

**KNOWLEDGE, ATTITUDE AND MANAGEMENT PRACTICES OF FARMERS
REGARDING CHILI WILT DISEASE AT DUMURIA UPAZILA**

**A THESIS
BY
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STUDENT ID. MS-170808**



**A Thesis (Course No. PLP-6104) Submitted to Agrotechnology Discipline in Partial
Fulfillment of the Requirements for the Degree of**

**MASTER OF SCIENCE
IN
PLANT PATHOLOGY**



**AGROTECHNOLOGY DISCIPLINE
LIFE SCIENCE SCHOOL
KHULNA UNIVERSITY
KHULNA-9208
MAY, 2022**

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MAY, 2022

DEDICATED

TO

MY

BELOVED PARENTS



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The Author

ABSTRACT

Chili wilt disease causes major crop yield losses and affect production in low-income farmers. A limited understanding by farmers about the identity of plant diseases, transmission pathways and appropriate management methods is a key way to control that. The main purpose of the study was to evaluate the knowledge, attitude and management practices of the farmers regarding chili wilt disease to know their level of understanding. Data were collected from 105 chili farmers of Dumuria upazila in Khulna district through personal interview method by the researcher himself using an interview schedule during 15th December to 10th April, 2020. Farmers knowledge, attitude and management practices regarding chili wilt disease were the dependent variables and the nine selected characteristics of the respondents considered as the independent variables of the study. Majority (56.2%) of the respondents had high knowledge and followed by 43.8% of them had medium knowledge. As well as majority (89.5%) of them had high attitude and mostly (84.8%) of the respondents had medium management practices. Among the selected characteristics of the respondent's educational qualification, annual family income, extension media contact, extent of factors affecting chili wilt disease and net return of the respondents showed a significant positive relationship with their extent of knowledge, attitude and management practices while age and farming experience showed a significant negative relationship with their extent of knowledge, attitude and management practices. Out of 10 identified factors that affects chili wilt disease, respondents indicate "High rainfall" as the highest factor followed by "Farmers equipment" was the lowest one.

Key words: Wilt, Farmers' knowledge, attitude, chili

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ACRONYMS AND ABBREVIATIONS

BBS	: Bangladesh Bureau of Statistics
GDP	: Gross Domestic Production
NGO	: Non-governmental Organization
SAAO	: Sub-Assistant Agriculture Officer
SD	: Standard deviation
SPSS	: Statistical Package for the Social Sciences
PPCC	: Pearson's Product Moment co-efficient of correlation
NS	: Non-significant
Min	: Minimum
Max	: Maximum

CHAPTER I

INTRODUCTION

1.1 Background of the study

Chili (*Capsicum annuum* L.) is one of the most important commercial crops in Bangladesh. Chili is used for different purposes such as vegetable, spice, condiments, sauce and pickles. Chili is a tropical and subtropical crop, is one of the major vegetable and spice crops grown in the country and is popularly known as wonder spice. Chili is grown all over areas in Bangladesh. It is intensively grown in Khulna, Mymensingh, Narsingdi, Comilla, Savar, Bogra, Jamalpur, Dinajpur, Rajshahi districts of Bangladesh. It is being grown extensively in India, Pakistan, China, Philippines, France, Italy and United States. In Bangladesh Chili occupies an area of 204022 acres with an annual production of 105236 M.tonnes (BBS,2019). Chili contains different vitamins and minerals especially rich in vitamin C. Besides it contains 1.29 mg protein, 11 mg calcium, 870 i.u. vitamin a, 1.75 mg ascorbic acid, 0.06 g thiamin, 0.03 mg riboflavin and 0.55 mg niacin per 100 g edible fruit (Hossain, 2006).

Chili are merely produced in a little amount in south-west region of Bangladesh to meet up the local need. But the little amount that is growing also facing different problems such as salinity, drought, water logging, unfavorable climatic condition and different diseases like chili wilt, damping off, die-back and anthracnose (fruit rot), wet rot, powdery mildew cercospora leaf spot bacterial leaf spot. Among them chili wilt diseases are caused by major fungal pathogens *Fusarium oxysporum* f. sp. capsici, *Sclerotium rolfsii* Sacc, *Rhizoctonia solani* and bacterial pathogen *Ralstonia solanacearum*. All these wilt pathogens cause devastating damage of chili production. Wilt causes 10-50 percent crop losses around the world. (Devika Rani *et al.*, 2006). The occurrence of the disease was first reported from New Mexico as early as 1919 as a rapid wilt (Priya and Mesta, 2018). The disease of chili pepper

first found to occur in New Mexico in 1908 by Leonlan on 1919 (Nakayama, 1960). To meet up the increasing demand of chili it is important to reduce the diseases incidence. Considering these points, a study enlisted “Evaluation of knowledge, attitude and management practices of farmers regarding chili wilt disease” was undertaken at Dumuria Upazila of Khulna District in Bangladesh.

1.2 Scope of the study

In the recent year in the south-west region chili production related problem are increasing. Farmer's have lack of knowledge and scope to manage the problems. This research work will help to make them conscious about the occurrence of chili disease and the management process. This work will also help the future researcher to take a view of that area.

1.3 Statement of the problem

Soils of Bangladesh by birth are healthy in which diversified crops can grow easily. Chili is a valuable spice and also one of the most important cash crops grown in Bangladesh. The production of chili largely depends on the use of fertilizers, irrigation, pesticide etc. Calamities like disease, draught, flood etc. are a very regular phenomenon which hinders the production of agriculture to a great extent. Cultivable land is being decreased due to the pressure of massive population. To achieve self-sufficiency in chili production and farmer's betterment it is important to have proper knowledge, favorable attitude and use of proper management practices on chili. Most of the farmers in Bangladesh fail to overcome their problems (Basak, 2018). It is due to that they have lack of proper knowledge and conception about the situation.

In this connection, the following research questions were raised to have clear understanding about chili wilt disease by evaluating the knowledge, attitude and practice of the farmers:

- i. What is the level of knowledge of the farmers regarding chili wilt disease?

- ii. What is the present status (i.e., attitude) of the farmers towards chili wilt disease?
- iii. What is the farmer's extent of use of management practices to control chili wilt disease?
- iv. What are the socio-economic factors influencing chili wilt disease?

1.4 Objectives of the Study

Followings are the specific objectives of the study:

- I. To measure the knowledge, attitude and practice status level of the farmers regarding chili wilt disease.
- II. To identify the factors affecting chili wilt disease.
- III. To find out the extent of chili wilt disease incidence.
- IV. To describe the selected personal characteristics of the farmers performing chili.
- V. To ascertain the relationships between selected personal characteristics of the farmers and the knowledge, attitude and practice of chili wilt disease



1.5 Assumptions of the study

During conducting the researcher, the following assumptions were kept in mind.

- i. The respondents were qualified to satisfy the queries designed by the researcher in the interview schedule.
- ii. The information furnished by the respondents was reliable and valid.
- iii. Views and opinions furnished by the respondents included in the sample were the represented views and opinions of the population of farmers in the study area.

1.6 Limitations of the study

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

- i. The study was confined at Dumuria upazilla under Khulna district. This is mere study involving a very small area in the whole Bangladesh. A thorough and wide investigation is also needed to gather clear idea.
- ii. Views and opinions furnished by the respondents included in the sample were the represented views and opinions of the population of farmers of Dumuria upazilla at Khulna district in Bangladesh.
- iii. Major information and facts supplied by the respondents were applicable to the situations prevailing in the locality during the year 2021.
- iv. Large scale chili production is rarely found. So, the study was confined to only small-scale production.

1.7 Definitions of some terms related to this study

Certain terms used throughout the study are defined below for clear understanding.

Respondent

Farmers who answer questions those were asked by the interviewer for a the study are called respondents. They are the people from whom a social research worker usually gets most of data required for his research. In this study, the farmers who responded to the questions during interview conducted by researcher himself were considered as respondents.

Knowledge on chili wilt disease

Knowledge on chili wilt disease refers to the extent of basic understanding of the farmers in different aspects of chili wilt disease.

Attitude on chili wilt disease

It treats the willingness/ unwillingness of a farmer to take part in chili farming.

Practice related to management of chili wilt disease

It refers to the cultivation processes, types and works that are done by the farmers regarding to management of chili wilt disease.

Age

Age of the farmers refers to the period of time in years from his birth to the time of interview.

Educational qualification

Educational qualification refers to the ability of an individual to read and write or having formal education received up to certain standard of full schooling years.

Family size

Family size refers to the number of members in his family including himself, his wife, children and other dependent members.

Annual family income

Annual income of the respondents refers to total yearly earnings from agriculture and other source (if any) including him and other family member(s).

Experience in farming

It refers to the duration of involvement of respondents in farming.

Experience in chili farming

It refers to the duration of involvement of respondents in chili farming.

2.2 Reviews Related to Knowledge, Attitude and Management Practices of different crops

2.2.1 Reviews on knowledge and attitude

Santaweek et al. (2019) conducted research in Nakhon Nayok Province, Thailand about knowledge, attitude and practice of pesticide use and serum cholinesterase levels among rice farmers. The results indicated that the majority of the respondents (56.9%) had a neutral attitude toward pesticide use. It is shown that when considering each question, almost all respondents agreed with the question "while spraying, you should stand in the direction of the wind." On the other hand, many respondents agreed with negative questions such as "you can smoke or eat while spraying pesticide."

Islam et al. (2020) conducted research on chili pepper anthracnose disease where he takes 260 farmers producing chili pepper in Bangladesh as sample. The results show that virtually all farmers had experienced typical symptoms of anthracnose disease and farmers reported average crop yield losses of 4%. Yet, only 22% of the farmers knew that this was a fungal disease and only 25% could tell how the disease spreads in the field. Of the farmers, 99% said that they had observed anthracnose disease symptoms in their chili production during the last five cropping cycles. On average, farmers had observed these symptoms 3.7 times during these five cycles. Asked whether they perceived the severity of these symptoms to have changed over the past five years, 43% indicated no change, 33% an increase, and 24% a decrease in severity. About half of the respondents (56%) were unable to name any cause of the anthracnose disease symptoms, 17% said weather conditions cause the problem, and 24% could correctly explain that a fungus causes it. Only 22% of the respondents were able to explain what is fungus. Furthermore, asked how the symptoms shown on the photo spread in the field, only about a quarter of the respondents were able to describe correctly how the disease spreads. Although wind and insects can potentially spread the *Colletotrichum*

pathogens. The most common pathways are water splashing (either from irrigation or rain) and infected farm tools. Yet, only 2% mentioned farm tools as spreading the disease.

Praneetvataku et al. (2015) made a study to analyze the relationship between pesticide use and farmers' risk behavior and knowledge of pesticide risk. Data were gathered from 200 Thai farmers growing hot chili pepper (*Capsicum annuum* L.) and tomato (*Lycopersicon lycopersicum* L.). It was found that knowledge was a significant factor determining level of pesticide expenditure, i.e., more knowledge about physical and chemical properties, routes of entry to body, and adverse health outcomes of pesticide, were associated with lower pesticide expenditure. Farmers who had more years of schooling tended to purchase more pesticides. Pesticide risk knowledge was measured using a pesticide risk beliefs inventory. Enhancing farmer knowledge about pesticide risk can make an immediate contribution to lowering pesticide use.

Tafesse et al. (2019) investigated the understanding of farmer's disease knowledge of bacterial wilt and late blight of potato. A survey of 261 randomly selected farmers was carried out in three major potato growing districts in the central highlands of Ethiopia to examine farmers' knowledge and management practices of the two diseases, and to analyze the role of relevant knowledge in their practices. The majority of the farmers (60%) did not know bacterial wilt spreading mechanisms. But 40% of the farmers reported that they knew how bacterial wilt spreads and described different methods they thought it spreads through. Among these farmers, 63% and 52% of them mentioned infected seed potato and infested soil, respectively. Only a few farmers 7%, pointed out contaminated farm tools as a means for the spread of the disease. But none of the farmers mentioned other bacterial wilt spreading mechanisms such as contaminated irrigation water, and infected alternative host plants. In addition, none of the farmers was able to recognize latent infection (symptomless transmission) of bacterial wilt.

Farmers are knowledgeable about pests and diseases that affect their crops through their experience, but treat the diseases with pesticides on seeing symptoms without analyzing what kind of disease it is. It is important to understand how they perceive of these pests and diseases within their local area, their attitudes as well as how they respond to the diseases and pests as they affect livelihoods. People's attitudes and perceptions about a practice need to be sought before implementing any program. Pesticide use has been the most common technique for controlling pests in the world. There is no direct means of control however, method of control is aimed at the thrips vector or application of sanitation measures to limit spread of the virus. With these losses farmers cannot sit back and watch their produce being attacked by tospoviruses. Farmers have their own perceptions, attitudes and farming practices to help deal with the tospoviruses and among these are traditional methods and use of pesticides. Among the traditional methods are use of ash, neem tree, use of dung and early harvesting of tomatoes while still green as is the case in Nigeria (Banjo et al. 2003).

Pieniak et al. (2010) on his study found that in general, consumers were very well informed about organic vegetables practices, though their subjective knowledge was on moderate to rather low level. Subjective knowledge is shown to be an important factor in explaining organic vegetables consumption. It is significantly, relatively strongly and directly associated with organic vegetables consumption. Objective knowledge, in contrast, is only indirectly associated with organic vegetables consumption, through increased subjective knowledge and more favorable general attitudes towards organic vegetables.

A survey was conducted in Botswana on Vegetable farmers' knowledge and perceptions of pests, diseases and pest management practices in 2004 and it was indicated that 98 percent of farmers relied heavily on the use of synthetic pesticides to control pests. Their decision to apply pesticides was mostly on noticing the presence of a pest or disease. (Obopile et al. 2008).

Farmers have their own perceptions, attitudes and farming practices to help deal with the tospoviruses and among these are traditional methods and use of pesticides. Among the traditional methods are use of ash, neem tree, use of dung and early harvesting of tomatoes while still green as is the case in Nigeria (Banjo, Lawal, Fapojuwo and Songonuga, 2003). Similar methods were also used in managing Tomato leaf curl virus disease in Southern India and vegetable pests and diseases in Botswana (Obopile et al. 2008).

Abang et al. (2014) assessing vegetable farmer knowledge of diseases and insect pests of vegetable and management practices under tropical conditions. They found that about 78% of vegetable farmers were men aged 31–40, with 51% having little formal education. About 21% of farmers can identify diseases and 16% can identify insects.

In Uganda, among the main constraints identified by extension workers in reaching farmers were negative attitudes of the farmers towards change in farming practices (NDP, 2010).

Pieniak et al. (2010) on his study found that the attitudes towards organic vegetables have a direct positive and relatively strong relationship with organic vegetables consumption. Information and promotion campaigns could focus on promoting organic vegetables and organic food in general, so that consumers could improve their expertise and experience with those products.

Chen (2009) on his study found that the results are consistent with previous studies, which assert that concern for one's health and for the environment are the two most commonly stated motives for purchasing organic foods, with the former exceeding the latter in importance. In addition, the healthy lifestyle indeed exerts effective mediating effects on the positive relationships between health consciousness and environmental attitudes and the consumer's attitude toward organic foods. Therefore, a healthy lifestyle should be advocated to render the consumer's attitude toward organic foods more positive.



Verhoog et al. (2003) conducted a survey on which qualitative interviews were executed with arrange of people in the field of organic agriculture and with consumers of organic products, on the basis of a list of statements about the meaning of the concept of naturalness formulated by the authors. Based on the results of the interviews, it is distinguished 3 aspects of the concept of naturalness: natural as the organic (life processes), natural as the ecological, and natural as referring to the characteristic nature of an entity. We related these conceptual aspects to three main approaches within the field of organic agriculture: the no chemicals approach, the agro-ecological approach, and the integrity approach. It became clear that these approaches can also be recognized in the change of attitude of farmers as they convert from conventional to organic agriculture, and in the attitudes of consumers of organic food products.

Egri (1999) conducted a study and the study examines the socio demographic, farm-related, attitudinal and communication behavior differences between organic and conventional farmers in Canada. While organic farmers have fewer years of farming experience, operate smaller farms and are less dependent on hired farm labor, the most significant differences concern farmer's attitudes towards organic farming and the use of synthetic agrichemicals. A close attitudinal alignment between government extension agents and conventional farmers was also found. In addition, organic and conventional farmers proved to have significantly different patterns of information behavior and preferences. Implications for organic farming advocates and extension services are discussed.

Padel and Foster (2005) on his study found that the results show that most consumers associate organic at first with vegetables and fruit and a healthy diet with organic products. Fruit and vegetables are also the first and, in many cases, only experience with buying organic product. The decision-making process is complex and the importance of motives and barriers may vary between product categories.

Tarkiainen and Sundqvist (2005) proposed a modified model of the TPB (Theory of planned behavior) model which is to test the extension of the theory of planned behavior (TPB) in an organic food buying context. The proposed modified model of the TPB (Theory of planned behavior) model fitted the data better than the original model, implying that in the organic food buying context the role of subjective norms differs from the original theory of planned behavior. In buying organic food subjective norms affected buying intention indirectly through attitude formation. In addition, results showed that the modified TPB model predicts intention to buy organic food better than the original model. Based on the results, it can be said that consumers' intentions to buy organic food can be predicted with their attitudes ($R^2=0.558$), which can further be predicted by subjective norms ($R^2=0.374$), and that behavioral intentions reliably predict self-reported behavior ($R^2=0.824$).

2.2.2 Reviews on management practices

Islam et al. (2020) reported that only 1% of the respondents indicated to have used cultural control methods such as mulches to cover the soil, resistant varieties or quality seed to prevent or control anthracnose. Apart from using pesticides, 9% of the farmers harvested chilies at the immature stage before the disease symptoms become more apparent. When farmers observe anthracnose infection in their chili pepper field, 54% said that they would still harvest their field as usual, but sort after harvest and discard the infected fruit. Another 45% indicated that they would leave the infected fruit in the field and 1% (2 farmers) said they would harvest chilies at the immature (green) stage instead of the mature (red) stage. This is understandable because in Bangladesh and other countries, the market demand and price for red chili fruits is higher and more constant than for green fruits. One farmer said that infected fruit could be used to produce chili powder while two farmers said they would still sell the infected fruit, which are practices that could be hazardous to consumers. Farmers were aware that there is a health risk from eating chili fruits infected with anthracnose as 97% of the respondents said

that it is unhealthy. Most respondents were unable to explain why contaminated fruits are harmful, but 15% was knowledgeable about aflatoxins while 23% thought that infected chili fruits are unhealthy because of pesticide spraying, which could also be true and the average application rate of synthetic pesticides was 21.6 kg of formulated product per hectare per production cycle.

The cultivation of resistant varieties is the most effective, economical and environmentally safe method for controlling plant diseases. Because of the soil borne nature of wilt pathogens, cultivation of resistant genotypes, if any, is best way of managing the problem. Various chili wilt resistant varieties available are Musalwadi, Arka Lohit, Pusa Jwala, Pant C-2, and Jwaha-218, (Nayeema et al., 1995, Joshi et al. 2012).

Khan et al. (2018) reported that biological management of plant pathogens is assuming significance on account of ill-effects of conventional measures of disease control by chemical fungicides, and has become quite popular strategy to manage especially those diseases which are soil borne in nature and, hence, difficult to manage chemically. *Trichoderma viride* and *Trichoderma harzianum* has been found as potent biocontrol agents against Fusarium wilt in chili. The application of endophytic bacteria *Bacillus subtilis* and rhizobacteria *Pseudomonas fluorescens*, singly and in combination were found to be effective in controlling the Fusarium wilt of chili disease by inducing systemic resistance (ISR). Also, the plant extracts (*Eucalyptus citriodora*) and essential oils (neem and garlic oil) provide an effective measure for Fusarium wilt disease management and it represents an alternative to reliance on fungicides.

Organic amendments to the soil are traditionally used for improving soil conditions and crop productivity, but they can also aid in suppressing soil borne pathogens. Composts and liquids enriched with essential oils, phenols, organic acids and many other biocidal compounds from herbs could be effective against soil borne diseases, although the use of these soil amendments is rare. Organic manures made up of organic wastes, composts and peats, have been proposed

to control soilborne diseases and pests. Organic amendments not only improve soil structure and increase water holding capacity, they also support other beneficial microorganisms which help to suppress soil borne pathogens. The increase in activity of microorganisms in the soil creates competition, which may lead to effective suppression of harmful soil borne pathogens (Panth et al. 2020).

Farmers' opinion about the insect and disease management of chili is reported that sucking insect pests (thrips and mite) and choanecyba are the major problems of these areas and need to be controlled. Most of the farmers (88.86%) indicated that it is difficult to control. A few farmers (11.14%) opined that sucking pest and disease are controllable. There was no doubt that sucking pests and diseases caused tremendous yield loss of chili. Each and every farmer is in support to adopt control measures. However, it is reflected from their opinion that the pest is difficult to control. Farmers have been experienced with the unsuccessful in controlling sucking pest and disease in chili by spraying pesticides and are in agreement that the pest is difficult to control. Opinion of the few farmers (11.14%) those who mentioned that the pest is controllable should be taken into consideration for developing and implementation of better management technologies as the scope is there (Mannan et al. 2020).

2.3 Conceptual Framework of the Study

In scientific research, selection and measurement of variables constitute an important task. The conceptual framework of Townsend, J. C. (1953) was kept in mind while framing the structural arrangement for the dependent and independent variables.

The present study tried to focus on extent of knowledge, attitude and practices of farmers on chili wilt disease knowledge, attitude, management practice, disease identifying competence & disease incidence (these are dependent/focus variables).

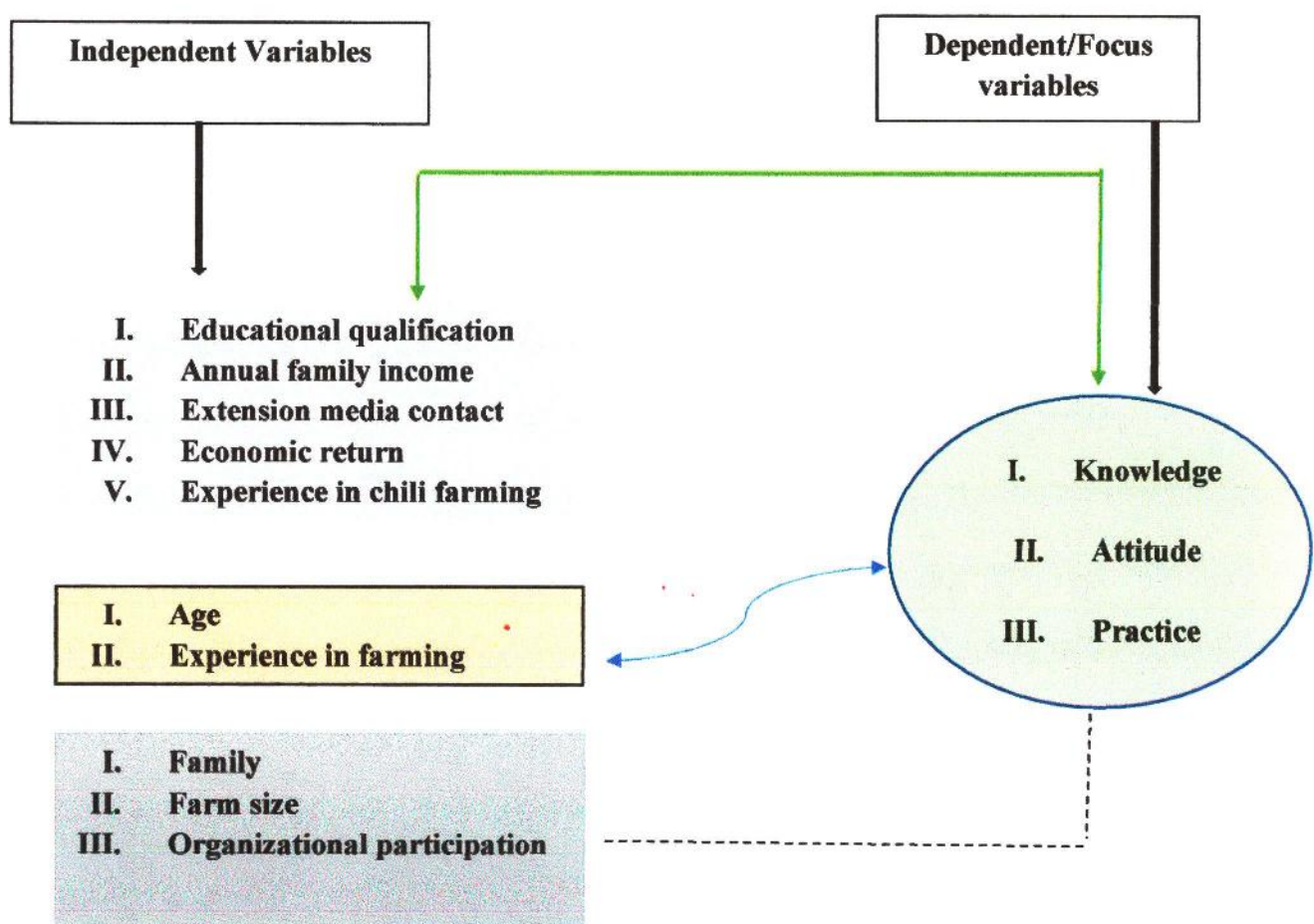


Fig. 2.1 The conceptual framework of the study

Positive Significant= 

Negative Significant= 

Non-significant= 

CHAPTER III

METHODOLOGY

Methodology plays an important role in scientific research. Without an appropriate methodology the researcher is unable to collect valid and reliable information and to analyze that information properly in order to attain at correct conclusion. Research methodology is a systematic way to solve a research problem. It may be understood as a science of studying how research is done (Selvi and Thomson, 2016).

The purpose of the chapter is to give an experienced investigator enough information to replicate the study. A research design is used to structure the research and to show how all of the major parts of the research project, including the sample, measures, and methods of assignment, work together to address the central research questions in the study.

3.1 Design of the study

The present study was a socio-economic and scientific survey. It was designed to evaluate the knowledge, attitude and practice regarding chili wilt disease.

3.2 Locale of the study

The study was conducted at Dumuria upazila of Khulna district in Bangladesh which is situated between 22°39' and 22°56' north latitudes and in between 89°15' and 89°32' east longitudes ([http://www. banglapedia.org](http://www.banglapedia.org)).



Figure 3.1 A MAP OF DUMURIA UPAZILA

3.3 Sample selection

In all, 105 chili farmers from the study area were treated as a sample of the study.

3.4 Preparation of interview schedule

An interview schedule was used as the research instrument in order to collect relevant information from the respondents (chili growers). The interview schedule was prepared for data collection. The interview schedule contained different type of questions to collect data on the selected variables. The 20-interview schedule was pre-tested before final collection of data. After pre-test necessary correction, addition, alteration and rearrangements were made. The interview schedule was then multiplied in its final form for collection of data. The same interview schedule has been presented in the Appendix.

3.5 Field survey

105 chili farms were surveyed within 10 different locations within the Dumuria upazila. The respondents were served with pictorial print-out of diseases of chili vegetable to acquaint them with disease that could be observed on their farms. The incidence of chili diseases was estimated based on twenty (20) plants observation per field and severity were visually- rated on their farms. Survey and perception of farmers on chili wilt disease symptoms were taken by walking across a “W” shaped path in a field, with 5 plants per side spaced at an equal distance from each other. Percentage of disease incidence was calculated based on:

$$\text{Percentage incidence} = \frac{\text{Number of infected plants (symptomatic plants)}}{\text{Total number of sampled plants}} \times 100$$

From each farm visited, incidence of a pest or disease observed was assessed from three locations each involving five stands of chili excluding those plants in the border lines (Samuel et al. 2013).

3.6 Data collection

The researcher met the selected respondents and explained the purpose of the study and requested them to help and co-operate for collecting data for the study. Data were collected with the help of the interview schedule by the researcher himself. Interviews of the respondents were taken at their homes during leisure period and also when they are on field. A good rapport was established with the respondents during interview. However, if any respondent failed to understand any question, the researcher took utmost care to explain the issue. Respondents were assured about the confidentiality of their information by the researcher. After completion of the interview, each statement was checked and verified to make sure that answer to each item had been properly recorded. Data were collected during 15th December, 2020 to 10th April, 2021.

3.7 Data processing

After completion of survey all the interview schedules were compiled for data processing. At first all the qualitative data were converted into quantitative form by means of suitable code and score wherever necessary. In several instances indices and scales were constructed through the simple accumulation of scores assigned to individual or pattern of attributes. Indices and scales are considered the efficient instrument for data reduction and analysis.

3.8 Measurement/ Evaluation of knowledge, attitude and practice of farmers regarding chili disease:

3.8.1 Knowledge of the farmers on chili diseases

To measure the knowledge of the farmer on chili diseases, 10 questions were included in interview schedule (Appendix-A). Irrespective of difficulty to answer the question, a score of 2 was assigned against each of the questions. Thus, the whole questions comprised of 20 marks. Based on accuracy of the answer, the farmers were given marks. The total score of a farmer was determined by summing up of all the scores obtained by the farmer against the selected 10 questions. The possible score of knowledge of a farmer on chili diseases could range from 0 to 20, where 0 indicates no knowledge and 20 indicate high knowledge. The farmers were classified into different categorize on the basis of their knowledge score on chili diseases as presented in Table

3.1

Table 3.1 Categories of the farmers according to their knowledge on chili diseases

Categories	Score
No knowledge	0
Low knowledge	1-7
Medium knowledge	8-14
High knowledge	>14

practice score could range from 0-27 where 0 indicates no practice and 27 indicate high practice are shown in Table 3.3

Table 3.3 Categories of the farmers according to their practice on chili diseases

Categories	Score
Low practice	1-15
Medium practice	16-30
High practice	>30

3.8.3.1 Measurement of extent of practices on chili disease

To compare among the statements related to practices on chili disease, a calculation was done by the following formula:

$$EP = N_1 \times 3 + N_2 \times 2 + N_3 \times 1 + N_4 \times 0$$

Where, EP= Extent of practice

N_1 = No. of farmers practiced regularly

N_2 = No. of farmers practiced sometimes

N_3 = No. of farmers practiced rarely

N_4 = No. of farmers practiced not at all

3.9 Factors affecting wilt diseases

To evaluate the factors affecting wilt disease of chili plant, 10 activities were included in the interview schedule (Appendix-A). The knowledge about the factors that is liable to occur wilt disease farmers can become more aware to control it. A five-point opinion scale (highly agree, agree, undecided, disagree, highly disagree) were fit against each of the activity and a weight of 5, 4, 3, 2 and 1 were assigned respectively. The activity scores of a farmer were determined by summing up of all of the score against the ten. The possible score of factors activity of a farmer on chili wilt disease could range from 10 to 50, where 10 indicate factors affect at minimum level and 50 indicate highest level. Based on factors affecting wilt diseases score, the farmers were grouped into three categories as shown in Table 3.4

Table 3.4 Factors affecting chili wilt diseases

Categories	Score
Low Favorable	Up to 15
Medium Favorable	16-30
Highly Favorable	>31

3.10.1 Measurement of extent of factors affecting chili wilt disease

To compare among the statements related to factors affecting wilt disease, a calculation was done by the following formula:

$$EF = N_1 \times 5 + N_2 \times 4 + N_3 \times 3 + N_4 \times 2 + N_5 \times 1$$

Where, EF= Extent of factors

N_1 = highly agree

N_2 = agree

N_3 = undecided,

N_4 = disagree

N_5 = highly disagree



3.11 Incidence of chili diseases during last “Three Year”

Here five major diseases and pest of chili are selected that occur frequently in chili field naming wilt, mites, anthracnose, army cutworm and chili leaf curl virus. A number of 105 chili growing farmers were surveyed with the selected five diseases within the Dumuria upazila. The incidence of chili diseases is scored by computing for each farmer on the basis of the extent of his answer with the selected five diseases.

3.12 Selection and Measurement of variables

3.12.1 Selection of variables

Ten selected characteristics of the farmers were treated as independent variable for this study. The selected characteristics were age, educational qualification, experience in farming, experience in chili farming, family size, farm size, annual income of the family, organizational participation and extension media contact. Knowledge, attitude and management practice on chili wilt disease were considered as focus variables of the study.

3.12.2.1 Age of the farmers

The age of the farmers was measured in terms of actual years from their birth to the time of interview on the basis of their response. Based on age, the farmers were classified into following categories in Table 3.5

Table 3.5 Categories of the farmers according to their age

Categories	Score (Year)
Young	≤ 35
Medium aged	36-50
Old	>50

3.12.2.2 Educational qualification of the farmers

The educational qualification of a farmer was measured based on his year of schooling in formal education. For example, a score of 5 was given to the farmers who passed class v. A score of '0' and '1' also given to those who do not know reading and writing and can sign name respectively.

The farmers were classified into following categories based on their educational qualification as shown in Table 3.6

Table 3.6 Categories of the farmers according to their educational qualification

Categories	Score (Year of schooling)
Illiterate	0
Primary	1-5
Secondary	6-10
Higher secondary	11-12
Graduate or above	>12

3.12.2.3 Family size of the farmers

The family size of a farmer was measured by the total number of family member who were eating and staying together. Based on family size, the farmers were classified into different categories as shown in Table 3.7

Table 3.7 Categories of the farmers according to their family size

Categories	No of family members
Small sized family	Up to 4
Medium sized family	5-7
Large sized family	>7

3.12.2.4 Annual family income of the farmers

Family income of a farmer was measured on the basis of total yearly earning from agriculture and his/her other sources (service, business, daily labor etc.) by the farmer and other family members. For calculating the annual family income of a farmer; income of that farmer as well as his/her family members (earned from different sources) in an average added together to obtain total family income of a farmer in a year. The farmers were classified into following categories according to monthly income (converted from yearly income) as shown in Table 3.8

Table 3.8 Categories of farmers according to annual family income

Categories	Score
Low income	≤ 15000
Medium income	150000-300000
High income	> 300000

3.12.2.5 Farming experience of the farmers

The experience of the farmers about farming was determined on the basis of the duration i.e. how long they are involved in farming activities. The farmers were classified into following categories Table 3.9

Table 3.9 Categories of the farmers according to their farming experience

Categories	Score (Year)
Low experience	1-10
Medium experience	11-20
High experience	> 21

3.12.2.6 Chili farming experience of the farmers

The experience of the farmers about chili cultivation was determined on the basis of duration i.e. how long they have involved in chili farming activities. The farmers were classified into following categories Table 3.10

Table 3.10 Categories of the farmers according to their chili farming experience

Categories	Score (Year)
Low experience	1-10
Medium experience	11-20
High experience	>20

3.12.2.7 Farm size of the farmers

Farm size of a represent farm was measured as the size of his farm on which his farming operations was operated during the period of study. It included the area of homestead as non-farm area, own cultivated area, own land given to others on barga (1/2), land taken from other on barga (1/2), land taken from others on lease, land given to others on lease and others. The area was measured in terms of hectare. The farm size of a farmer was calculated by using the following formula:

$$FS = A + B + C/2 + D/2 + E + F$$

Where,

FS = Farm size

A= Homestead non-farm area

B= Own cultivated area

C= Own land given to others on barga (1/2)

D= Land taken from other on barga (1/2)

E= Land taken from others on lease

F= Others

Actual size of the farm was considered as the score of the farm size. For example, if a farmer had 0.05 ha of land, then his score was 0.05. The data were first recorded in local unit and then converted to hectare. Based on farm size, the farmers were classified into five categories as shown in Table 3.11

Table 3.11 Categories of farmers according to farm size

Categories	Score (ha)
Landless	<0.02
Marginal	0.02-0.20
Small	0.21-1.00
Medium	1.01-3.00
Large	>3.00

3.12.2.8 Net return of the chili harvester

The net returns are calculated on an investment in chili production after accounting for investment costs such as land preparation, fertilizer, pesticides and labor fees etc. The farmers based on net returns were classified into following categories:

Table 3.12 Categories of the farmers according to the net return of the chili harvester

Categories	Scores (Tk)
Low return	≤ 75000
Medium return	75001-150000
High return	> 150000

3.12.2.9 Organizational participation

Organizational participation of a respondent was measured by the nature of participation in selected organizations. The score of organizational participation for a particular organization was computed in the following manner:

Nature of participation Score

No involvement = 0

General member = 1

Executive member = 2

Executive officer = 3

The organizational participation scores of a respondent were determined by summing up of all the scores obtained by him/her against the five organizations where she/he participated. The organizational participation scores of a farmer could range from 0-15 where '0' indicates no participation and 15 indicate higher participation. Based on organizational participation scores, the respondents were grouped into following categories as shown in Table 3.13

Table 3.13 Categories of the respondents based on organizational participation

Categories	Score (No. of organization)
No Participation	0
Low participation	1-5
Medium participation	6-10
High participation	11-15

3.12.2.10 Extension media contact of the farmers

In this study, the extension media contact score was computed for each farmer on the basis of the extent of his contact with selected ten media as ascertained from his/her response to the question no. 9 of the interview schedule (Appendix-A). Each farmer was asked to indicate the extent of his contact as regularly, occasionally, rarely and not at all and a weight of 4, 3, 2, 1 and 0 was assigned to these rating scales respectively. The extension contact scores of a farmer were determined by summing up of all the scores obtained by him/her against the eight media where she/he communicated. The extension contact scores of a farmer could range from 0-40 where 0 indicates no extension contact and 40 indicate highest extension contact. Based on extension media contact score, the farmers were grouped into four categories as shown in Table 3.14

Table 3.14 Categories of the farmers according to their extension media contact

Categories	Score
Low	1-12
Medium	13-24
High	>24

3.13 Statistical Analysis

After collection, data were analyzed and tabulated for interpretation. Statistical treatments such as number, mean, standard deviation, range, rank order etc. were used to interpret data. To explore relationship between any two variables Pearson's product correlation coefficient 'r', Spearman rank correlation and functional relationship were employed. For analysis of data Statistical Package for Social Science (SPSS) version 20 was used.

CHAPTER IV

RESULTS AND DISCUSSION

The findings of the study have been presented and discussed under the following sections according to objectives. The initial part deals with findings of knowledge, attitude and management practices where the rest part deals with factors affecting chili wilt disease, chili disease incidence, selected characteristics and relationship between the selected characteristics of the respondent and their knowledge, attitude and management practices.

4.1 Knowledge, attitude and management practices status of the farmers related to chili wilt disease

The knowledge, attitude and management practices of the farmers on chili wilt disease are shown in Table 4.1

Table 4.1 Distribution of farmers knowledge, attitude and practices according to chili wilt disease

Knowledge	Categories	Score	Respondents (N=105)		Mean	SD	Range	
			Number	Percentage (%)			Max	Min
	Low	1-7	0	0				
	Medium	8-14	46	43.8				
	High	>14	59	56.2				
Attitude	Low	1-15	0	0	36.70	4.5	26	45
	Medium	16-30	11	10.5				
	High	>30	94	89.5				
	Low	1-15	16	15.2	19.08	3.08	11	26

Practices	Medium	16-30	89	84.8				
	High	>30	0	0				

Data presented in Table 4.1 indicate that the knowledge on chili wilt disease score of the farmers ranged from 9 to 19 with a mean and standard deviation of 15.04 and 2.4 respectively. And majority (56.2%) of the farmers had high knowledge and 43.8% of them had medium knowledge where any respondents were not found who had no knowledge. Praneetvatakul et al. (2015) showed in his work that pests and diseases experienced by most chili farmers were anthracnose, yellow leaf curl virus, mites, aphids, army cutworm and root-knot nematode and several have knowledge deficiencies concerning pesticide risk were identified. Many farmers thought that they could determine if a pesticide was dangerous from its color.

The attitude on chili wilt disease score of the farmers ranged from 26 to 45 with a mean and standard deviation of 36.70 and 4.5 respectively. In the table it's indicate that most 89.5% of the farmers had highly favorable attitude and one tenth (10.5%) of them had medium attitude. Islam et al. (2020) in his research work found that majority of the respondents (56%) was unable to name any cause of the anthracnose disease symptoms, 17% said weather conditions cause the problem, and 24% could correctly explain that a fungus causes it. Only 22% of the respondents was able to explain what a fungus is.

The practices on chili wilt disease score of the farmers ranged from 11 to 26 with a mean and standard deviation of 19.08 and 3.08 respectively. In the table 4.1 it's indicated that mostly 84.8% of the farmers had medium practices where 15.2% of them had low practices. Farmers' opinion about the insect and disease management of chili is reported that sucking insect pests (thrips and mite) is the major problems of these areas and need to be controlled. Most of the farmers (88.86%) indicated that it is difficult to control. A few farmers (11.14%) opined that

sucking pest and disease are controllable. Opinion of the few farmers (11.14%) those who mentioned that the pest is controllable should be taken into consideration for developing and implementation of better management technologies as the scope is there (Mannan et al. 2020).

4.1.1 Measurement of extent of practices (rank order) on chili disease

The extent of practices (rank order) of individuals those practices on chili wilt disease showed on Table 4.2

Table 4.2 Extent of practices (rank order)

Sl. No.	Practices	Percentage (%)	Rank
1	Harvesting chili at green stage	86.35	1 st
2	Use of disease free planting material	75.56	2 nd
3	Practice of rouging in field	75.24	3 rd
4	Maintaining cropping season properly	73.01	4 th
5	Following proper irrigation technique	70.80	5 th
6	Use of resistant variety as an alternate to insecticide	66.67	6 th
7	Follow crop rotation practice	62.86	7 th
8	Burn the severely infected plants	58.41	8 th
9	Use of biological weed control technique	51.75	9 th

Among the ten selected practices chili harvesting at green stage occupied the first position, disease free planting material second; rouging in field third and biological weed control technique is the last factors that done in chili field.

4.2 Factors affecting chili wilt disease as perceived by the farmer

Factors that affect chili wilt disease score ranged from 24 to 48 with the mean and standard deviation 37.22 and 4.8 respectively. The distribution of the respondents according to their response on factors affecting chili wit disease in Table 4.3

Table 4.3 Distribution of the respondents according to their perception on factors affecting chili wit disease

Categories	Score	Respondent (N=105)		Mean±Sd	Range	
		Numbe r	Percentage (%)		Min	Max
Low Favorable	Upto 15	0	0	37.22±4.8	24	48
Medium Favorable	16-30	9	8.6			
Highly Favorable	>31	96	91.4			
Total		105	100.00			

Table 4.3 shows that 91.4% of the factors were highly favorable and 8.6% were medium favorable for chili wilt with few low favorable factors.

4.2.1 Rank order of factors affecting chili wilt disease

Factors affecting chili wilt disease that perceived by the farmers is showed on Table 4.4

Table 4.4 Rank order on factors affecting chili wilt disease perceived by the farmers

Sl. No.	Factors	Percentage (%)	Rank
1.	High rainfall	89.52	1 st
2.	Insect vector	80.95	2 nd
3.	Irrigation water	77.33	3 rd
4.	Wounds in plants	76.76	4 th
5.	Weed Insect vector	74.86	5 th
6.	High temperature	74.67	6 th
7.	Infested soil	74.29	7 th
8.	Crop residues	70.67	8 th
9.	Transplanting	69.90	9 th
10.	Farmer's equipment	68.95	10 th

Among the ten selected factors most influential factor affected the chili wilt disease followed by high rainfall occupied the first position, insect vector second; irrigation water third and farmers equipment is the last factors that mostly affect chili wilt disease.

4.3 Incidence of chili wilt disease observed thorough field survey

The incidence of chili wilt disease was observed thorough field survey is shown in Table 4.5

Table 4.5 Incidence of chili wilt disease

Categories	Score	Respondent (N=105)		Mean	Sd	Range	
		Number	Percentage (%)			Min	Max
No	0	14	13.3	30.19±19.80		0	75
Low	1-25	33	31.4				
Medium	26-50	41	39				
High	51-75	17	16.2				
Very High	76-100	0	0				
Total		105	100.00				

Table 4.5 indicate that majority (39%) of the chili fields were medium affected followed by very high (0.00%), high (16.2%), low (31.4%). And 13.3% fields were free from chili wilt disease.

4.3.1 Incidence of chili diseases during last "Three Year"

Major pest and diseases that mostly found in chili filed are showed on Table 4.6

Table 4.6 Last 3 years major pest and diseases in chili production

SL.	DISEASE	2018		2019		2020	
		No.	%	No.	%	No.	%
1	Wilt	45	42.8	89	84.7	83	79.0
2	Mites	23	21.9	27	25.7	46	43.8
3	Anthracnose	54	51.4	52	49.5	64	60.9

4	Army Cut Worm	27	25.7	18	17.1	56	53.3
5	Leaf curl virus	56	53.3	55	52.3	61	58.0

The incidence of chili disease was observed 42.8, 79.00, 84.7 percent in 2108, 2019 and 2020 respectively (Table 4.6). It means that with the passage of time the incidence of wilt disease of chili is increased. The incidence of other chili disease was highest in 2019.

4.4 Selected characteristics of the respondents

The factors related to selected characteristics are presented below:

4.4.1 Age of the respondents

The age of the farmers was markedly varied. The mean and standard deviation of age were 45.32 and 7.15 respectively. Based on age categories, the distribution of the farmers is shown in Table 4.7

Table 4.7 Distribution of the respondents according to their age

Categories	Score (Year)	Respondent (N=105)		Mean±Sd	Range	
		Number	Percentage (%)		Min	Max
Young	≤ 35	9	8.6	45.32±7.15	30	60
Middle aged	36-50	69	65.7			
Old	>50	27	25.7			
Total		105	100.00			

Data furnished in the Table 4.7 revealed that the majority (65.7%) of the respondents were middle aged as compared to 25.7% old aged and 8.6% being young. The age of the respondents



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was ranging from 30 to 60. The findings of the present study related to average age of the framers have similarity with the findings of Islam et al. (2020) who found that the average age of the respondents include in the study was 43 years.

4.4.2 Educational qualification of the respondents

The educational qualification of the respondents ranged from 0 to 14 with mean and standard deviation of 4.55 and 4.5 respectively. Based on education categories, the distribution of the farmers is shown in Table 4.8

Table 4.8 Distribution of the respondents according to educational qualification

Categories	Score (Year of schooling)	Respondent (N=105)		Mean±Sd	Range	
		Number	Percentage (%)		Min	Max
Illiterate	0	18	17.1	4.55±4.5	0	14
Primary	1-5	46	43.8			
Secondary	6-10	24	22.9			
Higher secondary	11-12	11	10.5			
Graduate or above	>12	6	5.7			
Total		105	100			

Data presented in the Table 4.8 demonstrate that highest proportion (43.8%) of the respondents had primary level of education followed by secondary (22.9%), illiterate (17.1%), (10.5%) higher secondary and rest graduate or above (5.7%). The respondents those who had highest level of education they are nearly more conscious about chili wilt disease. Basak, S. (2018)

found that 33.33 percent of the sample populations have completed primary education, 36.67 percent were secondary passed and 20 percent were at higher secondary and above higher secondary level were 9 percent.

4.4.3 Family size of the respondents

Family size of the respondents ranged from 4 to 11, with a mean of 6.48 and standard deviation 1.5. The distribution of the respondents according to their family size categories is shown in Table 4.9

Table 4.9 Distribution of the respondents according to their family size

Categories	Score (Year)	Respondent (N=105)		Mean±Sd	Range	
		Number	Percentage (%)		Min	Max
Small	Upto 4	12	11.4	6.48±1.5	4	11
Medium	5-7	68	64.8			
Large	>7	25	23.8			
Total		105	100			

Data presented in Table 4.9 show that majority (64.8 %) of the respondents belonged to the medium sized family while 11.4% and 23.8% belonged to small size family and large size family respectively. The minimum and maximum no. of the family members ranged from 4 to 11. The mean of family size was also 5.5 on Islam et al. (2020) findings. The average family size (6.48%) of the study area is about similar to the national average (BBS, 2013).

4.4.4 Annual family income of the respondents

Annual family income of the respondents ranged from 145000 to 500000 with a mean of 258695.23 and standard deviation of 55899.8. The distribution of the respondents according to their annual family income is shown in Table 4.10

Table 4.10 Distribution of the respondents according to their annual family income

Categories	Scores (Tk)	Respondents (N=105)		Mean±SD	Range	
		Number	Percentage (%)		Min	Max
Low income	≤150000	2	1.9	258695.23±55899.8	145000	500000
Medium income	150000-300000	92	87.6			
High income	>300001	11	10.5			
Total		105	100			

Data presented in Table 4.10 reveal that majority (87.5%) of the respondents had medium income while 10.5% and 1.9% had high and low income respectively.

4.4.5 Farming experience of the respondents

The farming experience score of the respondents ranged from 6 to 40 with a mean and standard deviation of 19.99 and 8.8 respectively. The distribution of the respondents according to their farming experience categories is shown in Table 4.11

Table 4.11 Distribution of the respondents according to their farming experience

Categories	Score (Year)	Respondent (N=105)		Mean±Sd	Range	
		Number	Percentage (%)		Min	Max
Low experience	1-10	15	14.3	19.99±8.8	6	40
Medium experience	11-20	56	53.3			
High experience	21-40	34	32.4			
Total		105	100			

Table 4.11 indicate that majority (53.3%) of the respondents were medium experienced in farming followed by high experience (32.4%) and (14.3%) had low experience. The findings also indicate that most of them had medium to high experience.

4.4.6 Chili farming experience of the respondents

Chili farming experience of the respondents was classified into three categories. The mean and standard deviation was 12.58 and 4.9 respectively. The distribution of the respondents according to their chili farming experience is shown in Table 4.12

Table 4.12 Distribution of the respondents according to their chili farming experience

Categories	Score (Year)	Respondent (N=105)		Mean±Sd	Range	
		Number	Percentage (%)		Min	Max
Low experience	1-10	49	46.7	12.58±4.9	4	24
Medium experience	11-20	50	47.6			
High experience	>20	6	5.7			
Total		105	100			

From the above table 4.12 it is shown that highest proportion of the farmers had medium (47.6%) followed by low experience (46.7%) and high experienced (5.7%).

4.4.7 Farm size of the respondents

The minimum and maximum value of the farm size was ranged from 0.14 to 1.25ha. where the mean and standard deviation value were 0.46 and 0.25 respectively. The distribution of the farmers according to their farm size is shown in Table 4.13

Table 4.13 Distribution of the respondents according to their farm size

Categories	Score (ha)	Respondents (N=105)		Mean±SD	Range	
		Number	Percentage (%)		Min	Max
Landless	<0.02	0	0	0.46±0.25	0.14	1.25
Marginal	0.02-0.20	9	8.6			
Small	0.21-1.00	91	86.7			
Medium	1.01-3.00	5	4.8			
Large	>3.00	0	0			

4.4.9 Organizational participation of the respondents

The observed organizational participation score of the respondents ranged from 0 to 5 with a mean of 1.70 and standard deviation of 1.2 respectively. The distribution of the respondents according to organizational participation their score is presented in Table 4.15

Table 4.15 Distribution of the respondents according to their organizational participation

Categories	Score	Respondent (N=105)		Mean	Sd	Range	
		Number	Percentage (%)			Min	Max
No	0	18	17.1	1.70	1.2	0	5
Low	1-5	87	82.9				
Medium	6-10	0	0				
High	11-15	0	0				
Total		105	100.00				

Data contained in Table 4.15 indicate that most (82.9%) of the respondents had low level of organizational participation. On the contrary, 17.1% of them had no involvement in any organizational participation. Basak,S. (2018) found that, among the respondent farmers in Shibgong upazila, 70.00 percent chili producers were found to have membership in different NGOs and/or farmers' organizations.

4.4.10 Extension media contact of the respondents

The extension contact score of the respondents ranged from 8 to 26 with a mean and standard deviation of 15.44 and 3.8 respectively. The distribution of the respondents based on their extension contact is shown in Table 4.16

Table 4.16 Distribution of the respondents according to their extension media contact

Categories	Score	Respondent (N=105)		Mean±Sd	Range	
		Number	Percent (%)		Min	Max
Low	1-12	26	24.8	15.22±3.9	8	26
Medium	13-24	77	73.3			
High	>24	2	1.9			
Total		105	100.00			

Most (73.3%) of the respondents had medium scale extension media contact followed by high extension contact 1.9%) and low scale extension media contact (24.8%).

4.5 Relationship between the selected characteristics of the farmers and their knowledge, attitude and management practice

This section deals with the relationship between selected characteristics of the farmer's and their knowledge; attitude and practice on chili wilt disease. To explore the relationships between the selected characteristics of the farmers and their knowledge, attitude and practice on chili wilt disease Pearson's product Moment co-efficient of correlation (r) as well as Spearman rank correlation Coefficient were used.

The relationship of the selected characteristics of the farmers with their knowledge, attitude and practice on chili wilt disease appears in Table 4.17

Table 4.17 Computed coefficient of correlation (r) and spearman rank correlation between the selected characteristics of the respondents and their focused variables.

No.	Independent variable (selected characteristics)	Dependent variable (focus variable)			Remark
		Knowledge	Attitude	Practices	
1	Age	-0.584**	-0.378**	-0.422**	PPCC
2	Farm size	0.155 NS	0.232*	0.337**	PPCC
3	Educational Qualification	0.557**	0.444**	0.455**	PPCC
4	Family size	0.034 NS	0.193*	-0.022 NS	PPCC
5	Farming experience	-0.566**	-0.388**	-0.510**	PPCC
6	Experience in chili farming	0.205*	0.050 NS	-0.015 NS	PPCC
7	Annual family income	0.358**	0.391**	0.446**	PPCC
8	Organizational participation	-0.078 NS	0.064 NS	-0.040 NS	SRCC
9	Extension media contact	0.632**	0.502**	0.550**	SRCC
10	Factors affecting Chili wilt	0.488**	0.563**	0.449**	PPCC
11	Net return	0.583**	0.505**	0.528**	PPCC

12	Wilt disease Incidence	-0.100 NS	-.001 NS	-0.040 NS	PPCC
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NS= Non-significant **Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed). PPCC = Pearson's Product Moment co-efficient of correlation. SRCC = Spearman Rank Correlation Coefficient.

Data presented in Table 4.17 show that among the selected characteristics of the respondents' educational qualification, annual family income, extension media contact, knowledge on factors affecting chili wilt disease and economic return of the respondents showed a significant positive relationship with knowledge, attitude and practices. It means that with the increase of educational qualification, annual family income, extension media contact, knowledge on factors affecting chili wilt disease and economic return increases knowledge, attitude and practices significantly.

Age and farming experience showed a significant negative relationship with their extent of knowledge, attitude and practices. It means that with the increases of age and farming experience extent of knowledge, attitude and practices decreases significantly.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The study was conducted to have an idea about knowledge, attitude and practices of farmers about chili wilt disease. Data were collected from the chili cultivar of villages of Dumuria upazila under Khulna district. From the selected villages 105 respondents were selected to collect information. These 105 respondents were treated as sample of the study. Data were collected from the selected 105 respondents through interview method by the researcher himself using an interview schedule from 15th December, 2020 to 10th April, 2021.

5.1 Summary of findings

5.1.1 Knowledge, attitude and management practices status of the farmers related to chili wilt disease

The major findings of the study are summarized below:

Knowledge on chili wilt disease

Majority (56.2%) of the farmers had high knowledge followed by medium knowledge (43.8%) and no one have low knowledge.

Attitude on chili wilt disease

Most (89.5%) of the farmers had highly favorable attitude followed by moderately favorable attitude (10.5%) and no farmers had less favorable attitude which indicates most of the farmers keep positive attitude towards chili wilt disease.

Management Practice of the farmers

Majority (84.8%) of the farmers had medium practice followed by low (15.2%) practice.

Measurement of extent of practices (rank order) on chili disease

Among the ten selected practices chili harvesting at green stage occupied the first position, disease free planting material second; rouging in field third and biological weed control technique is the last factors that done in chili field.

Factors affecting chili wilt disease as perceived by the farmer

Majority 91.4% of the factors were highly favorable and 8.6% were medium favorable for chili wilt with no less favorable factors.

Rank order of factors affecting chili wilt disease

Among the ten selected factors high rainfall occupied the first position, insect vector second; irrigation water third and farmers equipment is the last factors that mostly affect chili wilt disease.

Incidence of chili wilt disease observed thorough field survey

Majority (39%) of the chili fields were medium affected followed by very high (0.00%), high (16.2%), low (31.4%). And 13.3% fields were free from chili wilt disease.

Incidence of chili diseases during last "Three Year"

The incidence of chili disease was observed 42.8, 79.00, 84.7 percent in 2108, 2019 and 2020 respectively. It means that with the passage of time the incidence of wilt disease of chili is increased. The incidence of other chili disease was highest in 2019.

5.2.1 Selected characteristics of the farmers

Age

Highest proportion (65.7%) of the respondent was middle aged as compared to 8.6% and 25.7% percent was young and old respectively. The respondents who were middle aged had more knowledge and showed higher performance on attitude and practices on chili wilt disease.

Educational qualification

Majority (43.8%) of the farmers had primary level of education followed by secondary (22.9%), illiterate (17.1%) and graduate or above (5.7%) and rest (10.5%) higher secondary level of education. The farmers those who had primary and secondary level of education are more conscious about chili wilt disease.

Family size

Highest proportion (64.8 %) of the farmers belonged to the medium sized family while 11.4 and 23.8 percent of the farmers belonged to small sized and large sized family respectively.

Annual family income

Majority (87.5%) of the respondents had medium income while 10.5% and 1.9% had high and low income respectively.

Farming experience

Majority (53.3%) of the farmers was medium experienced in farming followed by high experience (32.4%) and (14.3%) respondents had low experience.

Chili farming experience

Most (47.6%) of the farmers were medium experienced in farming followed by low (46.7%) and high experience (only 5.7%). The chili farming experience score of the farmers ranged from 4 to 24.

Farm size

Majority (86.7%) of the farmers possessed small farm compared to 8.6 and 4.8 percent of them having medium and marginal farm respectively. None of the farmers belong to large farm size category.

Net return of the chili harvester

Majority (71%) of the respondents had medium net return while 3.8% had high and 28.6% had low return.

Organizational participation

Majority (82.9%) of the respondents had low level of organizational participation. On the other hand, one-fifths (17.1%) of the farmers had no organizational participation and no farmers had high organizational participation.

Extension media contact

Most (73.3%) of the respondents had medium scale extension media contact followed by high extension contact (1.9%) and low scale extension media contact (24.8%).

5.3 Relationship between the selected characteristics of the farmers and focus variables (knowledge, attitude and practice)

Among the selected characteristics of the respondents' educational qualification, annual family income, extension media contact, knowledge on factors affecting chili wilt disease and economic return of the respondents showed a significant positive relationship with knowledge, attitude and practices. It means that with the increase of educational qualification, annual family income, extension media contact, and economic return increases knowledge, attitude and practices significantly.

Age and farming experience showed a significant negative relationship with their extent of knowledge, attitude and practices. It means that with the increases of age and farming experience extent of knowledge, attitude and practices decreases significantly. Organizational participation and wilt disease incidence showed no significant result i.e., with the decrease of knowledge, attitude and practices organizational participation decrease and disease incidence increase.

5.4 Conclusions

Majority of the respondents had high knowledge and attitude but medium practice related to wilt disease of chili. Harvesting chili at green stage was the most dominant practices by the respondents. Some other major practices were use of to control wilt disease.

Farm size, educational qualification, annual family income, extension media contact, factors affecting chili wilt and net return showed a significant positive relationship with knowledge, attitude and practices. But age and farming experience showed negative significance with

knowledge, attitude and practices. The rest characteristics did not show any significant relationship.

5.5 Recommendations

On the basis of the finding of the study it was evident that chili was profitable enterprises to the rural people of Bangladesh only by solving the disease incidence issue. A positive attitude, reliable knowledge and soft practice can be useful against chili wilt disease. The following specific recommendation may be made:

- As chili is a profitable enterprise and farmers have low organizational participation, government and concern institutions should provide adequate extension programme.
- Wilt, leaf curl virus and anthracnose are more susceptible disease in Dumuria upazila. So proper management research should be conducted by the researchers in field condition.
- More training programme is needed to increase farmers practice skills.
- Facilities should be provided by the government so that young aged literate person willingly engage on farming.
- To make chili production safe and profitable subsidiary package should be given the concern authorities.



CHAPTER VI

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APPENDIX A

AGROTECHNOLOGY DISCIPLINE KHULNA UNIVERSITY KHULNA

KNOWLEDGE, ATTITUDE AND MANAGEMENT PRACTICES OF FARMERS REGARDING CHILI WILT DISEASE AT DUMURIA UPAZILA

Sample
Date.....

No.....

1. Address

Name: Union: Block:
.....

Village:..... Post:..... Phone:

2. Age Years

3. Educational qualification: Please put tick mark (✓) against the correct response

- (a) Can't read and Write. ()
- (b) Only can sign. ()
- (c) I have read up to class.....

4. Family size

5. Experience in farming Years

6. Experience in Chili farming Years

7. Annual family income

Source of income	Amount (BDT)
Agriculture	
Business	
Service	
Other (.....)	
Total	

07. Farm size:**Please furnish information about your lands according to use**

Sl. No.	Use of land	Area of land	
		Local unit	Hectare
a	Homestead		
b	Own land under own cultivation		
c	Land taken from others on barga (1/2)		
d	Land given to others on barga (1/2)		
e	Land taken from others on lease		
f	Land given to others on lease		
g	Others		
Total	$a+b+\frac{1}{2}(c+d)+e-f+g$		

08. Organizational Participation:

Serial no	Name of the organization	No Involve ment (0)	General Member (1)	Executive Member (2)	Executi ve officer (3)	Duration
1	Farmers club					
2.	NGO association					
3.	Mosque/ Mondir committee					
4.	Bazar committee					
5.	Youth organization					

09. Extension media contact:

Sl. no	Media	Extension contact				
		Never (0)	Seldom (1)	Sometimes (2)	Often (3)	Regularly (4)
I.	Peer group contact	Not even once in a month ()	1-3 times/month ()	4-6 times/month ()	7-9 times/month ()	>9times/month ()
II.	Agricultural extension officers	Not even once in a month ()	1-2 times/month ()	3-4 times/month ()	5-6 times/month ()	6times/month ()
III.	NGO persons	Not even once in a month ()	1-2 times/month ()	3-4 times/month ()	5-6 times/month ()	6times/month ()
IV.	Input dealers(e.g. fertilizer dealers)	Not even once in a month ()	1-2 times/month ()	3-4 times/month ()	5-6 times/month ()	>6 times/month ()
V.	Radio/TV/Leaflets/Newspaper/ Mobile phone	Not even once in a week ()	1-2 times/week ()	3-4 times/week ()	4-5 times/week ()	>6 times/month ()
VI.	Sub assistant agricultural officers	Not even once in a month ()	1-3 times/month ()	4-6 times/month ()	7-9 times/month ()	>9times/month ()
VII.	Field day	Not even once in a month ()	1-3 times/month ()	4-6 times/month ()	7-9 times/month ()	>9times/month ()
VIII.	See agricultural poster, advertisement	Not even once in a month ()	1-3 times/month ()	4-6 times/month ()	7-9 times/month ()	>9times/month ()

10. Incidence of chili diseases during last "Three Year"

Serial No.	Disease/Pest Name	Incidence of Chili Diseases According to Farmers Opinion		
		2020	2019	2018
1	Wilt			
2	Mites			
3	Anthraco nose			

11. Status relates to Chili production at Dumuria Upazila:

Net return:

Items		BDT
Cost:	- Land Preparation	
	-Seed supplies	
	-Fertilizers	
	-Pesticides	
	-Labor	
	-Other	
	A: Total	
Total	B: Output Value	

13. Farmers knowledge regarding chili diseases:

Sl. No.	Question	Full marks	Marks Obtained
1	Tell two diseases name of chili	2	
2	Tell two symptoms of chili wilt	2	
3	What is pheromone trap?	2	
4	Mention two pesticide name to control chili wilt	2	
5	Mention the proper chili growing season	2	
6	Tell the vector name responsible for chili wilt disease spreading	2	
7	Mention soil treating procedure	2	
8	Tell two hazards of high dose of pesticide	2	
9	Mention the proper irrigation schedule for chili	2	
10	Illustrate two seed treating chemical name	2	

14. Attitude towards chili diseases:

Statements	Degree of agreement				
	Highly agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Highly Disagree (1)
1. Chili production is beneficial					
2. Chili are more vulnerable to diseases					
3. High humidity cause Chili wilt disease					
4. Over irrigation suppress the yields of chili					
5. Plant debris can cause chili wilt					
6. Proper irrigation can control chili wilt diseases					
7. Uprooting can control chili wilt diseases					
8. Pesticides are harmful for human health					
9. Bio-pesticides are eco-friendly					
10. Weather is responsible for chili wilt diseases					

15. Practices on chili diseases:

Sl. No.	Practices	Extent of practice			
		Regularly(3)	Sometimes(2)	Rarely(1)	Not at all (0)
1.	Harvesting chili at green stage				
2.	Use of disease free planting material				
3.	Practice of rouging in field				
4.	Maintaining cropping season properly				
5.	Following proper irrigation technique				
6.	Use of resistant variety as				