SAAO	Sub Assistant Agriculture Officer
SAU	Sher-e-Bangla Agricultural University
SPSS	Statistical Package for Social Sciences

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ABSTRACT

The objectives of the study were to describe the selected characteristics of the onion cultivars; to determine the extent of use of modern onion cultivation practices and to identify the contributing factors that significantly influences use of modern onion cultivation practices. The study was undertaken purposively in Santhia upazila under Pabna district. Validated and well-structured interview schedule was used to collect data from 120 farmers during 15th February to 15th March, 2021. Descriptive statistics, multiple regressions were used for analysis. The majority 52.94 percent of the farmers had medium use of modern onion cultivation practices compared to having 19.61 percent high and 27.45 percent had low use of modern onion cultivation practices, respectively. Among 12 selected characteristics of the farmers 4 characteristics namely, education, training exposure, onion cultivation experience and onion cultivation knowledge of the respondents had significant positive contribution with their use of modern onion cultivation practices. The rest 8 characteristics namely, age, farm size, onion cultivation area, annual income family income, income from onion cultivation, extension contact, problem faced in onion cultivation and attitude towards onion cultivation had no significant contribution with their use of modern onion cultivation practices.

CHAPTER I

INTRODUCTION

1.1 General Background of the Study

Bangladesh predominantly is an agricultural country. Most inhabitants of the country are involved directly or indirectly to agriculture for their livelihood. The sector contributed to 13.10% share of the national Gross Domestic Product (BBS, 2021). In earlier decades, the sector contributes more than 30% of GDP. Due a gradual transformation of the economy from agriculture to industry and service sectors, this sector decreases gradually around 50% in 1970 to 13.10% in 2020-2021 (BBS, 2021). It ranks first in production (889000 MT) and second in area (125101 ha) among the spices (BBS, 2018). It covers almost 36% of the total areas under spices. The mean yield of onion in Bangladesh is very low (4 t/ha) compared to world average of 17.27 t/ha (FAO, 1998). During winter, onion is widely cultivated all over Bangladesh.

The average yield hectare⁻¹ in Bangladesh is about 8.81 tons, which is very low compared to that of Korean Republic (66.67 MT ha⁻¹), USA (56.56 MT ha⁻¹), Spain (53.53 MT ha⁻¹), Netherlands (48.81 MT ha⁻¹), China (22.21 MT ha⁻¹) and India (13.6 MT ha⁻¹) as per FAO (2009). Thus there is a wide gap between the yields of Bangladesh and other developed countries, suggesting the huge scope of increasing the yields in Bangladesh. Adoption of high yielding lines with proper cultural practices at production level may be a tool to increase the yield of onion in the country.

Farmers generally follow traditional method for cultivating onion in Bangladesh. Area and production of onion in Bangladesh during the last fifteen years are given below; Although production of onion is increasing day by day, but in a land hungry country like Bangladesh it may not be possible to meet the domestic

demand due to increase in population. There is an acute shortage of onion in relation to its requirement. Every year, Bangladesh has to import a big amount of onion from neighbouring and other countries to meet up its demand.

Table 1.1 Areas and production of onion in Bangladesh

Year	Area ('000 ha)	Production ('000 MT)
2003-04	52.0	272.2
2004-05	86.4	589.4
2005-06	115.6	768.6
2006-07	129	894
2007-08	125	889
2008-09	131	897
2009-10	128	883
2010-11	137	901
2011-12	139	903
2012-13	141	906
2013-14	145	913
2014-15	147	921
2015-16	152	926
2016-17	156	932
2017-18	161	938

(BBS, 2018)

Many attempts were taken in the recent past to augment the yield and to improve the quality of onion seed. In Bangladesh, short-day length prevails in the growing season of onion (October-November). So, adjusting the planting time of onion cultivation is very important. Mondal (1980) considered the last week of October as the optimum planting time for attaining highest yield and best quality onion seeds. Haque et al. (2011) reported that the farmers encountered different problems during onion cultivation such as non-availability of HYV seed at proper time. Most of the farmers in Bangladesh use their own seed material for cultivation, which is not regulated properly for varietal admixture and consists of a heterogeneous material which reduces yield potentiality.

The annual production of onion in Bangladesh remains far short of demand. Every year, the country has to import a huge amount of onion from neighboring and other countries to meet up its demand. Mosleh Ud-deen (2011) stated that frequently onion prices reached in recent past years. As a result, the high price is mostly pinching the pockets of the country's low-income group populations.

Onion is the most essential and important spices crop. The production of onion largely depends on the use of seeds, fertilizers, irrigation, pesticide etc. The Government of Bangladesh has, therefore, provided priority to the agriculture sector to increase the production of onion by giving subsidy to the farmers and inputs support such as seeds, fertilizer, irrigation, pesticide etc. to achieve self-sufficiency of agricultural crops including onion production. Production of crops, cost of production and market price of crops are directly interrelated. Government has to give proper attention on these three factors as stated, so that the farmer will get fair price of the crop to be produced during the harvest time. Generally, government has to declare procurement price at the harvesting time of the crop so that producers may get proper price. Procurement price of the crop has to be fixed considering all these matters. If procurement price is lower than the production cost, producers get looser and will be discouraged to produce more crops and if selling price is higher than the production cost, producers will show keen interest to continue production. Due to importance of onion and its widely uses in the country as spice, it was essential to BBS to conduct the Productivity Survey of Onion like eight other productivity surveys among all agricultural crops

The high demand of onion can only be met by increasing its production vertically. Efficient use of resources can provide the farmers to have higher production from the available resources. The situation is particularly critical in a country like Bangladesh where per hectare recommended amount is seldom used in production (Jabbar and Alam, 1979). As a result, farm level yield of onion is very low

compared to their recommended yield. Farmers in the study areas also follow different levels of management depending upon their infrastructural facility and socio-economic conditions which ultimately results variability in yields. Few studies (Awal et al., 2004; Saha and Elias, 1990) have been conducted on onion cultivation. But the information on production and input use pattern in onion cultivation is still scarce. Lack of farm level information on onion cultivation frequently prevents researcher from undertaking priority research areas.

1.2 Statement of the Problem

At present, there are many reasons or approaches followed in vegetable cultivation. Those are conventional farming system, IPM and organic. Organic onion cultivation is sound in environmental aspect but have limitation to gain desire production. In a country like Bangladesh where there is no compromise with production, organic method is not good. Therefore, majority of the farmers cultivate onion by following either conventional method to get more profitability. In conventional technique of onion cultivation, farmers are only use pesticides to control pest. So, in this regard the cost of production becomes high. Benefit obtained from this very lower than other techniques. However there may be question arise regarding gaining yield as well as profitability in onion cultivation. In this regard, following questions should be answered through investigation.

- i) What are the characteristics of the farmers' cultivate onion with use of modern onion cultivation practices?
- ii) What extent of the use of modern onion cultivation practices?
- iii) What are the factors that significantly influence onion cultivars use of modern onion cultivation practices?

1.3 Specific Objectives of the Study

The following specific objectives were drawn in order to give proper direction to the study:

1. To describe the following selected characteristics of the onion cultivars;
 - i. Age
 - ii. Level of education
 - iii. Farm size
 - iv. Onion cultivation area
 - v. Annual family income
 - vi. Income from onion cultivation
 - vii. Training exposure
 - viii. Extension contact
 - ix. Onion cultivation experience
 - x. Problem faced in onion cultivation
 - xi. Onion cultivation knowledge
 - xii. Attitude towards onion cultivation
2. To determine the extent of use of modern onion cultivation practices ; and
3. To identify the contributing factors that significantly influences use of modern onion cultivation practices.

1.4 Justification of the Study

Agriculture plays a vital role through employment generation, poverty alleviation, food security enhance, standard of living by increasing income level of the rural people. About 80 percent of the people of Bangladesh live in the rural areas and they depend on agricultural activity. But population is increasing day by day which causes the decrease of farm size in a horrid manner. Land for the people of Bangladesh is the single most important asset. The majority of households in Bangladesh largely depend on land-based activities for their livelihoods. As almost 65 percent of the total population (and above 80 percent of the rural population) were depend on agriculture. In order to meet the demand of spices for the increasing population and to achieve self-sufficiency in spices, the government of Bangladesh has given much emphasis on onion production. Significant compositional changes occurred within onion production. The area under study is

onion growing area under different arrangement and this area onion increased by several times over the past two decades due to diffusion of new technologies such as HYV seeds, fertilizer, irrigation, pesticides, power tiller etc. This has definitely changed the cost structure of onion production.

Under such circumstances, compared to past, if onion production under arrangements is not remunerative for the farmers, they may be disinterested in onion production which has serious implication on the Bangladesh economy as a whole since onion is the main sector in agriculture which still contributes major share in the GDP. To continue onion production in order to meet increasing demand for spices for the nation whole, farmers' economic incentive for onion production under different systems need to be examined.

So these study attempts to measure use of modern onion cultivation practices of onion producing farms under different system. It also attempts to measure socioeconomic characteristics of the farmers in the study area.

1.5 Assumptions of the Study

An assumption has been defined as “the supposition that an apparent fact or principle is true in light of the available evidence” (Goode, 1945). An assumption is taken as a fact or belief to be true without proof. So the following assumptions were in mind of the researcher while carrying out this study:

- i) The respondents included in the sample were capable of furnishing proper responses to the questions of the interview schedule.
- ii) Views and opinions furnished by the respondents were the representative views and opinions of the whole population of the study.
- iii) The responses furnished by the respondents were reliable and they truly expressed their opinions on the profitability of onion cultivation in the selected area of Pabna district.

- iv) The data collected by the researcher were free from bias.
- v) The researcher who acted as the interviewer was well adjusted to the social and cultural environment of the study area. Hence, the respondents furnished their correct opinions without any hesitation.
- vi) The respondents had almost similar background and seemed to be homogenous to a great extent.
- vii) The information sought by the researcher revealed the real situation to satisfy the objectives of the study.
- viii) The findings were useful in choosing the clients as well as for planning execution and evaluation the extension programme.

1.6 Limitations of the Study

The present study was undertaken to have an understanding of the use of modern onion cultivation practices and to determine the contribution factors with selected characteristics of the farmers. Considering the time, money and other necessary resources available to the researcher and to make the study manageable and meaningful from the point of view of research, it becomes necessary to impose certain limitations. The limitations were as follows:

- i. The study was confined in one unions of Sujanagar upazila under Pabna district.
- ii. The study was restricted within the farmers who had some cultivable land under their own cultivation.
- iii. The population for the study was kept confined to the heads of the family who regularly cultivated their onion land.
- iv. There were many characteristics of the farmers but in the study only 12 of them were selected for investigation.
- v. For information about the study, the researcher depended on the data furnished by the selected respondents during their interview with him.
- vi. Major information, facts and figures supplied by the respondents were

applicable to the situation prevailing in the locality during the year 2020.

1.7 Definition of Terms

A researcher needs to know the meaning and contents of every term that he uses. It should clarify the issue as well as explain the fact to the investigator and readers. However, for clarity of understanding, a number of key concepts/terms frequently used throughout the study defined are interpreted as follows:

Age

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

Education

Education referred to the development of desirable knowledge, skill, attitudes, etc. of an individual through the experiences of reading, writing, observation and related matters.

Farm size

Farm size referred to the total area on which a farmer's family carries on farming operations, the area being estimated in terms of full benefit to the farmer's family.

Onion cultivation area

Onion cultivation area referred to the total area on which a farmer's family carries on onion cultivation area, the area being estimated in terms of full benefit to the farmer's family.

Annual family income

Annual income referred to the total annual earnings of all the family members of a respondent from agriculture, livestock and fisheries and other accessible sources (business, service, daily working etc.).

Income from onion cultivation

Income from onion cultivation referred to the total annual earnings of onion cultivation of a respondent from onion cultivable land.

Training exposure

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

Extension 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.

Problem faced

Problem faced refers to different problems faced by the farmers during onion cultivation.

Onion cultivation knowledge

Literally knowledge means knowing or what one knows about a subject, fact, person etc. Onion cultivation knowledge referred to the understanding of the onion cultivation related about the different aspects of scientific agriculture such as improved seed, fertilizer, plant protection, irrigation, etc.

CHAPTER II

REVIEW OF LITERATURE

The intent of this chapter is to review the after-effects of a portion of the past examinations and prominent articles having pertinence to this investigation. The researcher made and elaborated search of available literature for this research. But no study could be found to be specially undertaken in this direction. Therefore, attempt has been made in the present chapter to review some interlinked literature on this aspect from home and abroad. The interlinked reviews conveniently presented on the major objectives of the study as far as possible. This chapter is divided into five major sections. The first section deals with concept of practice. The second section deals with past related research on practice and knowledge. The third section deals with past research findings relating to the relationship of farmers' onion cultivation behavior with their selected characteristics, the fourth section deals with research gap of the study and the conceptual framework of the study is presented in the fifth section.

2.1 Concept of Practice

“Practice may be referred as the activities of an individual that he/she performed followed by some instructions in order to fulfill some wants that he/she needed” (Alam, 2003). “Practice may be defined as a method, procedure, process, or rule used in a particular field or profession; a set of these regarded as standard” according to Karl Sweiby (2003).

In another definition “Practice is the actual application or use of an idea, belief, or method as opposed to theories relating to it” according to Oxford dictionary. From Oxford dictionary it is also found that practice is “the facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject. There is a proverb that “practice makes a man perfect”

in the same way more practice increase knowledge and attitude (positive or negative) to a specific subjects. In strawberry cultivation Practice includes irrigation, applying fertilizer and pesticides, washing fruits, grading, harvesting, handling, storage, processing, packaging, transportation, marketing etc. Regular practice on strawberry cultivation increase knowledge and attitude towards strawberry cultivation.

2.2 Past Related Research on Practice and Knowledge

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that the majority (69.9 percent) of the strawberry farmers had medium practice, while 17.7 percent farmers had high practice and 12.4 percent farmers had low practice on strawberry cultivation.

Saha (2001) made an attempt on farmers' knowledge in improved practices of pineapple cultivation and found that the majority (62 percent) of the farmers possessed good knowledge, 33 percent poor knowledge and only 5 percent possessed excellent knowledge.

Khan (1996) conducted a research on the effectiveness of a farmer primer on growing rice in knowledge change of the farmers in Shaktipur Thana and found that 67 percent farmers had good knowledge at initial stage, where 21 percent had excellent knowledge and 12 percent had poor knowledge.

Khan (2005) studied on knowledge of maize cultivation and found that majority (68 percent) of the farmers had relatively low level of knowledge and 32 percent of the farmers possessed relatively high level of knowledge.

Sana (2003) studied farmers' knowledge of shrimp culture and showed that majority (61 percent) of them had medium level of knowledge, while 30 percent had low and rest 9 percent possessed high knowledge.

Hasan (2004) reported that the highest proportion of the respondents had medium knowledge on partnership extension approach (70.4 percent) followed by 16.9 percent had low knowledge and 13.3 percent had high knowledge.

Rahman (2004) found in his study that the highest proportion (62.22 percent) of the respondents had medium knowledge compared to 25.56 percent having low knowledge and only 12.22 percent had high knowledge on HYV boro rice cultivation practices.

Hussen (2001) found in his study on farmers' knowledge and adoption of modern sugarcane cultivation practices found that highest proportion (84 percent) of the farmers possessed medium knowledge, 13 percent high knowledge and lowest proportion (3 percent) possessed low knowledge.

Islam (2002) found in his study that majority (87 percent) of the ecological farmers of Proshika had medium adoption while only one percent had low and 12 percent had high adoption of ecological agricultural practices. Considering extent of adoption, the mostly adopted ecological practices, as stated in descending order, were compost, mulching, inter and mixed cropping, multi-layer crop, crop rotation, green manuring, mechanical control of pest, disease and pest resistant varieties and botanical pesticides.

Rabbany (2003) showed that only 31.37 percent of the farmers were high users of integrated pest management (IPM) practices, while 86.89 percent were medium and none was low users. Among 10 selected IPM practices "Agroecosystem

Analysis (AESAs) in every crop season” ranked first in the order while “collection and destroy of eggs and larvae by hand” ranked last.

Mamun (2004) found that 25 percent of farmers having unfavorable, 61 percent having moderately favourable and 14 percent having favourable attitude towards the use of ITK. The average score of attitude was 21.49.

Monalesa (2014) found that about half (49.5 percent) of the farmers had favourable attitude towards summer tomato cultivation.

2.3 Relationship between Selected Characteristics of the Farmers and their Use of Modern Onion Cultivation Practices

2.3.1 Age and Practice

Mondal (2014) conducted a research on the farmers’ knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no relationship with their age.

Rahman (2004) found that practice on Boro rice cultivation has no relationship with their age.

Akhter (2003) found that practice on agricultural activities has significant and positive relationship with their age.

Sana (2003) found that practice on shrimp culture has negative relationship with their age.

Saha (2003) found that practice on poultry production has no relationship with their age.

2.3.2 Level of education and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no relationship with their education.

Rahman (2006) found that practice of prawn culture has significant and positive relationship with their level of education.

Roy (2006) found that practice of coping with flood condition has significant and positive relationship with their level of education.

Islam (2005) found that practice of IPM in crop production has significant and negative relationship with their level of education.

Islam (2005) found that practice of Boro rice cultivation has significant and positive relationship with their level of education.

Rahman (2004) found that practice of poultry production has no relationship with their level of education.

Hossain (2003) found that practice of modern Boro rice cultivation has significant and positive relationship with their level of education.

Akhter (2003) found that practice of agricultural activities has Significant and negative relationship with their level of education.

Saha (2003) found that practice of rice cultivation has no relationship with their level of education.

2.3.3 Farm size and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no relationship with their farm size.

Rahman (2006) found that there was significant and positive relationship with farm size and practice of prawn culture.

Islam (2005) found that there was significant and positive relationship with farm size and practice of IPM in crop production.

Islam (2005) found that there was no relationship with farm size and practice of coping with flood condition.

Khan (2005) found that there was no relationship with farm size and practice of maize cultivation.

Rahman (2004) found that there was significant and positive relationship with farm size and practice of Boro rice cultivation.

2.3.4 Onion cultivation area and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no relationship with their onion cultivation area.

2.3.5 Annual family income and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no relationship with their annual family income.

Rahman (2006) found that there was significant and positive relationship with annual family income and practice of prawn culture.

Roy (2006) found that there was significant and positive relationship with annual family income and practice of boro rice cultivation.

Islam (2005) found that there was significant and positive relationship with annual family income and practice of IPM in crop production.

Rahman (2004) found that there was no relationship with annual family income and practice of vegetable cultivation.

2.3.6 Annual income from onion cultivation and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has a positive and significant relationship with their annual income from onion cultivation.

2.3.7 Training exposure and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no significant relationship with their training exposure.

Rahman (2006) found significant and positive relationship with training exposure and practice of prawn culture.

Islam (2005) found no relationship with training exposure and practice of IPM in crop production.

Sana (2003) found significant and positive relationship with training exposure and practice on shrimp culture

Hossain (2001) found significant and positive relationship with training exposure and practice of crop cultivation.

2.3.8 Extension contact and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has a positive and significant relationship with their extension contact.

Roy (2006) found significant and positive relationship with extension contact and practice of Boro rice cultivation.

Islam (2005) found negative relationship with extension contact and Practice of IPM in crop production.

Sana (2003) found significant and positive relationship with extension contact and practice on shrimp culture.

Hossain (2001) found significant and positive relationship with extension contact and cultivation practices.

2.3.9 Onion cultivation experience and practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has no relationship with their onion cultivation experience.

2.3.10 Problem faced in onion cultivation and Practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has a negative and significant relationship with their problem faced in onion cultivation.

Islam (2005) found on relationship between farmers practice of IPM in crop production with problem faced.

Saha (2001) found significant and positive relationship with practice of pineapple cultivation and problem faced in pineapple cultivation.

2.3.11 Onion Cultivation knowledge and practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has a positive and significant relationship with their onion cultivation knowledge.

2.3.12 Attitude towards onion cultivation and practice

Mondal (2014) conducted a research on the farmers' knowledge, attitude and practice regarding strawberry cultivation and found that that practice on strawberry cultivation has a positive and significant relationship with their attitude towards onion cultivation.

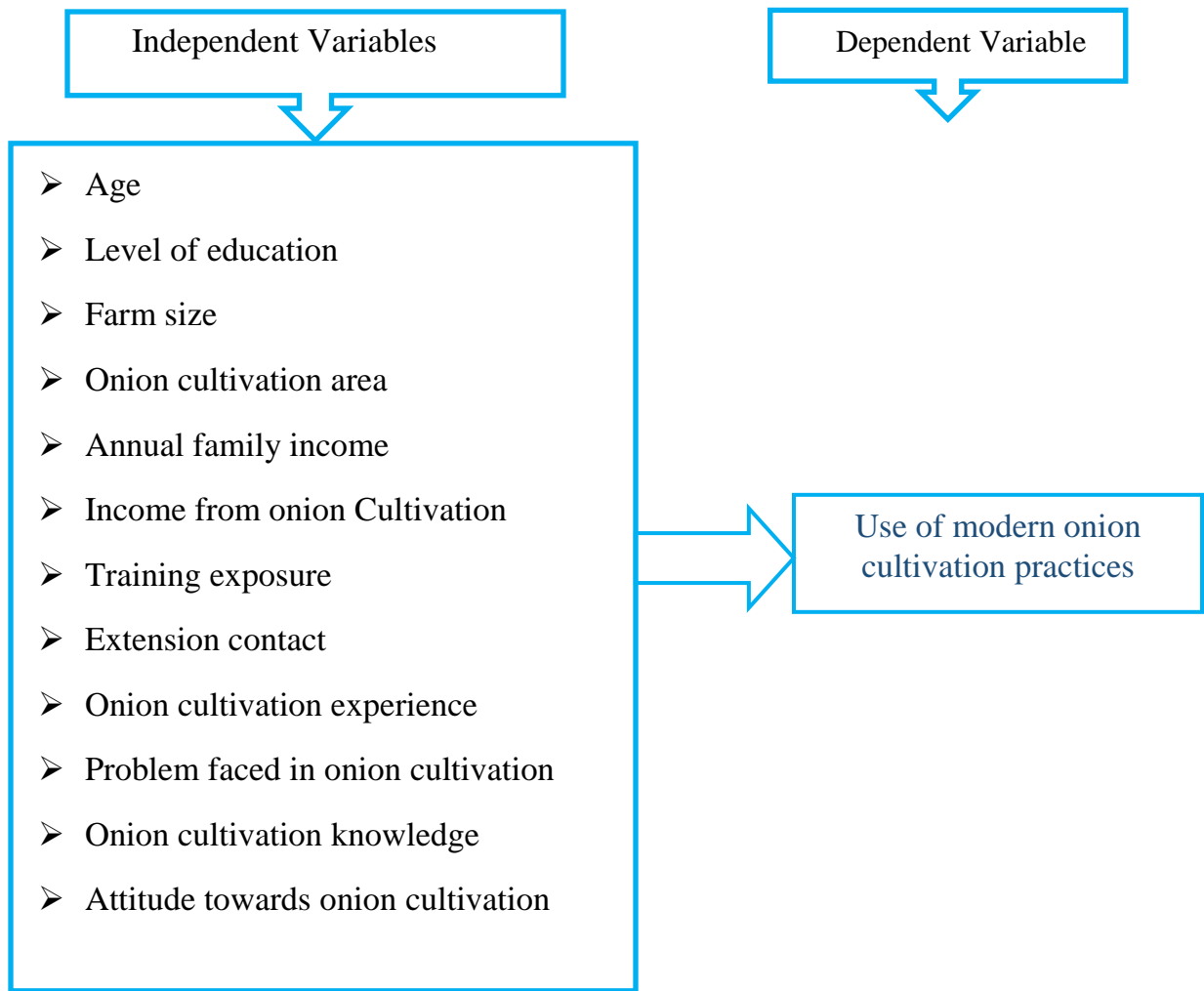
2.4 Research Gap of the Study

Very few researches on adoption selected h use of modern onion cultivation practices have so been conducted. Some researchers have found positive significant relationship between the selected characteristics and use of modern onion cultivation practices. Some other found no significant relationship and very

few have found negative significant relationship. No research work has so far been carried out to explore the relationship between each of the attitude of the farmers with their use of modern onion cultivation practices. So, the researcher carried out the present study to explore the relationship between each of selected characteristics of farmers with use of modern onion cultivation practices.

2.5 The Conceptual Framework of the Study

This study is concerned with the use of modern onion cultivation practices. Thus the use of modern onion cultivation practices was the main focus of the study and 12 selected characteristics of the farmers' were considered as those might have contribution with practice. It is not possible to deal with all the factors in a single study. Therefore, it was necessary to limit the factors, which included age, level of education, farm size, onion cultivation area, annual family income, income from onion cultivation, training exposure, extension contact, onion cultivation experience, problem faced in onion cultivation, onion cultivation knowledge and attitude towards onion cultivation. The conceptual framework of the study has been presented in Fig. 2.1.



2.1: The Conceptual Framework of the Study

CHAPTER III

METHODOLOGY

Methodology enables the researcher to collect valid information. It is impossible to conduct research work smoothly without proper methodology and it is very difficult to address the objectives with a scientific manner. It requires a very careful consideration on the part of the researcher to collect valid and reliable data and to analyze the same for meaningful conclusion. A sequential description of the methodology was followed in conducting this research work has been presented in this chapter.

3.1 Locale of the Study

The study was conducted at Santhia upazila under Pabna district. Santhia upazila has 10 unions and out of 10 unions Kashinathpur and Karanja unions were selected randomly as the locale of the study. Santhia Upazila of Pabna district, having an area of 331 square kilometers and consists of 10 unions. The unions are: Nagdemra, Dhulauri, Bhulbaria, Dhopadaha, Karamja, Kashinathpur, Gaurigram, Nandanpur, Khetupara and Rataiqula. Santhia is located at 24.0583°N 89.5333°E. It has 46745 households and total area 331.56 km². Santhia has some forest-like areas where there are wild animals like foxes, mongooses, wild cats etc. But these woods and animals are on the verge of extinction because of hunting and slash-and-burn. Maps of Pabna district and santhia upazila are presented in Figure 3.1 and 3.2.

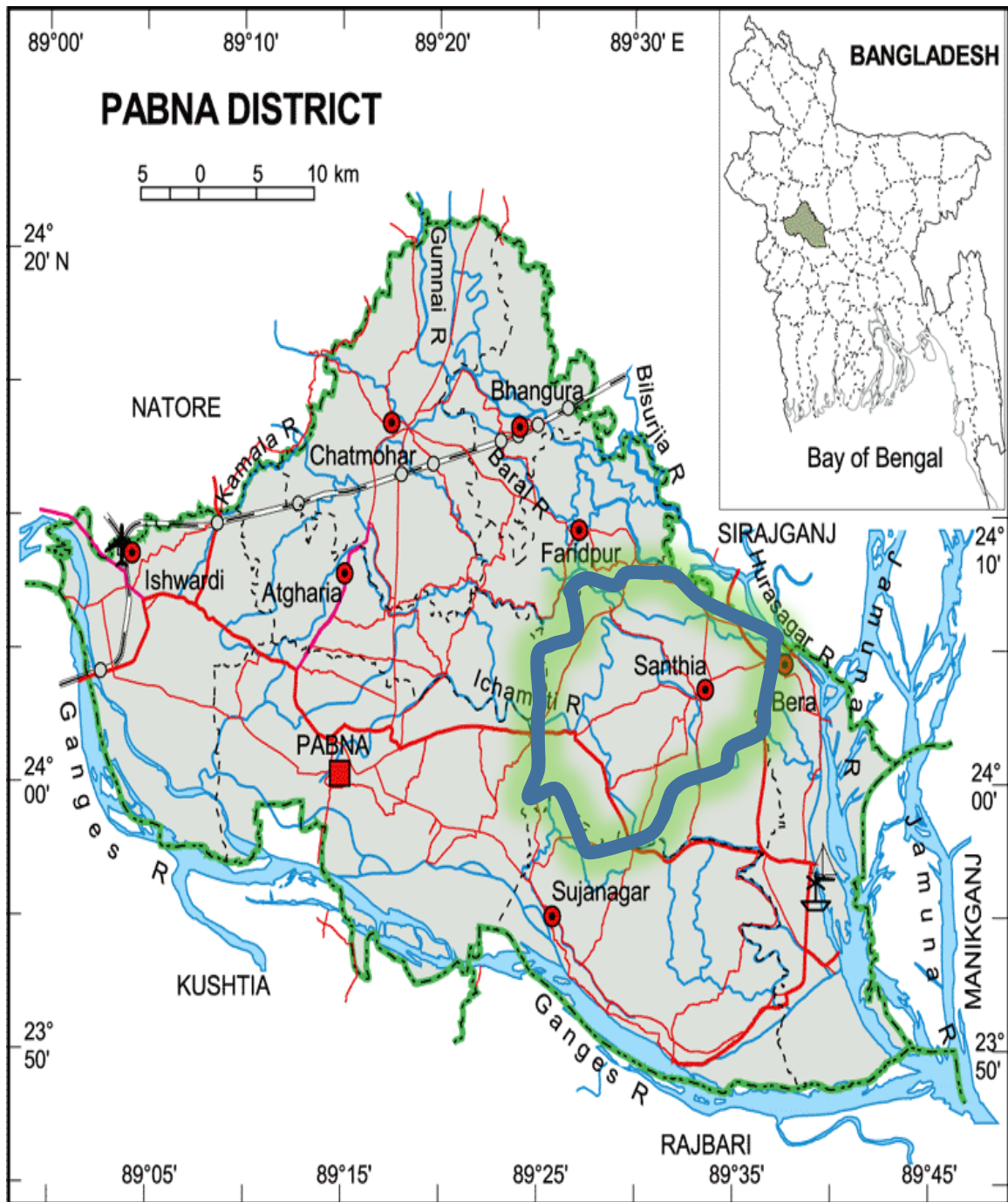


Figure 3.1: A map of Pabna district showing Santhia upazila

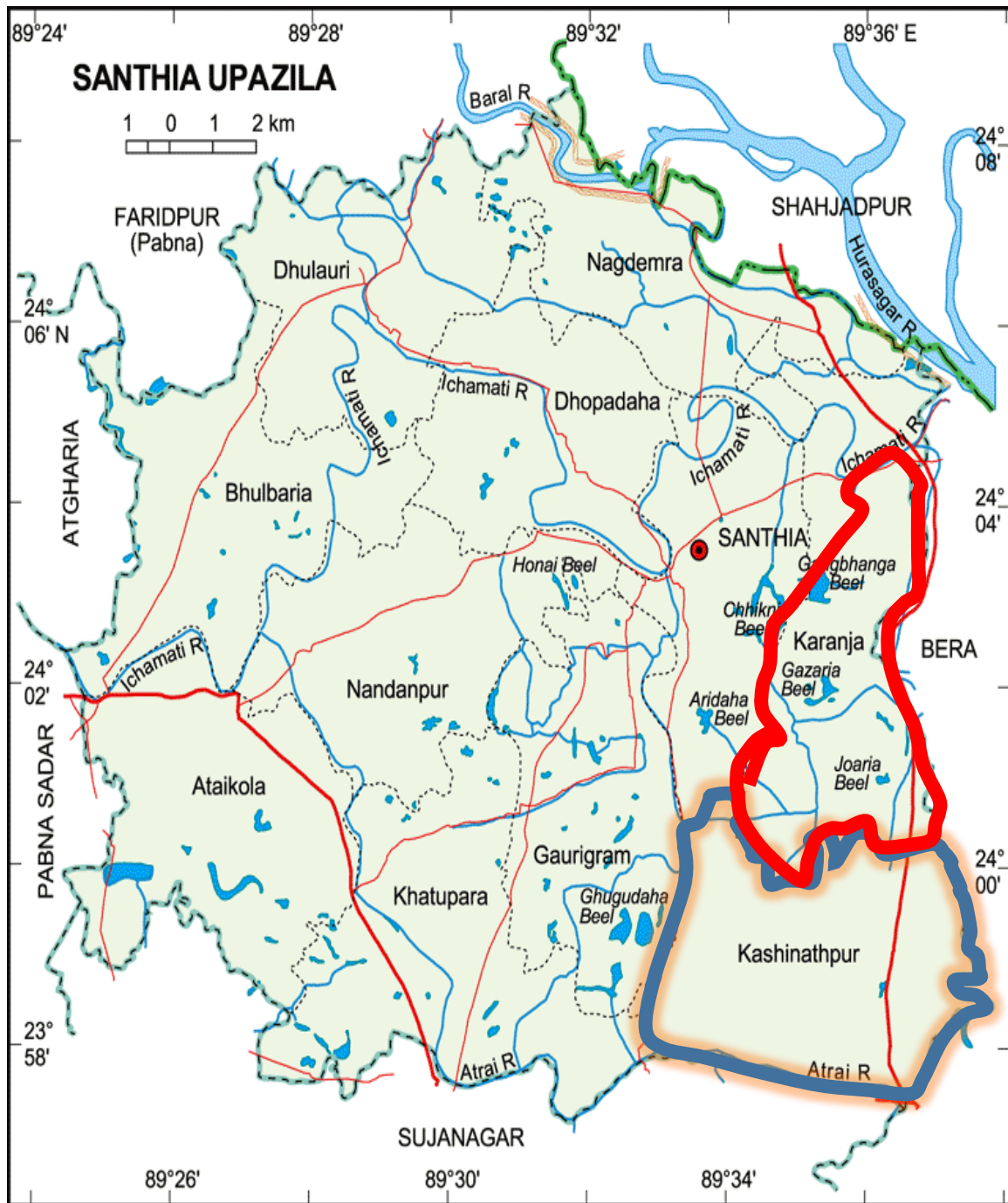


Figure 3.2: A map of Santhia upazila showing the study area

3.2 Distribution of the Population, Sample size and Reserve list

Three separate lists of onion growers of the selected four villages were prepared by the researcher herself with the help of the Sub-Assistant Agriculture Officer (SAAO) of Upazila Agriculture Office (UAO), Santhia. The list comprised a total of 1021 onion growers from which 268 farm family heads from Atiyapara village, 250 from Korial village under of Kashinathpur union and 214 from Karanja village and 289 from Sharisha village under the Karanja union which constituted the population of the study. The total onion cultivation farmers were 1021, among of those respondents comprised of 102 (10% of total population) farmers was the sample of the study.

A reserve list of 10 onion farmers was also prepared by the same method so that the respondents of this list could be used for interview if the respondents included in the original sample were not available at the time of conduction of interview. The distribution of the population sample and number of respondent in the reserve list (10%) are given in Table 3.1.

Table 3.1 Distribution of the farmers according to population and sample size and reserve list

Name of unions	Name of villages	Population	Sample size (10%)	Number of farmers included in the reserve list (10%)
Kashinathpur	Atiyapara	268	27	3
	Korial	250	25	2
Karanja	Karanja	214	21	2
	Sharisha	289	29	3
Total		1021	102	10

3.3 Measurement of Variables

The variable is a characteristic, which can assume varying or different values in successive individual cases. A research work usually contains at least two

important variables viz. independent and dependent variables. An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variable (Townsend, 1953). In the scientific research, the selection and measurement of variable constitute a significant task. Following this conception, the researcher reviewed literature to widen this understanding about the natures and scopes of the variables relevant to this research. At last she had selected 12 independent variables and one dependent variable. The independent variables were: age, level of education, farm size, onion cultivation area, annual family income, income from onion cultivation, training exposure, extension contact, onion cultivation experience, problem faced in onion cultivation, onion cultivation knowledge and attitude towards onion cultivation. The dependent variable of this study was the “use of modern onion cultivation practices”. The methods and procedures in measuring the variables of this study are presented below:

3.4 Measurement of Independent Variables

The 12 characteristics of the onion farmers mentioned above constitute the independent variables of this study. The following procedures were followed for measuring the independent variables.

3.4.1 Age

Age of respondent farmers was measured by the period of time from their birth to the time of conducting interview and it was measured in terms of complete years on the basis of their response. A score of one (1) was assigned for each year age. This variable appears in item number one (1) in the interview schedule as presented in Appendix- A.

3.4.2 Education

Education was measured by assigning score against each successful year of schooling by a respondent. One score was given for passing each level in an educational institution. For example, if a respondent passed the final examination of class five or equivalent examination, his/her education score has given five (5). Each respondent of can't read & write has given a score of zero (0). A person not knowing reading or writing but being able to sign only has given a score of 0.5. If a farmer did not go to school but took non-formal education, his educational status was determined as the equivalent to a formal school student. This variable appears in item number two (2) in the interview schedule as presented in Appendix- A.

3.4.3 Farm size

Farm size of a respondent referred to the total area of land on which his family carried out the farming operation, the area being in terms of full benefit to the family. The term refers to the cultivated area either owned by the respondent or cultivated on share-cropping, lease or taking from other including homestead area. It was measured in hectares for each respondent using the following formula:

$$FS = F_1 + F_2 + 1/2(F_3 + F_4) + F_5$$

Where, FS = Farm size,

F_1 = Homestead land (including pond and orchard),

F_2 = Land under own cultivation,

F_3 = Land given to others as barga,

F_4 = Land taken from others as barga,

F_5 = Land taken from others on lease,

The data was first recorded in terms of local measurement unit i.e. decimal and then converted into hectare. The total area, thus, obtained is considered as his farm

size score (assigning a score of one for each hectare of land). This variable appears in item number three (3) in the interview schedule as presented in Appendix -A.

3.4.4 Onion cultivation area

Onion cultivation area of a respondent was measured in terms of area covered by onion cultivation area by the respondent. It was expressed in hectare.

3.4.5 Annual family income

Annual family income of a respondent referred to the total earning by her/him and other members of her/his family from agriculture, livestock, poultry, fisheries, and other sources (service, business, daily wages by working, etc.) during a year. It was expressed in Taka. In measuring this variable, total earning of an individual respondent was converted into score. A score of one (01) was given for every one (01) thousand ('000') taka.

3.4.6 Income from onion cultivation

Income from onion cultivation of the respondents was measured in thousands taka on the basis of total annual income from onion cultivation. It was expressed in Taka. In measuring this variable, total earning of an individual respondent was converted into score. A score of one (01) was given for every one (01) thousand ('000') taka. This variable appears in item number six in the interview schedule as presented in Appendix-A.

3.4.7 Training exposure

Training exposure of the respondents was determined by the total number of days a respondent received training in his/her entire life on different production technology from different organizations. In a measuring score of 1 was assigned for each days of training. This variable appears in item number 7 in the interview schedule as presented in Appendix-A.

3.4.8 Extension contact

Extension contact of a respondent was measured by respondent's extent of contact with communication channels used by extension services. The degrees of contact was 'regularly', 'occasionally', 'rarely', 'not at all' against suitable scores are assigned as 3, 2, 1 and 0 respectively.

Degree of contact	Score
Regularly	3
Occasionally	2
Rarely	1
Not at all	0

If the number of communication channels are ten (10), then an individual respondent can obtain highest score 30 and minimum score 0 (zero).

3.4.9 Onion cultivation experience

In a measuring score of one (1) was assigned for each year of working experience of a respondent either in his own farm or to that of his parents. This variable appears in item number 9 in the interview schedule as presented in Appendix-A.

3.4.10 Problem faced in onion cultivation

Problem faced in onion cultivation, after thorough consultation with relevant experts, farmers and relevant a variable literature, 10 problems were selected related to onion cultivation for the study. A list of 10 probable problems that farmers could face in different aspects were listed and asked to indicate the extent of their problem faced in onion cultivation. It was measured by using a four point rating scale. For each problem score of 3, 2, 1 and 0 were assigned to indicate extent of problems as high, medium, low and no problem respectively. The problems score was computed for each respondent by adding his/her scores for all

10 problems. The possible range of problem scores thus could be 0 and 30. A total score of 30 indicated highest problems in respect of onion cultivation, while a score of 0 indicated no problems faced in onion cultivation.

3.4.11 Knowledge on onion cultivation

Knowledge on onion cultivation of the farmers referred to the knowledge gained by the respondent in onion cultivation activities. A scale consisting of 17 questions was used to determine the onion cultivation knowledge score of the respondents. The questions were selected from different dimensions of onion cultivars after thorough consultation with the relevant experts and review of relevant literatures as shown in Appendix A. The score allotted for each question was 2. A respondent could get 2 score against each question for correct response and 0 for wrong or no response and partial score was assigned for partially correct answer. Thus, onion cultivation knowledge score of the respondents could range from 0 to 34, where 0 indicated no knowledge on onion cultivation and 34 indicated highest knowledge on onion cultivation. This variable appears in item number 11 in the interview schedule as presented in Appendix-A.

3.4.12 Attitude towards onion cultivation

Attitude towards onion cultivation was measured by developing an attitude scale through Puttaswamy (1977) given scale that developed a scale to measure the attitude of village extension workers towards training and visit system in Indian context. Here five-point Likert method of summated ratings was used to find out the attitude towards onion cultivation.

Ten statements expressing attitude towards onion cultivation were constructed. Out of these ten statements those were positive. Scoring was done by assigning 4, 3, 2, 1 and 0 scores to the five alternative responses as "strongly agreed", "agreed", "undecided", "disagreed", and "strongly disagreed", respectively in case of a

statement. However, attitude towards onion cultivation of a farmer was obtained by summing up his/her scores for all the ten statements in item no. 12 in the interview schedule. Attitude score, thus, obtained for a respondent could range from zero (0) to 48, where zero (0) indicated no attitude and 48, indicated highest level of attitude.

3.5 Measurement of Dependent Variable

Use of modern onion cultivation practices of the farmers referred to the knowledge gained by the respondent in onion cultivation activities.

Ten statements expressing use of modern onion cultivation practices were constructed. Out of these nine statements those were positive. Scoring was done by assigning 3, 2, 1 and 0 scores to the four alternative responses as "regularly", "occasionally", "rarely" and "not at all", respectively in case of a statement. However, use of modern onion cultivation practices of a farmer was obtained by summing up his/her scores for all the nine statements in item no. 13 in the interview schedule. Use of modern onion cultivation practices score, thus, obtained for a respondent could range from zero (0) to 27, where zero (0) indicated no practice and 27, indicated high practice.

3.6 Statement of the Hypothesis

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

3.6.1 Research hypothesis

The following research hypothesis was put forward to know the contribution of each of the 12 selected characteristics of the onion cultivars on their use of modern onion cultivation practices.

Hypothesis: “Each of the ten selected characteristics of the onion cultivars has contribution to their use of modern onion cultivation practices.”

3.6.2 Null hypothesis

A null hypothesis states that there is no contribution of independent variables to the dependent variable. The following null hypothesis was undertaken for the present study:

H₀: There is no contribution of the selected characteristics of onion cultivars to their use of modern onion cultivation practices.

If a null hypothesis is rejected on the basis of statistical tests, it is assumed, that there is a contribution of the concerned characteristics of the onion cultivars to the use of modern onion cultivation practices.

3.7 Instrument for Collection of Data

In order to collect reliable and valid information from the respondents, an interview schedule was prepared for collection of data from respondents keeping the objectives of the study in mind. The question and statements contained in the schedule were simple, direct and easily understandable by the farmers. Simple and direct question, different scales, closed and open form statements and questions were included in the interview schedule to obtain necessary information. The draft interview schedule was prepared in accordance with the objective of the study.

The interview schedule was pre-tested with 10 respondents of the farmers in the study area during 05 January to 06 February, 2021.

The draft interview schedule was pretested in actual field situation before finalizing it for collection of data. The pre-test was helpful to identify inappropriate questions and statements in the draft schedule. Necessary addition, alternation and adjustments were made in the schedule on the basis of the experience of the pretest. The interview schedule was then printed in its final form. An English version of the interview schedule has been shown in Appendix-A.

3.8 Data Collection

Data were collected personally by the researcher herself through personal interview schedule from the sampled farm families of the selected villages. Before starting the collection of data; the researcher met the respective Upazila Agriculture Officer (UAO), Additional Agriculture Extension Officer (AAEO) and the concerned Sub-Assistant Agriculture Office (SAAO). The researcher also discussed the objectives of the present study with the respondents and above mentioned officers and requested them to provide actual information. A rapport was established with the rural people so that they feel easy to answer the questions. The researcher took all possible care to establish rapport with the respondents so that they would not feel any indecision while starting the interview. Very good cooperation was obtained from the field extension workers and the local leaders. No serious difficulty was faced by the researcher during the collection of data. The interviews were made individually in the places of respondents. Questions were asked in direct manner so that the respondents could easily understand the questions. Whenever a respondent faced difficulty in understanding any questions, care was taken to explain the same clearly with a view to enabling him to answer it properly.

Before going to the respondents' home for interviewing they were informed verbally to ensure their availability at home as per schedule date and time. In the case of failure to collect information from the respondents due to their other business, a revisit was made with prior to appointments. Data were collected during 15th February, 2021 to 15th March, 2021.

3.9 Compilation of Data

After completion of field survey, data recorded in the interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. In this process, all the responses in the interview schedule were given numerically coded values. Local units were converted into standard units and qualitative data were converted into quantitative ones by means of suitable scoring whenever necessary. All the collected data were checked and cross-checked before transplanting to the master sheets. To facilitate tabulation, the collected data were properly coded and transferred from interview schedule to a master sheet. Tabulation and cross tabulation was done on the basis of categorization developed by the researcher.

3.10 Categorization of Data

For describing the various independent and dependent variables the respondents were classified into various categories. In developing categories, the researcher was guided by the nature of data and general consideration prevailing on the social system. The procedures have been discussed while describing the variable in the sub-subsequent sections of next chapter.

3.11 Statistical Analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Sciences) computer

program, version 20. Statistical measures as a number, range, mean, standard deviation were used in describing the variables whenever applicable. Linear multiple regressions analysis was used to determine the contribution of farmers with regard to their use of modern onion cultivation practices based on selected characteristics. Throughout the study the 0.01 and 0.05 levels of probability was used as the basis of rejection or accepting a null hypothesis.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter deals with the result and discussion of present research work. Necessary explanations and appropriate interpretations have also been made showing possible and logical basis of the findings. However, for convenience of the discussions, the findings are systematically presented in the following sections.

4.1 Selected Characteristics of the Farmers

Twelve characteristics of the farmers were selected for this research. The characteristics include: age, level of education, farm size, onion cultivation area, annual family income, income from onion cultivation, training exposure, extension contact, onion cultivation experience, problem faced in onion cultivation, onion cultivation knowledge and attitude towards onion cultivation. Some descriptive statistics of these features are given in Table 4.1 Data contained in the Table 4.1 reveal the salient features of the characteristics of the farmers in order to have an overall picture of these characteristics at a glance. However, for ready reference, separate tables are provided while presenting categorizations, discussing and /or interpreting results concerning each of the characteristics in this chapter.

Table 4.1 The salient features of the selected characteristics of the farmers

Categories	Measuring Unit	Range		Mean	S D
		possible	observed		
Age	Years	-	20-67	44.07	8.71
Level of education	Year of schooling	-	00-16.00	5.39	4.23
Farm size	Hectare		0.15-3.99	.74	.61
Onion cultivation area	Hectare	-	.13-1.37	.29	.16
Annual family income	'000' Tk.		20-395	106.58	71.09
Income from onion cultivation	'000' Tk	-	22-65	53.49	9.01
Training exposure	Days	-	0-11	2.12	1.03
Extension contact	Score	0-30	8-24	15.53	5.25
Onion cultivation experience	Score	-	2-20	8.59	3.64
Problem faced in onion cultivation	Score	0-30	9-26	16.23	3.29
Onion cultivation knowledge	Score	0-34	12-34	27.77	5.78
Attitude towards onion cultivation	Score	0-48	13-38	28.84	4.59

4.1.1 Age

The age score of the winter vegetable farmers ranged from 20 to 67 with an average of 44.07 and a standard deviation of 8.71. Considering the recorded age farmers were classified into three categories namely young, middle and old aged following (MoYS, 2012). On the basis of their age, the farmers were classified into three categories: “young” (up to 35), “middle aged” (36- 50) and “old” (above 50). The distribution of the farmers according to their age is shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their age

Categories	Farmers		Mean	SD
	Number	Percent		
Young aged (up to 35)	18	17.65	44.07	8.71
Middle-aged (36-50)	65	63.72		
Old (>50)	19	18.63		
Total	102	100		

Table 4.2 indicates that the majority (63.72 percent) of the respondents were the middle-aged category while 17.65 percent and 18.63 percent were found young and old categories respectively. The mean value (44.07) rightly indicates the reality. The overwhelming majority (82.35 percent) of the farmers were middle to old aged. This means that cultivation in the study area is being managed by comparatively older farmers.

4.1.2 Education

Educational qualification of the respondents' has been categorized as done by Sadekuzzaman (2007). Education of the farmers ranged from 0 to 16 years of schooling having an average of 5.39 years with a standard deviation of 4.23. Based on their education scores, the farmers were classified into four categories namely illiterate (0-0.5), primary education (1-5), secondary education (6-10) and above secondary (above 10). The distribution of the farmers according to their education is shown in Table 4.3.

Table 4.3 Distribution of the farmers according to their education

Categories	Farmers		Mean	SD
	Number	Percent		
Illiterate(0-0.5)	30	29.41	5.39	4.23
Primary level(1-5)	23	22.55		
Secondary level(6-10)	35	34.31		
Above secondary level(>10)	14	13.73		
Total	102	100		

Data contained in Table 4.3 indicates the 34.31 percent of the farmers were secondary level of education. It was found that 29.41 percent were illiterate, 22.55 percent were primary level of education and 13.73 percent were above secondary level of education. Thus, the overwhelming majority (56.86 percent) of the farmers were education ranging from primary to secondary level of education. The findings thus, indicate that the current literacy rate in the study area is lower than that of the national average of 73.9 percent (BBS, 2020).

4.1.3 Farm size

Farm size of the respondents varied from 0.15 to 3.99 hectare and the average being .74 hectare and standard deviation of 0.61. According to the farm size of the farmers, they were classified into four categories as suggested by DAE (1999) “Marginal (up to 0.2 ha)”, “Small (0.21-1 ha)”, “Medium (1.01-3 ha)” and “Large (>3 ha)”. The distribution of the farmers according to their farm size is shown in Table 4.4.

Table 4.4 Distribution of the farmers according to their farm size

Categories	Farmers		Mean	S D
	Number	Percent		
Marginal farm (up to 0.2 ha)	2	1.96	0.74	0.61
Small farm (0.21-1.0 ha)	87	85.29		
Medium farm (1.01-3.0 ha)	9	8.82		
Large farm (above 3 ha)	4	3.92		
Total	102	100		

Similar result was observed Sadekuzzaman (2007) where highest respondents were small farm sized. Data contained in table 4.4 indicates the 85.29 percent of the farmers had small land while 8.82 percent of them had medium land, 3.92 percent of them were large farmer and only 1.96 percent of the farmers had marginal farm size.

4.1.4 Onion cultivation area

The onion cultivation area of the farmers ranged from 0.13 to 1.37 hectares and the mean was 0.29 hectares with standard deviation of 0.16. According to the farm size of the farmers, they were classified into three categories as suggested by DAE (1999) “Marginal (up to 0.2 ha)”, “Small (0.21-1 ha)” and “Medium (1.1-3 ha)”. The distribution of the farmers according to their farm size is shown in Table 4.5.

Table 4.5 Distribution of the farmers according to their onion cultivation area

Categories	Farmers		Mean	SD
	Number	Percent		
Marginal farm (up to 0.2 ha)	36	35.29	0.29	0.16
Small farm (0.21-1.0 ha)	63	61.76		
Medium farm (1.01-3.0 ha)	3	2.94		
Total	102	100		

Similar result was observed Sadekuzzaman (2007) where highest respondents were small farm sized. Above half (61.76 percent) of the farmers had small onion cultivation area compared to 35.29 percent had marginal and 2.94 percent had medium onion cultivation area.

4.1.5 Annual family income

The annual family income of the farmers ranged from Tk. 20 thousand to Tk. 395 thousand with an average of Tk. 106.68 thousand and standard deviation of 71.09 thousand. Based on the annual income, the farmers were divided into three categories (Mean±SD) as shown in Table 4.6.

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

Categories	Farmers		Mean	SD
	Number	Percent		
Low (up to 35)	8	7.84	106.58	71.09
Medium (36-177)	79	77.45		
High (above 177)	15	14.71		
Total	102	100		

Sadekuzzaman (2007) found the similar result where highest number of respondents were medium annual income. From the Table 4.6 it was observed that the highest portion (77.45 percent) of the farmers had medium annual family income compared to 7.84 percent having low and 14.71 percent had high annual family income.

4.1. 6 Income from onion cultivation

Income from onion cultivation of the farmers ranged from Taka 22 thousand to 65 thousand, the mean being 53.49 thousand and standard deviation 6.01 thousand. On the basis of their annual income scores, the farmers were divided into three categories: “low income” (up to 44), “medium income” (45-62) and “high income” (above 62). The distribution of the farmers according to their income from onion cultivation is shown in Table 4.7.

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

Categories	Farmers		Mean	SD
	Number	Percent		
Low (up to 44)	15	14.71	53.49	9.01
Medium (45-62)	75	73.53		
High (above 62)	12	11.76		
Total	102	100		

Similar result was observed Sadekuzzaman (2007) where highest respondents were medium income. The majority (73.53 percent) of the farmers had medium income compared to 14.71 percent of them having low income and 11.76 percent had high income. Thus, the vast majority (84.76 percent) of the farmers had medium to high income, indicating that onion cultivation is usually practiced by the farmers of comparatively lower economic standings.

4.1.7 Training exposure

The observed training exposure of the farmers ranged from 0-11 days, the mean being 2.12 and standard deviation of 1.03. According to their observed ranged of training exposure scores, the farmers were classified into four categories as shown in Table 4.8.

Table 4.8 Distribution of the farmers according to their training exposure

Categories	Farmers		Mean	SD
	Number	Percent		
No (0)	34	33.33	2.12	1.03
Low (up to 4)	49	48.04		
Medium (5-8)	15	14.71		
High (above 8)	4	3.92		
Total	102	100		

Data presented in the Table 4.8 indicated that 48.04 percent of the farmers had low training exposure compared to 33.33 percent had no training and 14.71 percent had medium training exposure and only 3.92 percent of the farmers had high training exposure. Findings again revealed that almost all (81.35 percent) of the farmers had low to no training exposure.

4.1.8 Extension contact

The observed extension contact scores of the farmers ranged from 8-24 against the possible range of 0 to 30, the mean being 15.53 and standard deviation of 5.25. According to their observed ranged of extension contact scores, the farmers were classified into three categories (Mean±SD) as shown in Table 4.9.

Table 4.9 Distribution of the farmers according to their extension contact

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 10)	19	18.63	15.53	5.25
Medium (11-20)	67	65.69		
High (above 20)	16	15.68		
Total	102	100		

Similar result was observed Sadekuzzaman (2007) where highest respondents were medium extension contact. Data presented in the Table 4.9 indicated that 65.69 percent of the farmers had medium extension contact compared to having 18.63 percent low and 15.68 percent had high extension contact. Findings again revealed that almost all (84.32 percent) of the farmers had low to medium

extension contact.

4.1.9 Onion cultivation experience

The observed onion cultivation experience of the farmers ranged from 2-20, the mean being 8.59 and standard deviation of 3.64. According to their observed ranged of onion cultivation experience scores, the farmers were classified into three categories (Mean±SD) as shown in Table 4.10.

Table 4.10 Distribution of the farmers according to their onion cultivation experience

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 5)	21	20.59	8.59	3.64
Medium (6-11)	61	59.80		
High (above 11)	20	19.61		
Total	102	100		

Similar result was observed Sadekuzzaman (2007) where highest respondents were medium experience. Data presented in the Table 4.10 indicated that 59.80 percent of the farmers had medium onion cultivation experience compared to having 20.59 percent low and 19.61 percent medium onion cultivation experience. Findings again revealed that almost all (80.39 percent) of the farmers had low to medium onion cultivation experience.

4.1.10 Problems faced in onion cultivation

Problem defined by Goode (1945) is, any significant perplexing and challenging situation, real and artificial, the solution of which requires reflective “thinking”. Problem faced, therefore, refers to the extent to which individual faces difficult situations about which something needs to be done. In this study, the computed Problems Faced by the farmers in onion cultivation scores ranged from 9 to 26 against the possible 0 to 30. The mean score was 16.23 and standard deviation was 3.29. Based on the problems faced scores, the farmers were classified into three categories as shown in Table 4.11.

Table 4.11 Distribution of the respondents according to their problem faced in onion cultivation

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 13)	28	27.45	16.23	3.29
Medium (14-19)	56	54.90		
High (above 19)	18	17.65		
Total	102	100		

The Table 4.11 indicates that the majority (54.90 percent) of the farmers faced medium problem while 27.45 percent of the farmers faced low problem. Comparatively few farmers (17.65 percent) faced high problem in onion cultivation. The findings again revealed that an overwhelming majority (72.55 percent) of the farmers faced medium to high problem.

4.1.11 Onion cultivation knowledge

Onion cultivation knowledge of the farmers ranged from 12 to 34. The average was 27.77 with a standard deviation of 5.78. On the basis of their knowledge, the farmers were classified into the following three categories (Mean \pm SD): "low knowledge" (up to 22), "medium knowledge" (23-32) and "high knowledge" (above 32). Table 4.12 contains the distribution of the farmers according to their knowledge.

Table 4.12 Distribution of the respondents according to their onion cultivation knowledge

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 22)	4	3.92	27.77	5.78
Medium (23-32)	84	82.36		
High (above 32)	14	13.72		
Total	102	100		

Table 4.12 showed that the majority of the 82.36 percent of the farmers had "medium knowledge" compared to more different than 13.72 percent of them

having "high knowledge". The proportion of "low knowledge" was 3.92 percent. Thus 86.28 percent of the farmers had low to medium knowledge.

4.1.12 Attitude towards onion cultivation

The score of attitude towards onion cultivation of the farmers ranged from 13 to 38 against the possible 0 to 44, the mean being 28.84 and standard deviation of 4.59. Based on attitude towards onion cultivation range, the farmers were classified into three categories as shown in Table 4.13.

Table 4.13 Distribution of the respondents according to their attitude towards onion cultivation

Categories (Scores)	Farmers		Mean	SD
	Number	Percent		
Low (up to 24)	12	11.76	28.84	4.59
Medium (25-32)	81	79.42		
High (above 32)	9	8.82		
Total	102	100		

Data contained in Table 4.13 indicates that 79.41 percent of the farmers had medium attitude towards onion cultivation; while 11.76 percent of the farmer's had low attitude towards onion cultivation and 8.82 percent had high attitude towards onion cultivation. Thus, about 91.18% of farmers had low to medium attitude towards onion cultivation.

4.2 Use of modern onion cultivation practices

The observed farmers' use of modern onion cultivation practices scores of the farmers ranged from 18-26 against the possible range of 0 to 27, the mean being 18.31 and standard deviation of 4.84. According to their observed ranged of farmers' use of modern onion cultivation practices scores, the farmers were classified into three categories (Mean±SD) as shown in Table 4.14.

Table 4.14 Distribution of farmers according to their use of modern onion cultivation practices

Categories	Farmers		Mean	SD
	Number	Percent		
Low practice (up to 14)	28	27.45	18.31	4.84
Medium practice (15-22)	54	52.94		
High practice (>22)	20	19.61		
Total	102	100		

Data presented in the Table 4.14 indicated that the majority 52.94 percent of the farmers had medium use of modern onion cultivation practices compared to having 19.61 percent high and 27.45 percent had low use of modern onion cultivation practices. Findings again revealed that almost all (80.39 percent) of the farmers had medium to high use of modern onion cultivation practices.

4.3 The Contribution of the selected characteristics of the respondents to their use of modern onion cultivation practices

In order to estimate the use of modern onion cultivation practices, the step wise multiple regression analysis was used which is shown in the Table 4.15.

Table 4.15 Summary of stepwise multiple regression analysis showing the contribution of all the 12 independent variables to their use of modern onion cultivation practices

Dependent variable	Independent variables	B	p	R ²	Adj. R ²	F
Use of modern onion cultivation practices	Age	0.106	0.215 ^{NS}	0.531	0.468	12.32
	Level of education	0.207	0.021*			
	Farm size	0.012	0.906 ^{NS}			
	Onion cultivation area	0.093	0.300 ^{NS}			
	Annual family income	0.080	0.404 ^{NS}			
	Income from onion cultivation	0.030	0.699 ^{NS}			
	Training exposure	0.530	0.001**			
	Extension contact	0.011	0.897 ^{NS}			
	Onion cultivation experience	0.174	0.044*			
	Problem faced in onion cultivation	-0.057	0.454 ^{NS}			
	Onion cultivation knowledge	0.209	0.037*			
	Attitude towards onion cultivation	0.004	0.967 ^{NS}			

** Significant at p<0.01; *Significant at p<0.05 and ^{NS}Not significant

Results presented in the Table 4.15 show that education, training exposure, onion cultivation experience and onion cultivation knowledge of the respondents had significant positive contribution with their use of modern onion cultivation practices. Of these, training exposure was the most important contributing factors (significant at the 1% level of significant) and education, onion cultivation experience and onion cultivation knowledge of the respondents were less important contributing factors (significant at 5% level of significant). Coefficients of other selected variables don't have any contribution on their use of modern onion cultivation practices .

The value of R² is a measure of how of the variability in the dependent variable is accounted by the independent variables. So, the value of R² = 0.531 means that

independent variables account for 53.1% of the variation with their use of modern onion cultivation practices. The F ratio is 12.32 which is highly significant ($p < 0$).

However, each predictor may explain some of the variance in respondents their use of modern onion cultivation practices simply by chance. The adjusted R^2 value penalizes the addition of extraneous predictors in the model, but value 0.468 is still show that variance is farmers their use of modern onion cultivation practices can be attributed to the predictor variables rather than by chance (Table 4.14). In summary, the models suggest that the respective authority should be considers the farmers' education, training exposure, onion cultivation experience and onion cultivation knowledge of the farmers in use of modern onion cultivation practices and in this connection some predictive importance has been discussed below:

4.3.1 Significant contribution of training exposure to their use of modern onion cultivation practices

From the multiple regression, it was concluded that the contribution of training exposure to their use of modern onion cultivation practices was measured by the testing the following null hypothesis;

“There is no contribution of training exposure to their use of modern onion cultivation practices”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the training was significant at 1% level (0.001)
- b. So, the null hypothesis could be rejected.
- c. The direction between training and use of modern onion cultivation practices was positive.

The β -value of training exposure was (0.530). So, it can be stated that as training exposure increased by one unit, farmers' use of modern onion cultivation practices increased by 0.530 units.

Based on the above finding, it can be said that farmers had more training increased the use of modern onion cultivation practices. So, training has high significantly contributed to the farmers' use of modern onion cultivation practices. Training helps farmers to gather more knowledge on use of modern onion cultivation practices which ultimately helps farmers to reduce their problems in onion cultivation.

4.3.2 Significant contribution of education of the farmers to their use of modern onion cultivation practices

The contribution of education of farmers to their use of modern onion cultivation practices was measured by the testing the following null hypothesis;

“There is no contribution of education of the farmers' to their use of modern onion cultivation practices”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the education was at 5% significance level (.021).
- b. So, the null hypothesis could be rejected.
- c. The direction between education and use of modern onion cultivation practices was positive.

The β -value of level education is (0.207). So, it can be stated that as education increased by one unit, farmers' use of modern onion cultivation practices increased by 0.207 units.

Based on the above finding, it can be said that farmers' education increased the farmers' use of modern onion cultivation practices. So, education has significantly contributed to the farmers' use of modern onion cultivation practices. Education plays an important role to reduce problems in use of modern onion cultivation practices in many cases. Education enhances knowledge on many aspects such as training, participation, extension contact and so on.

4.3.3 Contribution of onion cultivation experience of the farmers to their use of modern onion cultivation practices

From the multiple regression, it was concluded that the contribution of onion cultivation experience to the farmers' use of modern onion cultivation practices was measured by the testing the following null hypothesis;

“There is no contribution of onion cultivation experience to the farmers' on use of modern onion cultivation practices”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the onion cultivation experience was significant at 5% level (.044)
- b. So, the null hypothesis could be rejected.
- c. The direction between onion cultivation experience and use of modern onion cultivation practices was positive.

The β -value of onion cultivation experience is (0.174). So, it can be stated that as onion cultivation experience increased by one unit, farmers' use of modern onion cultivation practices increased by 0.174 units.

Based on the above finding, it can be said that farmers' had more onion cultivation experience increased farmers' use of modern onion cultivation practices. So, onion cultivation experience has high significantly contributed to the farmers' use of

modern onion cultivation practices increased. Onion cultivation experience increase farmer's knowledge about various aspects which helps farmers make enough reduce their problem in use of modern onion cultivation practices.

4.3.4 Significant contribution of onion cultivation knowledge to their use of modern onion cultivation practices

From the multiple regression, it was concluded that the contribution of onion cultivation knowledge to their use of modern onion cultivation practices was measured by the testing the following null hypothesis;

“There is no contribution of onion cultivation knowledge to their use of modern onion cultivation practices”.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

- a. The contribution of the onion cultivation knowledge was significant at 5% level (.037)
- b. So, the null hypothesis could be rejected.
- c. The direction between onion cultivation knowledge and use of modern onion cultivation practices was positive.

The β -value of onion cultivation knowledge was (0.209). So, it can be stated that as onion cultivation knowledge increased by one unit, farmers' use of modern onion cultivation practices increased by 0.209 units.

Based on the above finding, it can be said that farmers had more onion cultivation knowledge increased farmers' use of modern onion cultivation practices. So, knowledge in hybrid rice seed production has high significantly contributed to the farmers' use of modern onion cultivation practices increased.

CHAPTER V
SUMMARY OF THE FINDINGS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Summary of the Findings

5.1.1 Individual characteristics of the farmers

Age: The majority (63.72 percent) of the respondents were the middle-aged category while 17.65 percent and 18.63 percent were found young and old categories respectively.

Education: The majority 34.31 percent of the farmers were secondary level of education. It was found that 29.41 percent were illiterate, 22.55 percent were primary level of education and 13.73 percent were above secondary level of education.

Farm size: The majority 85.29 percent of the farmers had small land while 8.82 percent of them had medium land, 3.92 percent of them were large farmer and only 1.96 percent of the farmers had marginal farm size.

Onion cultivation area: Above half (61.76 percent) of the farmers had small onion cultivation area compared to 35.29 percent had marginal and 2.94 percent had medium onion cultivation area.

Annual family income: The highest portion (77.45 percent) of the farmers had medium annual family income compared to 7.84 percent having low and 14.71 percent had high annual family income.

Income from onion cultivation: The majority (73.53 percent) of the farmers had medium income compared to 14.71 percent of them having low income and 11.76

percent had high income.

Training exposure: The highest 48.04 percent of the farmers had low training exposure compared to 33.33 percent had no training and 14.71 percent had medium training exposure and only 3.92 percent of the farmers had high training exposure.

Extension contact: The majority 65.69 percent of the farmers had medium extension contact compared to having 18.63 percent low and 15.68 percent had high extension contact.

Onion cultivation experience: The highest 59.80 percent of the farmers had medium onion cultivation experience compared to having 20.59 percent low and 19.61 percent had high onion cultivation experience.

Problems Faced by the Farmers in onion cultivation: The majority (54.90 percent) of the farmers faced medium problem while 27.45 percent of the farmers faced low problem. Comparatively few farmers (17.65 percent) faced high problem in onion cultivation.

Onion cultivation knowledge: The majority of the 82.36 percent of the farmers had "medium knowledge" compared to more different than 13.72 percent of them having "high knowledge". The proportion of "low knowledge" was 3.92 percent.

Attitude towards onion cultivation: The majority 79.41 percent of the farmers had medium attitude towards onion cultivation; while 11.76 percent of the farmer's had low attitude towards onion cultivation and 8.82 percent had high attitude towards onion cultivation.

5.1.2 Use of modern onion cultivation practices

The observed farmers' use of modern onion cultivation practices scores of the farmers ranged from 18-26 against the possible range of 0 to 27, the mean being 18.31 and standard deviation of 4.84. The highest 52.94 percent of the farmers had medium use of modern onion cultivation practices compared to having 19.61 percent high and 27.45 percent had low use of modern onion cultivation practices.

5.1.3 The Contribution of the selected characteristics of the respondents to their use of modern onion cultivation practices

Among 12 selected characteristics of the farmers four characteristics namely, education, training exposure, onion cultivation experience and onion cultivation knowledge of the respondents had significant positive contribution with their use of modern onion cultivation practices. The rest eight characteristics namely, age, farm size, onion cultivation area, annual income family income, income from onion cultivation, extension contact, problem faced in onion cultivation and attitude towards onion cultivation had no significant contribution with their use of modern onion cultivation practices .

5.2 Conclusions

Following conclusions were drawn on the basis of findings, logical interpretation and other relevant facts of the study:

1. Among the farmers, the highest proportion (52.94 percent) belonged to the medium group of practice compared to 19.61 percent and 27.45 percent in high and low use of modern onion cultivation practices. Therefore, it may be concluded that there is scope to increase the extant of use of modern onion cultivation practices by the farmers.
2. About 29.41 percent of the farmers were illiterate. There existed a positive significant contribution with their use of modern onion cultivation

practices. Therefore, it may be concluded that an appreciable proportion of the farmers will not continue to face problems in use of modern onion cultivation practices, if suitable steps are taken to remove illiteracy from the farmers.

3. Most of the farmers (81.35 percent) had no training to low training. Findings expressed that training exposure of the farmers had significant positive contribution with their use of modern onion cultivation practices. So, it may be concluded that the farmers having higher training exposure might be interested to use of modern onion cultivation practices more.
4. Farmer's onion cultivation knowledge had significant contribution to the use of modern onion cultivation practices in the study area. The majority (86.28%) of the farmers had medium to low knowledge on use of modern onion cultivation practices. It is therefore concluded that if the farmer's knowledge is increase, the use of modern onion cultivation practices will increase.
5. Onion cultivation experience of the onion growers showed positive significant contribution with their use of modern onion cultivation practices in the study area. About 80.39 percent of the onion growers had low to medium experience in onion cultivation. This means the higher experience of the growers; the higher be their use of modern onion cultivation practices.

5.3 Recommendations

Recommendations based on the findings and conclusions of the study have been presented below:

5.3.1 Recommendation for policy implication

1. The level of use of modern onion cultivation practices was encouraging. However, there is a need of efforts for even wide use of modern onion cultivation

practices by the onion growers. So, it may be recommended that favorable initiatives taken by the concerned authorities like DAE, BADC and other private providers may lead to more use of modern onion cultivation practices by farmers.

2. The findings of the study indicated that education had significant positive contribution with their use of modern onion cultivation practices. Therefore, it may be recommended that the concerned authorities should take the special mass education program for the illiterate and low lettered farmers for solving their problems.

3. The findings revealed that the training exposure had a significant positive contribution with their use of modern onion cultivation practices. So, it may be recommended that the concerned authority should increase training facilities to develop skills of the farmers technologically so that they can minimize their problems in use of modern onion cultivation practices.

4. The onion cultivation experience of the growers had high significant positive contribution with their use of modern onion cultivation practices. It leads to the recommendation that extension service should provide adequate farm management advice to the growers for increasing their farming experience. It is a fact that if experience were increased, growers' receptive capacity to use of modern onion cultivation practices will be increased and thereby production will be increased.

5. The onion cultivation knowledge of the growers had significant positive contribution with their use of modern onion cultivation practices. It is a fact that if knowledge on onion cultivation will increase, growers' receptive capacity to use of modern onion cultivation practices will be increased and thereby production will be increased.

5.3.2 Recommendations for further study

- 1.** The study was conducted on the farmers of only one selected area of Santhia upazila under Pabna district. Finding of the study need verification by similar research in other areas of the country including areas where use of modern onion cultivation practices is yet to get popularity.
- 2.** Contributions of 12 characteristics of farmers with their use of modern onion cultivation practices have been investigated in this study. Further research should be conducted to find out contribution of the other personal characteristics of the farmers with their others problems.
- 3.** In addition to use of modern onion cultivation practices, those might have other factors relative to their social, economic, housing, sanitation, nutrition and domestic etc. Therefore, it may be recommended that research should be conducted relation to other factors of the farmers.
- 4.** Research should also be undertaken to identify the factors causing hindrance towards the use of modern onion cultivation practices . Further research should be taken related to other issues like knowledge, other crops problems, adoption etc.

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Appendix-A

English Version of the Interview Schedule
Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University, Dhaka-1207

Interview schedule for data collection for the research on **USE OF MODERN ONION CULTIVATION PRACTICES BY THE FARMERS OF PABNA DISTRICT**

Respondent No
Name of the respondent
Village:
Union:

Upazilla:
District:

(Please provide following. Your information will be kept confidential and will be used for research purpose only)

1. Age

What is your present age?

2. Level of Education

- a) Can't read and write
- b) Can sign only
- c) I read up to class

3. Farm Size

Please indicate your area of lands according to use

Sl No	Use of land	Land Possession	
		Local Unit	Hectare
1	Homestead area (A_1)		
2	Own land own cultivation (A_2)		
3	Land taken from other on barga system (A_3)		
4	Land given to other on barga system (A_4)		
5	Land take from other on lease (A_5)		
Total			

Total farm size - = $A_1 + A_2 + \frac{1}{2} (A_3 + A_4) + A_5$

4. Onion cultivation area

Please indicate your land under onion cultivation (local unit)hectare.

5. Annual Family Income

Mention your annual family income from the following sources

Income sources	Income in '000 Tk
Agricultural Sources	
Corp	
a) Rice	
b) Jute	
c) Wheat	
d) Sugarcane	
e) Vegetables	
f) Other crops	
Livestock	
Poultry	
Fisheries	
Non-Agricultural sources	
i) Business	
ii) Job	
iii) Laborer	
iv) Others	
Total	

6. Income from Onion Cultivation

Products name	Production (Unit)	Per Unit price	Total
Onion			
Sampling			
Total			

7. Training Exposure

Have you received any training on onion cultivation

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

If yes, please give the following information:

Sl no	Subject of training	Duration of training (Days)
1		
2		
3		
4		
5		

8. Extension Contact

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

Sl no	Categories or farmers	Extent of participation			
		Regularly (3)	Occasionally (2)	Rarely (1)	Never (0)
1	Model farmers				

2	Agricultural input dealer				
3	NGO worker				
4	Sub-Assistant Agriculture Officer				
5	Upazila Agriculture officer				
6	Television program				
7	Radio				
8	Publication like newspaper, poster, leaflet etc				
9	Group discussion				
10	Meeting				

9. Onion cultivation experience

Mention your experience in onion cultivationyears.

10. Problems faced in onion cultivation

Sl no	Problem	Extent of problems			
		High (3)	Medium (2)	Low (1)	Not at all (0)
1	Degeneration of onion cultivar				
2	High production cost				
3	Short shelf life of onion				
4	Lack of storehouse				
5	Lack of money				
6	Inadequate training facilities				
7	Insect and disease attack				
8	Heavy rain and sunlight				
9	Lack of proper marketing facilities				
10	Poor communication system				

10. Onion Cultivation knowledge

Please give your answers to the following questions

Sl no	Questions	Full marks	Mark obtained
1	Name two varieties of onion	2	
2	What is suitable soil for onion cultivation?	2	
3	Which varieties of onion are profitable for our country?	2	
4	Mention the suitable time of the year for onion	2	

	cultivation		
5	What types of fertilizers are required in onion cultivation?	2	
6	Mention the harmful weeds in onion field	2	
7	Name of two diseases of onion	2	
8	Name two harmful insects of onion	2	
9	What types of control measures do you use to control diseases and insects?	2	
10	Which technique is better for onion propagation?	2	
11	What are the ripening indices of onion?	2	
12	How can you manage degeneration of onion cultivar?	2	
13	What is the suitable time for onion harvesting?	2	
14	How many times required for onion cultivation?	2	
15	Do you know why we use bulb for its propagation, not seeds?	2	
16	Mention the benefits of onion regarding health benefit	2	
17	How many days onion can be preserved?	2	
Total		34	

12. Attitude towards onion cultivation

Please mention your degree of agreement with the following statements

Sl No	Statements	Extent of agreement				
		Strongly agreed (4)	Agreed (3)	Undecided (2)	Disagreed (1)	Strongly disagreed (0)
1	Marketing facilities of onion are available					
2	Marketing facilities of onion are available					
3	Less insect attack in onion cultivation					
4	In small area onion can be cultivated					
5	onion has high demand in food industries					
6	onion cultivation is complex					
7	Most of the pest can be controlled by clean cultivation					
8	It is difficult to maintain					

	quality of seeds					
9	Less infestation of diseases occurs in onion cultivation					
10	Poor people can't cultivate onion due to lack of money					
11	Young and educated people are interested to cultivate onion					
12	Onion cultivation is more profitable than other crops					

13. Use of modern onion cultivation practices

Mention your level of practice for the onion cultivation to harvesting

Sl No	Items of the practices	Extent of agreement			
		Regularly (3)	Occasionally (2)	Rarely (1)	Not at all (0)
1	Maintaining the proper soil characteristics (pH 6.0-7.5; sandy loam soil)				
2	Collection of plants from timely sown seeds (For Summer - February to March; For Winter – July to August)				
	Following proper Plantation time				
3	Maintaining the recommended spacing during plantation(15cm X 10 cm)				
4	Applying recommended dose of fertilizer (Compost, TSP, MoP in interval of 20-40 days after plantation)				
5	Following proper irrigation (depending on weather and soil characteristics; in interval of 4-5 days)				
6	Weed management (Hand weeding and use of Herbicides)				
7	Application of pesticides and disease prevention measures (Rodomile Gold, Di-ethene M-45, Rovral 50 WP))				
8	Proper Harvesting method				
9	Proper and neat storage of onion (in dry space with proper ventilation)				
Total					

Thank you for your kind co-operation.

Dated

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Signature of the interviewer