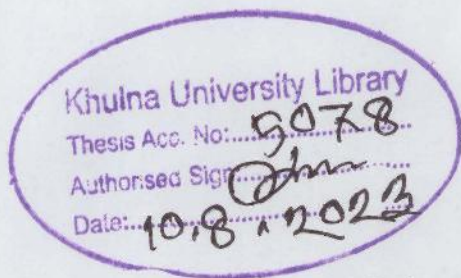


**KNOWLEDGE, ATTITUDE AND PRACTICES OF FARMERS
REGARDING YELLOW VEIN MOSAIC VIRUS OF OKRA AT
DUMURIA UPAZILA IN KHULNA DISTRICT**



MS Thesis

Submitted to

Khulna University, Khulna-9208

In Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

IN

PLANT PATHOLOGY

By

Samee Ansari

Student ID: MS-170811

Session: 2017-2018

Agrotechnology, Discipline

Khulna University

Khulna-9208

November, 2022

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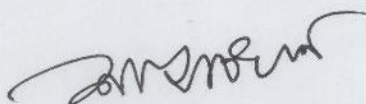
Prof. Md. Rejaul Islam

(Supervisor)



Prof. Dr. Mohammad Bashir Ahmed

(Co-Supervisor)



Professor Dr. Shamim Ahmed Kamal Uddin Khan

(Chairman, Examination Committee

&

Head

Agrotechnology Discipline,

Khulna University,

Khulna-9208)

November, 2022

DEDICATED
TO
MY
BELOVED PARENTS

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The Author

ABSTRACT

Yellow Vein Mosaic Virus (YVMV) of Okra causes major crop yield losses and affect production of Okra. The main purpose of the study was to evaluate the knowledge, attitude and practice of the farmers regarding YVMV of Okra. Data were collected from randomly selected 60 okra farmers through face-to-face interview from Dumuria upazila in Khulna district using an interview schedule during 21-25 June, 2022. About three fourth (73.3%) of the respondents had medium knowledge while the rest (27.3%) of them had low knowledge on YVMV of Okra. The majority (60%) of the respondents had favorable attitude towards the YVMV of Okra while 21.7% of them had highly favorable attitude and 18.3% had neutral attitude. About half (53.3%) of the respondents had adopted medium practices while rest (47.7%) of the respondents had adopted high practices related for management of the YVMV of Okra. Among 10 selected characteristics of the respondents only farming experience showed a positive significant (0.321*, 0.337*, 0.319*) relationship with their knowledge, attitude and practices. Education of the respondents showed a positive significant (0.330*, 0.334*) relationship with both knowledge and attitude while organizational participation and training showed a positive significant (0.0268*, 0.265*) relationship with practices only. However, annual income and extension media contact showed a negative significant (-0.407*, -0.409*) relationship with their practices. Age, experience in okra farming, family size, and farm size showed non-significant relationship with the knowledge, attitude and practices.

Key words: Yellow Vein Mosaic Virus of Okra, Farmers' knowledge, attitude, practice

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CHAPTER I

INTRODUCTION

1.1 Background of the study

Okra (*Abelmoschus esculentus* L. Moench) is the fruit of a large vegetable plant thought to be of African origin. A popular name for okra around the world is 'Lady's finger' and locally known as 'Dherosh/Bhendi'. It is considered as one of the most popular summer vegetables in Bangladesh and grown on about 12193.82 ha of land with a total production of 70242.27 metric tons annually (BBS, 2021). Okra is a multipurpose crop valued for its tender and delicious pods. Young aged okra can be used as salads and for its delicious taste and it is also consumed in different manners such as soups and stews, fresh or dried, fried or boiled (Ndunguru and Rajabu, 2004). Okra is a good source of protein, vegetable oil and also rich in vitamin A and B, phosphorus and iodine, which play significant role in human diet (Yadav & Dhankhar, 2001; Khushk *et al.*, 2003). Okra is a power house of valuable nutrients, soluble and insoluble fiber, which helps to lower serum cholesterol, risk of heart disease, keeps the intestinal tract healthy and decrease colorectal cancer (Broek *et al.*, 2007). The seeds have also gained much interest as a new oil (30–40%) and protein (15–20%) source (Gemedé *et al.*, 2015). Its medicinal value has also been reported in curing ulcers and relief from hemorrhoids (Adams, 1975). It has been found to possess various ethno-pharmacological and medicinal properties against cancer, high-cholesterol, and Diabetes mellitus (Sabitha *et al.*, 2011).

Cultivated okra is mostly susceptible to a large number of begomoviruses having overlapping host range, like radish, tomato, cotton etc. Yellow vein mosaic disease (YVMD), okra leaf curl disease (OLCD), and okra enation leaf curl disease (OELCD) are caused by viruses of genus begomovirus (family geminiviridae) resulting in the serious losses in okra cultivation (Venkataravanappa *et al.*, 2013b). This disease is common in all those places wherever okra is grown. If the disease is spread in the earlier stages then there is bad effect on the yield. Veins of diseased plants leaves turns yellow and thick. Due to continuous attack of the disease most of the leaves of the okra plant turns yellow, which later on turns into dry brown and fall down from the plant.

These types of diseased plants don't give fruits, if the effect of the disease shows up late then upper leaves of the plant becomes yellow but the stem remains green. Diseased plants give yellow, deformed, and hard fruits, which have no value in the market. Under field conditions, infected plants were found to be associated with heavy infestations of the whitefly *Bemisia tabaci*, the vector of begomoviruses (Venkataravanappa *et al.*, 2015a). The loss in yield, due to YVMV and/or OELCV in okra was found ranging from 30 to 100% depending on the age of the plant at the time of infection (Singh, 1996). Infection of 100% plants in a field is quite usual with yield loss ranging between 50 and 94% (Fajinmi and Fajinmi, 2010).

1.2 Statement of the problem

Several diseases damage okra such as Yellow vein mosaic disease, Fusarium wilt, Leaf spots Powdery mildew etc. causing significant losses in productivity. In our country, there are certain important pathogen that inflict significant harm to okra. In Bangladesh, 22 diseases of okra have been documented, including 13 caused by fungus, 1 caused by bacteria, 4 caused by nematodes, 4 caused by virus (DAE, 2019). Because of the occurrence of distinct races, biotypes, or strains of the pathogen, the amount of crop and fruit losses attributable to a single disease differed from place to place (Sastry and Hegde, 1989). The loss in yield, due to YVMV and/or OELCV in okra was found ranging from 30 to 100% depending on the age of the plant at the time of infection (Singh, 1996). This study was specifically designed to find out the answer of the following research questions.

- i. What are the knowledge, attitude and management practices of the farmers about yellow vein mosaic virus of okra?
- ii. What are the characteristics of the farmers?
- iii. Is there any relationship exists between the selected characteristics of the farmer and their knowledge, attitude and management practices regarding yellow vein mosaic virus of okra

1.3 Objectives of the study

Meaningful, accurate and obtainable objectives are an important part of research. The study was conducted with the following objectives

- i. To determine the knowledge, attitude and management practices of the farmers about yellow vein mosaic virus of okra.
- ii. To analyze the selected characteristics of the respondents.
- iii. To explore the relationship between the selected characteristics of the respondents and their knowledge, attitude and management practices about yellow vein mosaic virus of okra.

1.4 Justification of the study

One of the okra growing upazila is Dumuria where a bulk area is cultivated with okra. Large quantities of okra are delivered to the local market and the capital Dhaka as well. Though viral infections have caused a lot of problems for growers with okra. In Bangladesh, there have been few scientific studies on knowledge, attitude and the management practices of yellow vein mosaic virus of okra. However, very few research has been conducted so far on the knowledge, attitude and management practices of farmers about different diseases of different crops.

1.5 Importance of the study:

This study used the knowledge, attitude, and practice (KAP) model to examine farmers' knowledge, attitudes, and practices in the area against Yellow Vein Mosaic Virus of Okra. The study has the following importance-

- i. The study could provide information about farmer's knowledge, attitudes regarding YVMV of okra and practices used against this disease.
- ii. The study could provide information about present status of okra farmer and their socio-economic condition.
- iii. The study could provide present scenario of okra production in Dumuria upazila.
- iv. At last, the study could explore the relationship between selected characteristics of the farmers and knowledge, attitude and management practices about YVMV of okra.

1.6 Scope of the study

The study has the following scope-

- i. The study will show how the farmers' knowledge attitudes and practices can be improved.
- ii. This study may identify the major obstacle of managing YVMV of okra and provide a way to overcome the obstacle.
- iii. The study will provide information about knowledge, attitudes and practices against YVMV of okra for future researchers.

1.7 Limitations of the study

The present study was undertaken with a view to have an understanding of the knowledge, attitude and practice of the farmers regarding yellow vein mosaic virus of okra. In order to conduct the study in a meaningful and manageable way it is necessary to identify some limitations of the survey. Considering the time, money, labor and other necessary resources available to the researcher, the following limitations were observed throughout the study:

- i. The study was confined only to Dumuria upazila in Khulna district. Thus the whole picture of okra cultivation in Bangladesh could not be demonstrated.
- ii. Sample size of the study was limited (60).
- iii. The study was limited to only yellow vein mosaic virus of okra whereas other diseases of okra were not considered at all.
- iv. Sometimes farmers were failed to identify diseases so that they could not able to give accurate information on the yellow vein mosaic virus of okra.

1.6 Assumption of the study

The following assumptions were in the mind of the researcher while conducting the study

- i. The respondents of the study area capable of accurately furnishing all available information stated in the interview schedule.
- ii. The data collected from the respondents were free from bias and hesitation.
- iii. The response furnished by respondents were reliable and valid.

CHAPTER II

REVIEW OF LITERATURE

This chapter is designed for critical reviews of past studies about knowledge, attitude and management practices of yellow vein mosaic virus of okra. Under this chapter we have discussed the findings of different researchers related to this study.

2.1 Reviews Related to Yellow Vein Mosaic Virus of Okra

Bhendi Yellow Vein Mosaic Virus (BYVMV), the virus that causes YVMD, was first identified in Mumbai, India, in 1924 (Kulkarni, 1924).

Phad *et al.* (2009) stated that the occurrence of okra yellow vein mosaic virus and fruit borer causes yield losses to 50-80% depending upon severity.

A. Fajinmi and O. Fajinm (2006) observed that Okra Yellow Vein Mosaic is the most serious disease of okra and is transmitted by white fly (*Bemisia tabaci* Gen.)

According to Venkataravanappa *et al.* (2015a.) Yellow vein mosaic disease (YVMD), okra leaf curl disease (OLCD), and okra enation leaf curl disease (OELCD) caused by distinct mono and bipartite begomoviruses along with their satellites are becoming major threat for cultivation of okra in India.

2.1.1 Management Practices of Yellow Vein Mosaic Virus

2.1.1.1 Resistant Cultivars and Genetic Resistance

Resistant varieties make a significant contribution in the management of OYVMV. About twenty-four varieties of okra plants were evaluated against OYVMV under field conditions. Among these varieties, no one was found to be highly resistant. Three varieties were resistant, eight moderately susceptible, three susceptible, and ten highly susceptible (Kumari *et al.*, 2018).

Dhankhar *et al.* (1996) carried out a field trial to check the resistance against OYVMV. About twenty parents and fifty-one hybrids' cultivars were screened out. The data were collected after 35, 50, and 65-day intervals. Eleven hybrids and one parent

cultivar were highly resistant, seven showed moderate resistance, and others were susceptible or highly susceptible to OYVMV.

Chandra *et al.* (2000) screened out twelve okra lines under natural conditions. The lines, Okra 285 and Ok-292, exhibited resistance against OYVMV. Four lines Ok-317, OK-316, Ok-315, and OK-308, were found tolerant to the disease. Pusa, OK-307, OK-311, Ok-312, OK-310, and Ok-314 were highly susceptible.

Development of resistance in the okra cultivars against OYVMV is not only economical and ecofriendly but also a durable approach towards OYVMD management. The genetic resistance of okra plants was checked against OYVMV in susceptible and resistant parents. According to Wasala *et al* (2019) the dominant genes were involved in controlling the resistance against the virus.

Recently Emmanuel *et al.* (2020) revealed that tolerance to OYVMV in the okra plants is dependent on duplicating the dominant genes and two complementary dominant genes in the tolerant and susceptible cultivars.

Tharmila *et al.* (2020) observed that RNAi has a solid potential to reduce the infection of OYVMV.

2.1.1.2 Plants Extracts

Chowdhury *et al.* (1992) found excellent results of spraying various plant extracts, i.e., gingers and datura against OYVMV under field conditions.

Pun (1999) found that the sprays of leaf extracts of *Bougainvillea spectabilis* and *Prosopis chilensis* on okra plants effectively reduced the OYVMV. These extracts reduced the infection by 81.7–83.3%, respectively.

Kumar and Singh (2002) checked the efficacies of two insecticides and six plant extracts against aphid and whitefly populations in the okra field. The seed extract of neem and leaves extract of tobacco (2%) and BudduNarra (5%) considerably reduced the whitefly population in comparison to the pesticides Monocrotophos (0.05%) and Endosulfan (0.06%)

Ahmed and Patil (2010) examined the efficacy of the plant extracts and insecticides on the disease incidence and whitefly population. Plant extract of Parthenium (10%), pesticide action 100 (0.2%) and soil application of three pesticides [i.e., Roger (0.2%), Metasystox (0.2%) and Carbofuran 3G] were used. Among them, plant extracts followed by Carbofuran 3G effectively controlled the whitefly population.

2.1.1.3 Chemical control

Munir *et al.* (2020) described that okra yellow vein mosaic virus (OYVMV) and whitefly were controlled by changing the sowing dates and applying pesticides, and intercropping okra with the pulses. Previously one spray of foratox and three sprays of methyl demeton 0.025% or phosphamidon 0.02% effectively reduced the whitefly population.

Bhagat *et al.* (2001) revealed that the application of Dimethoate 0.03% after fifteen days of sowing effectively reduced the whitefly population. Three insecticides alone or along with the linseed oil were applied against whitefly and OYVMV. The soil application of Oxydemeton methyl followed by one spray of Carbofuramate effectively reduced the whitefly population, disease incidence and enhanced the yield.

According to Ali *et al.* (2012) Imidacloprid gave the best results compared to Thiamethoxan against the vector population and disease incidence.

2.2 Reviews Related to Knowledge, Attitude and Practice

2.2.1 Reviews Related to Knowledge

Manjari (2015) reported that the majority of respondents (65%) had poor knowledge, only 35% of respondents had median knowledge of cultural practices beyond the traditional, and none had a good knowledge of improved okra cultivation practices; as result, yield suffered.

Pandyal *et al.* (2013) indicated that a majority (71%) of respondents had a medium level of knowledge about okra production technology; equal numbers of respondents had low and high levels of knowledge (14.5%) about okra production technology, and yield was generally improved.

Lad *et al.* (2010) reported that the majority (70.84%) of respondents possessed a medium level of knowledge, with 19.16% having a high level of knowledge and yields were generally good.

Kshash (2017) found that the majority of respondents (49.6%) had a medium level of knowledge of okra cultivation practices followed by low (29.6%) and high (20.8%) levels of knowledge.

Muhammad *et al.* (2012) reported that okra producers lacked general knowledge about postharvest handling and quality suffered.

Agwu and Edum (2007) found that a majority (63.9%) of farmers had a high knowledge of the recommended practices, fewer (33.7%) had moderate knowledge, and only (2.4%) had low knowledge level. They also found that almost all (98.8%) respondents were knowledgeable about timely harvesting, planting (96.4%), fertilizer application (92.8%), insect control (90.4%), irrigation (87.9%), and seed treatment (81.3%); fewer had knowledge of use of an irrigation pump (66.9%), improved varieties (63.9%), crop spacing (61.4%), and tube well/bore holes (52.4%). Only 46.4% and 45.8% were knowledgeable about herbicide use and improved land preparation, respectively. It is necessary that growers have a working knowledge of appropriate cultural practices to maximize yield.

2.2.2 Reviews related to attitude

Masud *et al.* (2020) showed that over half of the respondents (56%) showed unfavorable attitude towards chemical pesticides use in vegetable cultivation and 19% showed highly unfavorable attitude. On the contrary, around 21% of the respondents showed favorable attitude and none of the respondents showed highly favorable attitude towards chemical pesticides use in vegetable cultivation.

Yeasmin *et al.* (2018) described that several factors might influence the farmers for having unfavorable attitude towards chemical pesticides, for instances, awareness of farmers about the harmful effects of chemical pesticides, high prices, or resistances of insect pests to chemical pesticides.

Siddique (2002) in his study on attitude of farmers towards improved winter vegetable production found that majority (64.35%) of the vegetables growers had moderately favorable attitude towards improved winter vegetable production while 25.74% had slightly favorable attitude and only 9.90% fell in the highly favorable attitude category. He also found that the majority (about 74%) of the vegetable growers showed medium to high favorable attitude.

Haque (2002) observed that highest proportion (41.88%) of the farmers possessed moderately favorable attitude towards extension activities of DAE while about one-third (32.48%) of them had moderately unfavorable attitude towards the same. Again, 14.53% farmers showed strongly unfavorable attitude towards extension activities of DAE while 6.84% respondents possessed strongly favorable attitude towards the same. Only 4.27% of the farmers had neutral attitude towards extension activities of DAE. The mean value indicated that overall attitude of the farmers was slightly favorable towards DAE.

2.2.3. Review of Studies Related to the Use of Different Practices

Islam (2002) conducted a study on adoption of modern agricultural technologies in winter vegetable management by the farmers of South part of Bangladesh. The study revealed that majority (69%) of the farmers had medium adoption while 13% and 18% had low and high adoption of modern agricultural technologies respectively.

Hussen (2001) reported that most (91%) of the respondents had medium adoption of modern winter vegetable cultivation practices compared to 7% having low and only 2% having high adoption of winter vegetable cultivation.

Rahman's (1999) study revealed that majority (71%) of the respondents had medium adoption compared to 29% having below optimum adoption and there was no respondent at all who adopted the fertilizer at above optimum level.

Sarkar (2002) observed that more than half or majority (55%) of the respondents had medium adoption compared to 23% having low adoption and 22% having high adoption of improved winter vegetable disease management.

2.3 Studies related to the relationship between the selected characteristics of the farmers and their KAP

2.3.1 Selected characteristics and knowledge

2.3.1.1 Age and knowledge

Kshash (2017) found that the highest percentage of respondents with a high knowledge level were near the median category for age and years of experiences.

Ahmed and Hossain (2018) found a non-significant relationship between age of the rural women and their exposure to communication media for seeking information regarding homestead gardening.

2.3.1.2 Education and knowledge

Kshash (2017) found that the highest percentage of respondents with the least knowledge had the least education.

Ahmed *et al.* (2009) found a significant relationship between education and knowledge in winter vegetable farming.

Ahmed and Hossain (2018) found a non-significant relationship between education of the rural women and their exposure to communication media for seeking information regarding homestead vegetable cultivation.

2.3.1.3 Experience in farming and knowledge

Ahmed *et al.* (2009) found a negative but significant relationship between experience in farming and knowledge in integrated farming.

2.3.1.4 Experience of okra farming and knowledge

Ahmed *et al.* (2009) found a negative but significant relationship between experience in integrated farming and knowledge in integrated farming.

2.3.1.5 Family size and knowledge

Ahmed *et al.* (2009) found a negative but significant relationship between family size and knowledge in integrated farming.

Ahmed and Hossain (2018) found a non-significant relationship between family size of the rural women and their exposure to communication media for seeking information regarding homestead gardening.

2.3.1.6 Farm size and knowledge

Ahmed *et al.* (2009) found a non-significant relationship between farm size and knowledge in integrated farming.

Ahmed and Hossain (2018) found a non-significant relationship between farm size of the rural women and their exposure to communication media for seeking information regarding homestead gardening.

2.3.1.7 Annual income and knowledge

Ahmed *et al.* (2009) found a significant relationship between annual income and knowledge in integrated farming.

2.3.1.8 Organizational participation and knowledge

Ahmed *et al.* (2009) found a significant relationship between organizational participation and knowledge in integrated farming.

Ahmed and Hossain (2018) found a significant relationship between organizational participation of the rural women and their exposure to communication media for seeking information regarding homestead gardening.

2.3.1.9 Extension media contact and knowledge

Ahmed *et al.* (2009) found a significant relationship between extension media contact and knowledge in integrated farming.

Ahmed and Hossain (2018) found a non-significant relationship between knowledge of the rural women and their exposure to communication media for seeking information regarding homestead gardening.

2.3.1.10 Training and knowledge

Ahmed *et al.* (2009) found a significant relationship between training and knowledge in integrated farming.

Ahmed and Hossain (2018) found a non-significant relationship between training of the rural women and their exposure to communication media for seeking information regarding homestead gardening.

2.3.2 Selected characteristics and attitude

2.3.2.1 Age and attitude

Ahmed *et al.* (2009) found a positive but non-significant relationship between age and attitude in integrated farming.

Islam (2018) found a non-significant relationship between age and attitude in organic farming.

2.3.2.2 Education and attitude

Ahmed *et al.* (2009) found a non-significant positive relationship between education and attitude in integrated farming.

Islam (2018) found a negative but non-significant relationship between education and attitude in organic farming.

2.3.2.3 Experience in farming and attitude

Ahmed *et al.* (2009) found a negative but non-significant relationship between experience in farming and attitude in integrated farming.

Islam (2018) found a significant relationship between experience in farming and attitude in organic farming.

2.3.2.4 Experience in okra farming and attitude

Ahmed *et al.* (2009) found a negative but non-significant relationship between experience in integrated farming and attitude in integrated farming.



Islam (2018) found a significant relationship between experience in organic farming and attitude in organic farming.

2.3.2.5 Family size and attitude

Ahmed *et al.* (2009) found a negative significant relationship between family size and attitude in integrated farming.

Islam (2018) found a non-significant relationship between family size and attitude in organic farming.

2.3.2.6 Farm size and attitude

Ahmed *et al.* (2009) found a positive significant relationship between farm size and attitude in integrated farming.

Islam (2018) found a non-significant relationship between farm size and attitude in organic farming.

2.3.2.7 Annual income and attitude

Ahmed *et al.* (2009) found a positive but non-significant relationship between annual income and attitude in integrated farming.

Islam (2018) found a non-significant relationship between annual income and attitude in organic farming.

2.3.2.8 Organizational participation and attitude

Ahmed *et al.* (2009) found a positive significant relationship between organizational participation and attitude in integrated farming.

Islam (2018) found a non-significant relationship between organizational participation and attitude in organic farming.

2.3.2.9 Extension media contact and attitude

Ahmed *et al.* (2009) found a positive significant relationship between extension media contract and attitude in integrated farming.

Islam (2018) found a negative but non-significant relationship between extension media contact and attitude in organic farming.

2.3.2.10 Training and attitude

Ahmed *et al.* (2009) found a positive but non-significant relationship between training and attitude in integrated farming.

Islam (2018) found a non-significant relationship between training and attitude in organic farming.

2.3.3 Selected characteristics and practice

2.3.3.1 Age and practice

Ahmed *et al.* (2009) found a positive but non-significant relationship between age and practice in integrated farming.

Islam (2018) found a non-significant relationship between age and practice in organic farming.

2.3.3.2 Education and practice

Ahmed *et al.* (2009) found a positive but non-significant positive relationship between education and practice in integrated farming.

Islam (2018) found a negative but non-significant relationship between education and practice in organic farming.

2.3.3.3 Experience in farming and practice

Ahmed *et al.* (2009) found a positive but non-significant relationship between experience in farming and practice in integrated farming.

Islam (2018) found a non-significant relationship between experience in farming and practice in organic farming.

2.3.3.4 Experience of okra farming and practice

Ahmed *et al.* (2009) found a negative but non-significant relationship between experience in integrated farming and practice in integrated farming.

Islam (2018) found a non-significant relationship between experience in organic farming and practice in organic farming.

2.3.3.5 Family size and practice

Ahmed *et al.* (2009) found a negative but non-significant relationship between family size and practice in integrated farming.

Islam (2018) found a non-significant relationship between family size and practice in organic farming.

2.3.3.6 Farm size and practice

Ahmed *et al.* (2009) found a positive significant relationship between farm size and practice in integrated farming.

Islam (2018) found a non-significant relationship between farm size and practice in organic farming.

2.3.3.7 Annual income and practice

Ahmed *et al.* (2009) found a positive significant relationship between annual income and practice in integrated farming.

Islam (2018) found a non-significant relationship between annual income and practice in organic farming.

2.3.3.8 Organizational participation and practice

Ahmed *et al.* (2009) found a positive significant relationship between organizational participation and practice in integrated farming.

Islam (2018) found a negative but non-significant relationship between organizational participation and practice in organic farming.

2.3.3.9 Extension media contact and practice

Ahmed *et al.* (2009) found a positive significant relationship between extension media contract and practice in integrated farming.

Islam (2018) found a positive but non-significant relationship between extension media contact and practice in organic farming.

2.3.3.10 Training and practice

Ahmed *et al.* (2009) found a positive but non-significant relationship between training and practice in integrated farming.

Islam (2018) found a negative non-significant relationship between training and practice in organic farming.

2.4 Conceptual Framework of the Study

In scientific research, the conceptual framework is selecting and measuring variables. A properly constructed research hypothesis contains a "dependent variable" and "independent variable." This study is concerned with knowledge, attitude and practice of farmers regarding Yellow Vein Mosaic Virus of Okra. So, knowledge, attitude and practice were the study's dependent variables. It is impossible to deal with all the variables in a single study. After consulting with the relevant experts and reviewing past related literature, ten selected characteristics of the farmers ' were considered for the study as the independent variables.

The conceptual framework of the study, has been formulated as shown in figure.

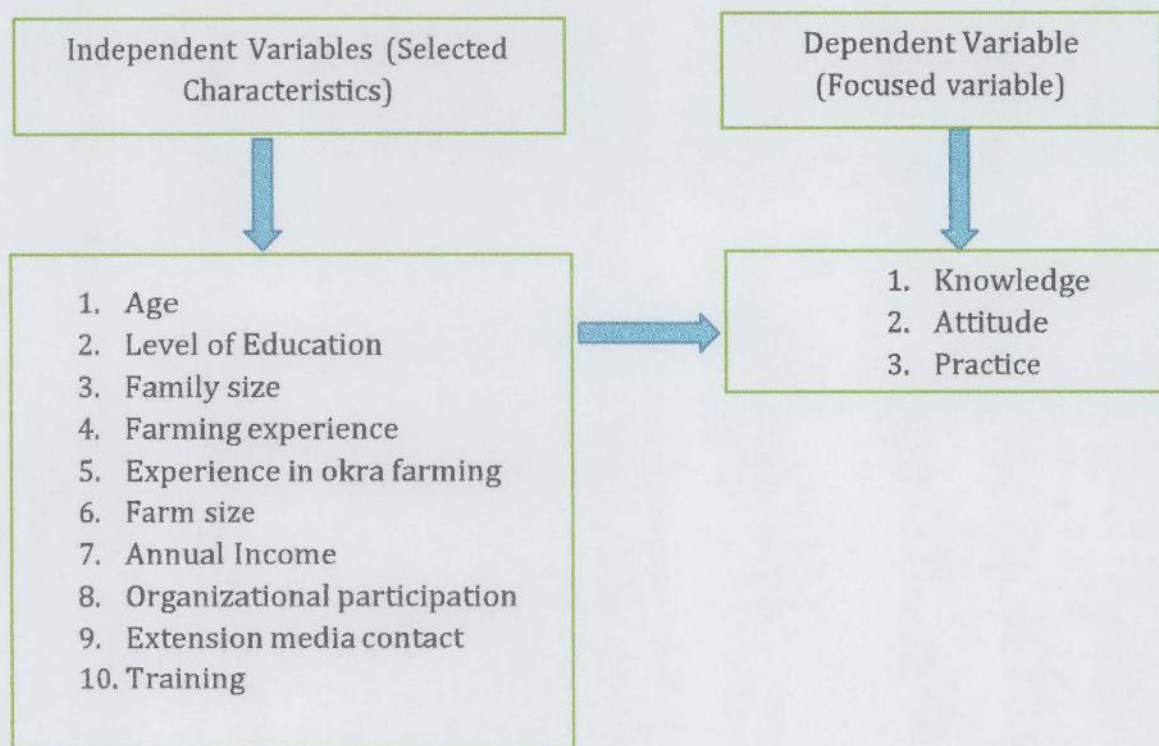


Fig 2.1: Conceptual model showing relationship between knowledge, attitude, practice and their selected characteristics (Independent Variables)

CHAPTER III

METHODOLOGY

Research methodology is the specific procedures or techniques used to identify, select, process, and analyze information about a topic. In a research paper, the methodology section allows the reader to critically evaluate a study's overall validity and reliability. The present study was a field survey on knowledge attitude and practices of farmers regarding Yellow Vein Mosaic Virus of Okra at Dumuria upazilla of Khulna district. To get a structured summary the researchers had to collect valid, active and reliable data. The data was collected according to a pre-tested interview schedule. The interview schedule was prepared very carefully to meet the objectives of the study. All the methods and procedures which were followed in this research are discussed in this chapter.

3.1 Design of the study

This study was based on descriptive and diagnostic research design (Kothari, 1990). It was designed to study the knowledge, attitude and management practices of the farmers about Yellow Vein Mosaic Virus of Okra.

3.2 Locale of the study

The study was conducted at Dumuria upazila under Khulna district (Fig 3.1). The upazila is situated under the same Agro-Ecological Zone (AEZ) of the Ganges Tidal Flood Plain (Anonymous, 1988). Besides, it is known to us as okra growing area, and plays an important role in local market in Khulna.

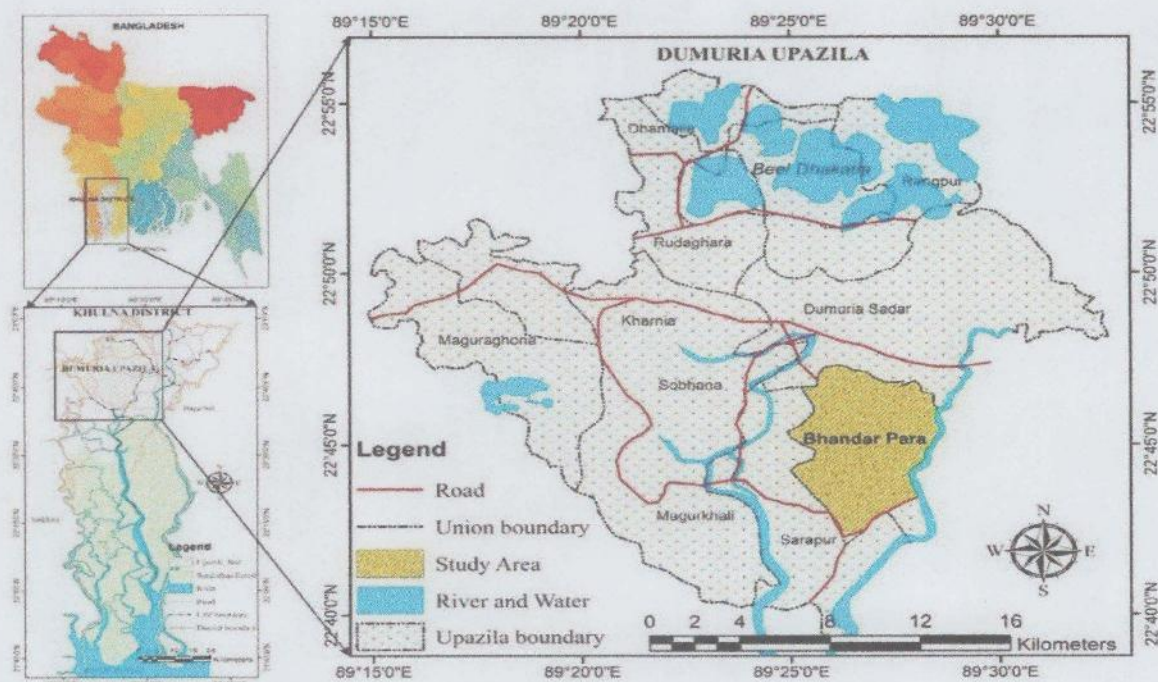


Figure 3.1: Map of Dumuria upazila

3.3 Population and Sampling Design

All the farmers of the selected area who were involved in the cultivation of okra constituted the population of the study. A number of 60 farmers were selected following accidental randomly sampling method.

3.4 Research Instruments

The researcher used pictorial print of disease of okra so that the farmer can easily identify the disease by seeing the clear picture. The interview schedule was prepared for data collection in English but the question were asked in Bangla keeping the objectives of the study in view. The interview schedule contained both closed and open ended questions. Considering the objectives of the study easy, simple, direct questions and different scales were included in the schedule to obtain necessary information. Based upon the pretest experience, necessary correction, addition, alteration and re-arrangement were made in the interview schedule before it was run for final data collection.

3.5 Methods and Time of Data Collection

The data were collected through personal interview by the researcher himself during 21-25 June, 2022. The researcher took every attempt to clarify the goal of the study to

the respondents in order to obtain valid and reliable data. With the use of a visual print of okra diseases, interviews were held with respondents in their fields. Before beginning an interview with any respondent, the researcher established rapport with them and explained the study's aims as much local language as possible. As a result, the respondents furnished proper responses to the questions and statements without hesitation.

3.6 Selection and Measurement of the Variables

3.6.1 Selection of variables

The investigator looked into the relevant literature to have a better grasp of the nature and extent of the variables in the investigation. Any attribute that may take on varied or distinct values in different instances is referred to as a variable (Ezekiel and Fox, 1959). At least two relevant variables, an independent and a dependent variable, are included in a well-organized study. An independent variable is a variable that is changed to determine the link to a phenomena. As the experiment introduces, eliminates, or modifies the independent factors, the dependent variable changes (Townsend, 1953). The specification and measurement of variables is a crucial effort in any research. Some of the respondents' characteristics were included as independent variables in the study. The characteristics were age, educational qualification, family size, experience in farming, experience in okra cultivation, farm size, annual income, organizational participation, extension media contact and training. The dependent (focus) variables of the study was Knowledge, Attitude and Practices of the farmers about yellow vein mosaic virus of okra.

3.6.2 Measurement of independent variables

3.6.2.1 Age

The age of the respondents was measured in terms of actual years from his/her birth to the time of interviewing. The respondents were asked directly about their age. It appears in question no. 1 of the interview schedule (Appendix A). The respondents were classified into different categories according to their age as shown in Table 3.1.

Table 3.1 Categories of the respondents according to their age

Categories	Score (years)
Young aged	Up to 35
Middle aged	36-50
Old aged	≥51

3.6.2.2 Educational qualification

Educational qualification was defined in terms of formal education of a respondent. It was measured by the number of years spent to acquire formal education. A score of one was given to the respondent for one year of schooling. Besides a score of '0' was given to the respondent who had no formal education and could not read and write. For example, a score of 5 was also given to the respondents who passed class five. Besides, a score of one (01) was given to the respondent who can sign his name. It appears in question no. 2 in the interview schedule (Appendix A). The respondents were classified into following categories according to educational qualification as shown in Table 3.2.

Table 3.2 Categories of the respondents according to their educational qualification

Categories	Score (years)
Illiterate	0
Primary	1-5
Secondary	6-10
Higher secondary	11-12
Graduate/Above higher secondary	13-17

3.6.2.3 Family Size

The family size of a respondent was measured by the total number of his family members including himself, his wife, children and other dependents that were eating and staying together. This variable has been shown in the question no. 3 of the interview schedule (Appendix-A). Based on family size, the respondents were classified into different categories as shown in Table 3.3.

Table 3.3 Categories of the respondents according to their family size

Categories	Score (number)
Small sized family	1-4
Medium sized family	5-6
Large sized family	≥7

3.6.2.4 Experience on farming

Experience in farming of the respondents were measured by the length covered from his/her stating years in cultivation to the time of interview on the basis of his statement. A score of one (1) was assigned for each year of his farming experience. It appears in question no. 4 of interview schedule (Appendix A). The respondents were grouped into different 3 categories based on experiences in farming.

Table 3.4 Categories of respondents according to their experience in farming

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

3.6.2.5 Experience on okra cultivation

Experience in okra cultivation the respondents were measured by the length covered from his/her stating years in okra cultivation to the time of interview on the basis of his statement. A score of one (1) was assigned for each year of his okra cultivation experience. It appears in it question no. 5 of interview schedule (Appendix A). The respondents were grouped into different 3 categories based on experiences for okra farming.

Table 3.5 Categories of respondents according to their experience in okra farming

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

3.6.2.6 Farm Size

The farm size referred to land under possession of the respondent. Actual size of the farm was considered as the score of the farm size. The data were first recorded in local unit and then converted to hectare (question no. 6 of the interview schedule). Based on farm size, the respondents were classified into five categories as shown in Table 3.6.

Table 3.6 Categories of respondents according to their farm size

Categories	Score (ha)
Landless farmers	<0.02
Marginal farmers	0.02 -0.20
Small farmers	0.21- 1.0
Medium farmers	1.01-3.0
Large farmers	>3.0

3.6.2.7 Annual income

The yearly income referred to the income of a respondent earned from different sources viz. crop farming, livestock rearing, fisheries, business, service, day laborer and others. The question to measure annual income of the respondents has been shown in the question no. 7 in the interview schedule (Appendix A). The respondents were classified into following categories according to annual income as shown in Table 3.7.

Table 3.7 Categories of respondents according to their family annual income

Categories	Score (BDT)
Low income	< 1,50,000
Medium income	1,50,000-3,00,000
High income	>3,00,000

3.6.2.8 Organizational participation

Organizational participation of a respondent was measured on the basis of number of organization he/she involved and his/her position in particular organization. For

example, if a respondent involved in one organization his organizational participation score is accordingly as no involvement (0), general member (1), executive member (2) and executive officer (3). Based on organizational participation scores, the respondents were grouped into following categories as shown in Table 3.8.

Table 3.8 Categories of the respondents according to their organizational participation

Categories	Score (number)
No participation	0
Low participation	1-5
Medium participation	6-10
High participation	11-15

3.6.2.9 Extension media contact

In this study, the extension media contact score was computed for each respondent on the basis of the extent of his contact with selected media as ascertained from his responses to question no. 9 in the interview schedule (Appendix A). Each respondent was asked to indicate the extent of his contact with its extension such as often, sometimes, seldom and never and a score of 3, 2, 1 and 0 was assigned to these categories respectively. Based on extension media contact score, the respondents were grouped into four categories as shown in Table 3.9.

Table 3.9 Categories of respondents according to their extension media contact

Categories	Score (number)
No contact	0
Low contact	1-8
Medium contact	9-16
High contact	17-24
Very high contact	25-32

3.6.2.10 Training exposure

Farmers training score was determined by the number of training s/he received by without considering duration of training.

Based on training score, the respondents were classified into following categories as shown in Table 3.10.

Table 3.10 Categories of respondents according to their training exposure

Categories	Score (Number)
No training	0
Low training	1-2
Medium training	3-5
High training	>5

3.6.3 Measurement of Dependent / Focus Variables

Knowledge, Attitude and Practice were the dependent variables of the study. Measurement procedure of the variable are discussed below.

3.6.3.1 The Knowledge level of the respondents about Yellow Vein Mosaic Virus of Okra

To determine knowledge of the respondents about Yellow Vein Mosaic Virus of Okra, a number of 10 questions were incorporated in item no.12 of the interview schedule (Appendix A). Each of the question was assigned a score of 2 (two). Thus the total number was 20. Each of the respondents was asked to answer the ten (10) questions. The obtained score of a respondent was determined by adding all the scores obtained score against the 10 questions. Based on the obtained score, the respondent were grouped into following categories as shown in Table 3.11.

Table 3.11 Categories of the respondents according to their knowledge

Categories	Score (number)
Low knowledge	1-7
Medium knowledge	8-14
High knowledge	15-20

3.6.3.2 Attitude of the respondents towards the Yellow Vein Mosaic Virus of Okra

To determine the attitude of the farmers, a number of 10 additional statements were included in the item 13 of interview schedule (Appendix A). A 5 point rating scales

such as highly agree, agree, undecided, disagree, highly disagree were employed against 10 statements related attitude about Yellow Vein Mosaic Virus of Okra. As a score of 5,4,3,2 and 1 were assigned against each of the rating scales respectively. Each of the respondents was asked to rate their responses against the 10 statements with their extent of attitudes. The attitude score of a respondent was calculated by adding all the obtained scores against the 10 attitudes. The attitude score of a respondent could be varied from 10 to 50 where 10 indicate very low attitude while 50 indicate very high attitude. Based on the attitude score, the respondent were classified into different categories as shown in Table 3.12

Table 3.12 Categories of respondents according to their attitude

Categories	Score (number)
Highly Unfavorable attitude	≤10
Unfavorable attitude	11-20
Neutral Attitude	21-30
Favorable Attitude	31-40
Highly Favorable Attitude	41-50



3.6.3.3 Practice of the respondents towards the Yellow Vein Mosaic Virus of Okra

To determine the practice of the farmers, a number of 10 practices were included in the item 14 of interview schedule (Appendix A). A 4 point rating scales such as regularly, sometimes, rarely and not at all were employed against 10 statements related practice about Yellow Vein Mosaic Virus of Okra. As a score of 3, 2, 1 and 0 were assigned against each of the rating scales respectively. Each of the respondents was asked to rate their responses against the 10 practices with their extent of practices. The practice score of a respondent was calculated by adding all the obtained scores against the 10 practices. The practice score of a respondent could varied from 0 to 30 where 0 indicate no practice while 30 indicate high practice. Based on the practice score, the respondent were classified into different categories as shown in Table 3.13

Table 3.13 Categories of the respondents according to their practice

Categories	Score (number)
Low practice	1-10
Medium practice	11-20
High practice	21-30

3.7 Data processing and analysis

Collected data were compiled, coded, tabulated for processing and analysis in accordance with the objectives of the study. For arriving at a meaningful conclusion, tabular presentation of data was intensively used. The SPSS-25 computer package program was used to analyze the data. Descriptive statistics like number, percentage, range, mean and standard deviation were used in describing selected variables of the study. To explore relationship, Pearson Product Correlation Coefficient (for interval and ratio type of data). Data analysis was done using the concerned software Statistical Package for Social Science. The SPSS program is quite good and useful for recording, categorizing, tabulation and computing various simple statistics MS Excel, statistical software was also used for graphical presentation of data.

CHAPTER IV

RESULTS AND DISCUSSION

The study was conducted at Dumuria upazilla under Khulna district. Data were collected from the respondents and were carefully accomplished, coded, computed, tabulated and analyzed in accordance with the objectives of the study. After completion of those processes this chapter was written carefully. In this chapter the findings of the research is presented and are discussed.

4.1 Knowledge, Attitude and Practices of the Respondent Farmers Regarding Yellow Vein Mosaic Virus of Okra

Knowledge scores of the respondent farmers ranged from 5 to 20 with a mean of 9.55 and standard deviation of 2.62. The distribution of respondent farmers according to their knowledge are shown in Table 4.1. Data presented in Table 4.1 reveal that about three fourth (73.3%) of the respondents had medium knowledge followed by low knowledge (23.3%) and high knowledge (3.3%) about Yellow Vein Mosaic Virus of Okra. The findings of the present study have the similarity with the findings of Farhad (2003), he reveals that the majority (68%) the women farmers had medium knowledge on pest management in vegetable cultivation compared to 17% had low knowledge and 15 % had high knowledge while Ahmed *et al.* (2009) found that majority (61.25%) of the respondents had medium knowledge followed by high (21.25%) and low (17.50%) knowledge on integrated farming.

The attitude scores of the respondents ranged from 26 to 45 with a mean of 36.00 and standard deviation of 5.046. The distribution of farmers (respondents) according to their attitude is shown in Table 4.1.

Table 4.1 Distribution of the respondents according to their knowledge, attitude and practice

Sl. No	Dependent variable	Categories	Score	Respondents (N=60)		Observed range	Mean	Std. Deviation
				Number	Percent			
1	Knowledge	Low knowledge	1-7	14	23.3	5-20	9.55	2.62
		Medium knowledge	8-14	44	73.3			
		High knowledge	15-20	2	3.3			
		Total		60	100			
2	Attitude	Highly Unfavorable attitude	1-10	0	0	26-45	36.00	5.046
		Unfavorable attitude	11-20	0	0			
		Neutral attitude	21-30	11	18.3			
		Favorable attitude	31-40	36	60			
		Highly favorable attitude	41-50	13	21.7			
		Total		60	100			
3	Practices	Low practices	1-10	0	0	15-29	20.30	2.976
		Medium practices	11-20	32	53.3			
		High practices	21-30	28	46.7			
		Total		60	100			

The data of Table 4.1 emphasize that majority (60%) of the respondents had favorable attitude towards the Yellow Vein Mosaic Virus of Okra while 21.7 percent of them had highly favorable attitude and 18.3% had neutral attitude towards the Yellow Vein Mosaic Virus of okra. The findings of Sadat (2002) and Ahmed *et al* (2009) had harmony with the present study. Sadat (2002) found that majority (72%) of the Proshika beneficiaries possessed a highly favorable attitude towards Proshika, while 20 percent of them possessed a moderately favorable attitude and only few (8%) beneficiaries had unfavorable attitude towards Proshika while Ahmed *et al* (2009) found that majority (73.75%) of the respondents had highly favorable attitude followed by moderately favorable attitude (26.25%) towards integrated farming.

The management practice score related to the Yellow Vein Mosaic Virus of Okra of the respondents ranged from 15 to 29 with a mean of 20.30 and standard deviation of 2.976. The distribution of farmers (respondents) according to their attitude is shown in Table 4.1. The majority (53.3%) of the respondents had adopted medium practice while rest (47.7%) of the respondents had adopted high practice related to Yellow Vein Mosaic Virus of Okra (Table 4.1). The findings of the present study have harmony with the findings of Rahman (2001). He found that the three fourth (75%) of the farmers fell under the medium adoption while 18 percent fell into high and 7 percent had low adoption of Aalok-6201 hybrid rice cultivation. Ahmed *et al.* (2009) findings had disagreement with the findings of the present study. They found that majority of the respondents (52.5%) had low practice followed by medium practice (47.5%) of integrated farming.

4.1.1 Rank order of farmers' knowledge regarding Yellow Vein Mosaic Virus of Okra

Sl No	Question	Score	Percentage	Ranking
1	Which is the proper okra growing season?	120	100	1 st
2	What is meant by okra yellow vein mosaic virus disease management?	75	62.5	4 th
3	Name two viral diseases of okra?	20	16.66	10 th
4	Cite the symptoms of okra yellow vein mosaic virus disease?	81	67.5	2 nd
5	Which vector is responsible for okra yellow vein mosaic virus disease spreading?	30	25	8 th
6	Which is the soil sterilization procedure?	77	64.16	3 rd
7	Which are the consequences of use of high dose of pesticide to control okra yellow vein mosaic virus disease?	40	33.33	6 th
8	Which is the proper irrigation schedule for okra yellow vein mosaic virus disease?	52	43.33	5 th
9	Which are the two common seed treating chemicals for making okra free from yellow vein mosaic virus disease?	36	30	7 th
10	How crop rotations help to control okra yellow vein mosaic virus disease?	24	20	9 th

4.1.2 Rank order of farmers' attitude regarding Yellow Vein Mosaic Virus of Okra

Sl No	Question	Score	Percentage	Ranking
1	Okra are more vulnerable to diseases	107	35.66	7 th
2	Low temperatures with high humidity causes okra yellow vein mosaic virus disease	48	16	9 th
3	Plant debris can cause okra yellow vein mosaic virus disease	62	20.66	8 th
4	Uprooting can control okra yellow vein mosaic virus disease	272	90.66	1 st
5	Okra yellow vein mosaic virus disease can be identified any stage of the growth	118	39.33	6 th
6	Cloudy Weather is responsible for okra yellow vein mosaic virus disease	212	70.66	2 nd

7	Okra yellow vein mosaic virus diseases are difficult to control	144	80	4 th
8	Okra yellow vein mosaic virus diseases spreads easily	184	61.33	3 rd
9	Clean cultivation can control okra yellow vein mosaic virus disease	184	61.33	3 rd
10	Pesticides are used to control okra yellow vein mosaic virus disease	126	42	5 th

4.1.3 Rank order of farmers' practices regarding Yellow Vein Mosaic Virus of Okra

Sl No	Question	Score	Percentage	Ranking
1	Use of disease free planting material	74	41.11	5 th
2	Use of resistant variety as an alternate to insecticide	54	30	8 th
3	Maintaining cropping season properly	160	88.88	1 st
4	Following crop rotation practice to reduce intension of okra yellow vein mosaic virus disease	42	23.33	9 th
5	Use of rouging in field	80	44.44	4 th
6	Use of biological weed control technique	66	36.66	6 th
7	Following proper irrigation technique	92	51.11	3 rd
8	Burning/buried the severely infected plants	144	80	2 nd
9	Controlling the vector can control the disease	30	16.66	10 th
10	Cultivation on alternate time may help in controlling disease	58	32.22	7 th

4.2 Selected Characteristics of the respondents

Ten characteristics of the farmer were selected to find out their relationship with the okra cultivars. The characteristics were age, educational qualification, family size, experience in farming, experience in okra cultivation, farm size, annual income, organizational participation, extension media contact and training etc.. These characteristics of the farmer are described in this section.

4.2.1 Age

The age of the respondents ranged from 21 to 70 years, with a mean of 46.35 years and the standard deviation was 12.09. The distribution of the respondents according to their age is shown in Table 4.2.

Table 4.2 Distribution of respondents according to their age

Categories	Score (Years)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Young aged	Up to 35	8	13.3	46.35	12.09	21	70
Middle aged	36-50	27	45				
Old aged	≥51	25	41.7				
Total		60	100				

Data presented in Table 4.2 indicate that highest proportion (45%) of the respondents fall in the middle-aged category compared to young (13.3%) and old (41.7%). The present study is harmony with Biswas (2018), which found similar result on age of the respondents. He found majority (57.83%) of the respondents were middle aged.

4.2.2 Level of Education

The level of education score of the farmer ranged from 0-13, with a mean of 7.45 and standard deviation 4.703. The distribution of the farmers according to their level of education is shown in Table 4.3.

Table 4.3 Distribution of farmers according to their education

Categories	Score (Years)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Illiterate	0	14	23.3	7.45	4.703	0	13
Primary	1-5	7	11.7				
Secondary	6-10	22	36.7				
Higher secondary	11-12	13	21.7				
Graduate	13-17	4	6.7				
Total		60	100				

Data presented in Table 4.3 show that highest proportion (36.7%) of the respondents belonged to the secondary education category followed by illiterate (23.3%), higher secondary (21.3%) and primary (11.7%) at Dumuria upazilla. Aliyu (2014) found harmonic result the findings also indicate that most of (40%) the respondents had secondary level of education in vegetable production.

4.2.3 Family Size

The family size of the respondents ranged from 1-12, with a mean of 5.83 and standard deviation 2.451. The characteristics of the respondents according to their family size category is shown in Table 4.4

Table 4.4 Distribution of respondents according to their family size

Categories	Score (No.)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Small size family	1-4	15	25	5.83	2.451	1	12
Medium size family	5-6	22	36.7				
Large size family	≥7	23	38.3				
Total		60	100				

Highest number (38.3%) of the respondents belonged to the large family whereas 36.7% and 15.0% of them belonged to medium and small sized family respectively. The average family size (5.83) of the respondents of the study area is higher than the national average 4.5 people per household (BBS, 2021). It means that the people in the study area were less conscious about their family size and population growth.

4.2.4 Farming experience

The data of the table 4.5 express that farming experience score of the respondents ranged from 2- 50 years with a mean of 21.12 and standard deviation of 11.362. The distributions of the respondents according to their farming experience is shown in Table 4.5

Table 4.5 Distribution of the respondents according to their farming experience

Categories	Score (Years)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Low	1-10	9	15	21.12	11.362	2	50
Medium	11-20	27	45				
High	>20	24	40				
Total		60	100				

Data presented in Table 4.5 reveal that highest proportion (45%) of the respondents were medium experienced followed by high (40%) and low experience (15%) respectively. It means that most (85%) of the respondent had medium to high experience in farming.

4.2.5 Experience in okra farming

The data of the Table 4.6 express that farming experience the score of the respondents ranged from 1- 25 years with a mean of 8.00 and standard deviation of 6.499. The characteristics of the respondents according to their experience in okra farming category is shown in Table 4.6

Table 4.6 Distribution of the respondents according to their experience in okra farming

Categories	Score (Years)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Low	1-10	44	73.3	8.00	6.499	1	25
Medium	11-20	15	25				
High	>20	1	1.7				
Total		60	100				

Data presented in Table 4.6 reveal that three fourth (73.3%) of the respondents were low experienced compared to medium (25%) and high (1.7%) experienced.

4.2.6 Farm Size

The observed farm size scores of the farmers (respondents) varied from 0.25 hectare to 3.00 hectares. The average farm size was 1.0018 hectares and the standard deviation was 0.632. The distribution of the farmers (respondents) according to their farm size is shown in Table 4.7. The findings reveal that majority (70%) of the farmers possessed small sized farm and rest 30% possessed medium sized farm. The average farm size (1.0018) of the respondents of the study area is higher than the national average which is less than 0.6 hectares (BBS, 2021).

Table 4.7 Distribution of respondents according to farm size

Categories	Score (ha)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Landless	<0.02	0	0	1.0018	0.632	0.25	3.00
Marginal	0.02-0.2	0	0				
Small	0.21-1.00	42	70				
Medium	1.1-3.00	18	30				
Large	>3.00	0	0				
Total		60	100				

4.2.7 Annual income

Annual income of the respondents ranged from 50000 to 310000 BDT with a mean of 145.8 and standard deviation 61.935. The distribution of the respondents according to their annual family income is shown in Table 4.8

Table 4.8 Distribution of respondents according to annual income of their family

Categories	Score (000 BDT)	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
Low income	<150	31	51.7				
Medium income	150-300	27	45.00				

High income	>300	2	3.3	145.8	61.9	50	310
Total		60	100		35		

Data presented in Table 4.8 reveal that majority (51.7%) of the respondents had low income compared to medium (45%) and high (3.3%) income.

4.2.8 Organizational participation

The observed organizational participation score of the farmers ranged from 0 to 8 with a mean of 3.38 and standard deviation of 2.018. The distribution of the respondents according to organizational participation score is presented in Table 4.9.

Table 4.9 Distribution of respondents according to their organizational participation

Categories	Score	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
No	0	5	8.3	3.38	2.018	0	8
Low	1-5	46	76.7				
Medium	6-10	9	15.0				
High	11-15	0	0				
Total		60	100				

Data contained in Table 4.9 indicate that majority (76.7%) of the respondents belonged to low organizational participation category while 15.0% of the respondents had medium and a few 8.3% had no organizational participation. However none of the respondent belong to high participation category. It also reveals that majority of the respondents are confined in their farming activities. Being busy with their farming activities it obviously that they don't have enough time to participate in different social organization. Ahmed *et al.* (2009) found that 65.7% of the respondent had low participation of organization which is similar with the present study.

4.2.9 Extension Media Contact

The observed extension contacts scores of the respondents ranged from 0-28 having an average of 13.20 with a standard deviation of 6.679. The distribution of farmers (respondents) according to their extension contact is shown in Table 4.10.

Table 4.10 Distribution of respondents according to their extension contact

Categories	Score	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
No contact	0	2	3.3	13.20	6.679	0	28
Low contact	1-8	24	40.0				
Medium contact	9-16	25	41.7				
High contact	17-24	9	15.0				
Very high contact	25-32	0	0				
Total		60	100				

The findings show that about majority (41.7%) of the farmers had medium extension contact followed by low (40%), high (15%) and no (3.3%) extension media contact. Thus, it can be concluded that most (96.7%) of the respondents were getting help from the extension workers or to different extent (low to high). The findings of the present study has the similarity with Hanjabam (2013) which was pointed out that the most of the farmers had medium level of extension agency contact (76.67 percent) followed by high level extension agency contact (15 percent).

4.2.10 Training

The observed training exposure score of the farmers ranged from 0 to 2 with mean of 0.67 and standard deviation of 0.601. The distribution of the respondents according to organizational participation score is presented in Table 4.11.

Table 4.11 Distribution of respondents according to Training

Categories	Score	Respondent (60)		Mean	SD	Min.	Max.
		Number	Percentage				
No	0	24	40	0.67	0.601	0	2
Low	1-2	32	53.3				
Medium	3-5	4	6.7				
High	>5	0	0				
Total		60	100				

Data contained in Table 4.11 indicate that majority (53.3%) of the respondents belong to low training exposure category followed by no training (40%) and medium (6.7%) training.

4.4 Relationship between the Selected Characteristics of the Respondents and their knowledge, attitude and management practices of the Yellow Vein Mosaic Virus of Okra

Pearson's coefficient of correlation was computed in order to explore the relationship between the selected characteristics of the farmers and their knowledge, attitude and practices (KAP) on Yellow Vein Mosaic Virus of Okra. The selected characteristics of the farmers constituted independent variables and the knowledge, attitude and management practices constituted the dependent variable of the study. In this section relationships between ten selected characteristics (independent variables) of the respondents and dependent variable knowledge, attitude and practices have been described. Person's Product Moment Co-efficient of Correlation (r) was used. Five percent and one percent level of probability were used. The results of the coefficient of correlation (r) indicating relationship between the selected characteristics of the farmers and their knowledge, attitude and practices on Yellow Vein Mosaic Virus of Okra are shown in Table 4.12.

Table 4.12 Relationship between the selected characteristics of the farmers and their knowledge, attitude and practices on Yellow Vein Mosaic Virus of Okra:

Sl. No	Selected characteristics	Knowledge	Attitude	Practices
1	Age	0.186NS	0.061NS	0.124NS
2	Education	0.330**	0.349**	0.195NS
3	Experience in farming	0.321*	0.337**	0.319*
4	Experience in okra farming	0.146NS	0.127NS	0.065NS
5	Family size	-0.001NS	0.126NS	0.193NS
6	Farm size	-0.119NS	-0.246NS	-0.208NS
7	Annual income	0.169NS	-0.378**	-0.407**
8	Organizational participation	0.235NS	0.215NS	0.268*
9	Extension media contact	-0.133NS	-0.070NS	-0.409**
10	Training	-0.075NS	-0.151NS	0.265*

NS= Non-significant. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed)

The findings indicate that the null hypotheses were rejected in case of all selected characteristics. Among the 10 selected characteristics of the respondents Education and Experience in farming showed a positive significant relationship with their knowledge about Yellow Vein Mosaic Virus of Okra. It means that the higher the Education and Experience in farming the higher the knowledge of the respondents on Yellow Vein Mosaic Virus of Okra. Ahmed *et al.* (2009) found that organizational participation and extension contract showed a positive significant relationship with their knowledge in integrated farming.

Education and Experience in farming showed a positive significant relationship with their Attitude about Yellow Vein Mosaic Virus of Okra. It means that the higher is Education and Experience farming more favorable is the attitude of the respondents regarding Yellow Vein Mosaic Virus of Okra. Shankaraiah and Swamy (2012) revealed

that education, farm size, extension participation, mass media participation had positive and significant relationship with attitude of farmers.

Experience in farming, Organizational participation, Extension and Training showed a positive significant relationship with their Practices about Yellow Vein Mosaic Virus of Okra. Annual income and Extension media contact showed a negative significant relationship which indicates that farmer intend to avoid okra farming for low income and less media contact.

Age, Experience in Okra Farming, Family size (person number) and Farm size showed non-significant relationship with the knowledge, attitude and practices.



CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

The main purpose of the study is to evaluate the knowledge, attitude and practice (KAP) of the farmers regarding Yellow Vein Mosaic Virus of Okra. The study was conducted at Dumuria upazilla under Khulna district. Data were collected from randomly selected 60 farmers of Dumuria upazilla under Khulna District through personal interview using an interview schedule during 21-25 June, 2022. Data were collected on some selected characteristics of the farmers as well as knowledge, attitude and practice regarding Yellow Vein Mosaic Virus of Okra.

5.1 Summary of findings

5.1.1 Selected characteristics of the farmers

The major findings of the study are summarized below:

Age: Highest proportion (45%) of the respondents was middle-aged category compared to young (13.3%) and old (41.7%) respectively were more interested in okra cultivation.

Educational qualification: Highest proportion (36.7%) of the respondents belonged to the secondary education category followed by illiterate (23.3%), higher secondary (21.3%) and primary (11.7%) at Dumuria upazilla.

Family size: Highest number (38.3%) of the respondents belonged to the large family whereas 36.7% and 15.0% of them belonged to medium and small sized family respectively.

Experience in farming: Highest proportion (45%) of the respondents were medium experienced followed by high (40%) and low experience (15%) respectively.

Experience in okra farming: Three fourth (73.3%) of the respondents were low experienced in okra farming compared to medium (25%) and high (1.7%) experienced.

Farm size: Majority (70%) of the farmers possessed small sized farm and rest 30% possessed medium sized farm. None of the farmers belong to landless farm size category.

Annual family income: Majority (51.7%) of the respondents had low income compared to medium (45%) and high (3.3%) income.

Organizational participation: Majority (76.7%) of the respondents belonged to low organizational participation category while, a few 8.3% and 15.0% of the respondents had no and medium organizational participation. However none of the respondent belong to high participation category.

Extension media contact: Majority (41.7%) of the farmers had medium extension contact followed by low (40%), high (15%) and no (3.3%) extension media contact. Thus, it can be concluded that most (96.7%) of the respondents were getting help from the extension workers or to different extent (low to high).

Training: Highest proportion (53.3%) of the respondents belong to low training exposure category followed by no training (40%) and medium (6.7%) training.

5.1.2 Focus knowledge, attitude and management practices of the Respondent Farmers Regarding Yellow Vein Mosaic Virus of Okra

Knowledge on Yellow Vein Mosaic Virus of Okra: Majority (73.3%) of the respondents had medium knowledge followed by low knowledge (23.3%) and high knowledge (3.3%) about Yellow Vein Mosaic Virus of Okra.

Attitude on Yellow Vein Mosaic Virus of Okra: Majority (60%) of the respondents had favorable attitude towards the Yellow Vein Mosaic Virus of Okra and while (21.7%) of them had highly favorable attitude and 18.3% had neutral attitude towards the Yellow Vein Mosaic Virus of okra.

Practices of the farmers on Yellow Vein Mosaic Virus of Okra: The majority (53.3%) of the respondents had adopted medium practice while rest (47.7%) of them had adopted high practice related for management of the Yellow Vein Mosaic Virus of Okra.

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

Among the 10 selected characteristics of the respondents Education and Experience in farming showed a positive significant relationship with their knowledge about Yellow Vein Mosaic Virus of Okra. Education and Experience in farming showed a positive significant relationship with their Attitude about Yellow Vein Mosaic Virus of Okra. Experience in farming, Organizational participation, Extension and Training showed a positive significant relationship with their Practices about Yellow Vein Mosaic Virus of Okra. Annual income and Extension media contact showed a negative significant relationship which indicates that farmer intend to avoid okra farming for low income and less media contact. Age, Experience in Okra Farming, Family size (person number), and Farm size showed non-significant relationship with the knowledge, attitude and practices.

5.2 Conclusion

There is a little bit consistency among knowledge attitude and practices of the respondents related to Yellow Vein Mosaic Virus of Okra. Majority of the farmers (73.3%) had medium knowledge and most of them (60%) had favorable attitude while majority (53.3%) of them had adopted medium practice related to Yellow Vein Mosaic Virus of Okra. Among 10 selected characteristics of the respondents only farming experience showed a positive significant (0.321*, 0.337*, 0.319*) relationship with their knowledge, attitude and practices. Education of the respondents showed a positive significant (0.330*, 0.334*) relationship with both knowledge and attitude while organizational participation and training showed a positive significant (0.0268*, 0.265*) relationship with practices only. However, annual income and extension media contact showed a negative significant (-0.407*, -0.409*) relationship with their practices. Age, experience in okra farming, family size, and farm size showed non-significant relationship with the knowledge, attitude and practices.

5.3 Recommendations for further research

This small piece of study being conducted in a specific location cannot provide all information for proper understanding about the knowledge, attitude and practice regarding Yellow Vein Mosaic Virus of Okra in Bangladesh. Future studies should be undertaken covering more dimensions in the related matters

CHAPTER VI

REFERENCES

- Adams, C. F. (1975). *Nutritive value of American foods in common units* (No. 456). Agricultural Research Service, US Department of Agriculture.
- Agwu, A. E., & Edun, O. A. (2007). Influence of farmer' demographic characteristics on knowledge gap of recommended fadam technologies in Ilaro agricultural zone of Ogun State. *Agro-Science*, 6(2), 52-59.
- Ahmed, M.B. and Hossain, M.I. (2018). "Communication exposure of the rural women in receiving information regarding homestead gardening". Paper presented in International Conference on Research and Extension for Sustainable Rural Development. Held at RDA, Bogura during Feb 15-16, 2018. Jointly organized by Bangladesh Agricultural Extension Society (BAES) and Rural Development Academy (RDA), Bogura.
- Ahmed, M.B., Kibria, M.S., Jahan, M.S., Islam, M.M., & Amin. M.R. (2009). Evaluation of knowledge, Attitude and Practice (KAP) of Farmers Regarding vegetable Farming. *South Asian Journal of Asia*, 4(122):146-150
- Ahmed, Z., & Patil, M. S. (2010). Incidence of yellow vein mosaic virus on different okra cultivars in Karnataka. *Karnataka Journal of Agricultural Sciences*, 17(3).
- Ali, M. I., Khan, M. A., Rashid, A., Javed, M. T., & Sajid, M. (2012). Epidemiology of Okra Yellow Vein Mosaic Virus (OYVMV) and its management through tracer, mycotal and imidacloprid.
- Aliyu, T. H. (2014). A Survey and Perception of Farmers on Okra (*Abelmoschus Esculentus* L.) Moench Diseases in the Rain Forest Agroecology of Kwara State, Nigeria. *Journal of Agricultural Research and Development*, 13(1): 1-10.
- Anonymous (1988). Agroecological Region of Bangladesh, Report 2, Land Resources Appraisal of Bangladesh for Agricultural Development. United Nations Development Program, Food and Agricultural Organization of the United Nations, Rome, 570.

- Bhagat, A. P., Yadav, B. P., & Prasad, Y. (2001). Rate of dissemination of okra yellow vein mosaic virus in three cultivars of okra. *Indian Phytopathology*, 54(4), 488-489.
- Biswas, S. and Islam, M. (2018). Farmers' problem confrontation in organic farming at Magura sadar upazila of Bangladesh. *South Asian Journal of Agriculture*, 7(1&2):19-24.
- Broek, R. V., Iacovino, G. D., Paradela, A. L., & Galli, M. A. (2007). Alternative control of *Erysiphe cichoracearum* on okra crop. *Ecossistema*, 27, 23-26.
- Chandra, D., Singh, K. P., & Panda, P. K. (2000). Screening of okra parental lines and their F1S for resistance against yellow vein mosaic virus. *Vegetable Science*, 27(1), 78-79.
- Chowdhury, A. K., Biswas, B., & Shah, N. K. (1992). Inhibition of bhendi (okra) yellow vein mosaic virus (BYVMV) by different plant extracts. *Journal of Mycopathological Research*, 30, 97-102.
- Dhankhar, S. K., Dhankhar, B. S., & Saharan, B. S. (1996). Screening of okra genotypes for resistance to yellow vein mosaic disease. *Annals of Biology*, 12, 90-92.
- Ezekiel, M., & Fox, W. (1959). *Methods of Correlation and Regression Analysis* 3rd edition. New York: John Wiley and Sons, Inc.
- Emmanuel, C. J., Manohara, S., & Shaw, M. W. (2020). Molecular characterization of begomovirus-betasatellite- alphasatellite complex associated with okra enation leaf curl disease in Northern Sri Lanka. *3 Biotech*, 10(12), 1-13.
- Fajinmi, A. A., & Fajinmi, O. B. (2010). Incidence of okra mosaic virus at different growth stages of okra plants (*Abelmoschus esculentus* (L.) Moench) under tropical condition. *J. Gen. Mol. Virol*, 2(1), 028-031.
- Fajinmi, A. A., & Fajinmi, O. B. (2010). Incidence of okra mosaic virus at different growth stages of okra plants (*Abelmoschus esculentus* (L.) Moench) under tropical condition. *J. Gen. Mol. Virol*, 2(1), 028-031.

- Farhad, A. K. M. (2003). Knowledge attitude and practices of rural women in using IPM vegetable cultivation. An MS (Ag. Ext. Ed.) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Gemedede, H. F., Ratta, N., Haki, G. D., Woldegiorgis, A. Z., & Beyene, F. (2015). Nutritional quality and health benefits of okra (*Abelmoschus esculentus*): A review. *J Food Process Technol*, 6(458), 2.
- Haque, M. Z. (2002). Attitude of Rural Women towards Homestead Agriculture in a Selected Area of Panchagarh (unpublished master's thesis). *Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.*
- Hussen, M. A. M. (2001). Farmers Knowledge and Adoption of Modern winter vegetable Production Practices. MS (Ag. Ext. Ed.) Thesis. *Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.*
- Islam, A. (2002). Farmers' Knowledge and Adoption of Ecological Agricultural Practices under Supervision of Proshika. MS (Ag. Ext. Ed.) Thesis. *Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.*
- Islam, S. (2018). Evaluation of Knowledge, Attitude and Practice of Farmers Regarding Organic Farming. A B.Sc Thesis, *Agrotechnology Discipline, Khulna university, Bangladesh.*
- Khushk, A.M., U. Shar and M.A. Memon. 2003. The cultivation of okra in Sindh and its economic view, PARC. Technology Transfer Institute, Tandojam. Publication in Sindh Zarat, 136: 17-18
- Kothari, S.A. (1990). Samprasaran Bijnan Dhaka: Bangladesh Packing Press.
- Kshash, B. H. (2017). Okra Grower's Knowledge of Cultivation Practices: A Case Study. *International Journal of Vegetable Science*, 23(2), 80-86.

- Kulkarni, G. S. (1924). Mosaic and other related diseases of crops in the Bombay Presidency. *Poona Agric Coll Mag*, 6, 12.
- Kumar, M., & Singh, R. (2002). Potential of *Pongamia glabra* vent as an insecticide of plant origin. *Biological Agriculture & Horticulture*, 20(1), 29-50.
- Lad, A. S., Bedre, V. S., & Wangikar, S. D. (2010). Knowledge of the okra growers about recommended cultivation practices of okra. *Agricultural Science Digest*, 30(4), 296-298.
- Manjari, M. B. (2015). Knowledge of the respondents about vegetable cultivation practices. *International Journal of Advanced Research in Management and Social Sciences*, 4(7), 157-170.
- Masud, R., Debashis, R., & Shamsia, K. (2020). Attitude of farmers towards chemical pesticides use in vegetable cultivation. *Journal of the Bangladesh Agricultural University*, 18(4), 1035-1041.
- Muhammad, R. H., Hionu, G. C., & Olayemi, F. F. (2012). Assessment of the post-harvest knowledge of fruits and vegetable farmers in Garun Mallam LGA of Kano, Nigeria. *International Journal of Development and Sustainability*, 1(2), 510-515.
- Munir, A., Ali, S., Zeshan, M. A., Ghani, M. U., & Khan, A. A. (2020). EVALUATION OF ORGANIC AMENDMENTS AND INSECTICIDES AGAINST OKRA YELLOW VEIN MOSAIC VIRUS AND ITS VECTOR: Department of Plant Pathology, University of Agriculture, Faisalabad, Pakistan. *Pakistan Journal of Agriculture, Agricultural Engineering and Veterinary Sciences*, 36(1), 13-20.
- Ndunguru, J., & Rajabu, A. C. (2004). Effect of okra mosaic virus disease on the above-ground morphological yield components of okra in Tanzania. *Scientia Horticulturae*, 99(3-4), 225-235.
- Pandya, C. D., Bhatt, S. T., & Chauhan, N. M. (2013). Knowledge and adoption level of farmers about scientific cultivation of okra in Tapi district. *Young (up to 35 years)*, 125, 62-5.

- Phad, G. N., Suryawanshi, A. B., Agale, D. A., & Chavan, S. R. (2009). Performance of New Hybrids of Okra [*Abelmoschus esculentus* (L.) Moench] For Yield, Yellow Vein Mosaic Virus and Fruit Borer. *International Journal of Plant Protection*, 2(1), 140-141.
- Pun, K. B. (1999). Effect of age of okra plants on susceptibility to Okra yellow vein mosaic virus. *Indian J Virol*, 15, 57-58.
- Rahman, M. M. (1999). Adoption of balanced fertilizer by the boro rice farmers of ishwarganj thana. MS (Ag. Ext. Ed.) Thesis Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, 84.
- Rahman, M. S. (2001). Knowledge, attitude and adoption of the farmers regarding hybrid cabbage in sadar upazila of mymensingh district. MS. (Ag Ext. Ed.) Thesis. Department of Agricultural Extension Education. Bangladesh Agricultural University, Mymensingh.
- Sabitha, V., Ramachandran, S., Naveen, K. R., & Panneerselvam, K. (2011). Antidiabetic and antihyperlipidemic potential of *Abelmoschus esculentus* (L.) Moench in streptozotocin-induced diabetic rats. *Journal of pharmacy and bioallied sciences*, 3(3), 397.
- Sadat, M. A. (2002). Farmers Attitude towards Proshika: A Comparative Study between Proshika Beneficiaries and Non Beneficiaries. MS (Ag. Ext. Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Sarker, M. R. A. (2002). Farmers' Knowledge and Attitude towards winter vegetable production (unpublished master's thesis). Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- Sastry, M. N. L., & Hegde, R. K. (1989). Variability of Phytophthora species obtained from plantations of Karnataka. *Indian Phytopathology*, 42(3), 421-425.
- Siddique, A. B. (2002). Attitude of the Farmers towards Winter Vegetable Production in a selected area of Goforgaon Upazila under Mymensingh district. MS (Ag.



Ext. Ed) Thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Singh, S. J. (1996). Assessment of losses in okra due to enation leaf curl virus. *Indian Journal of virology*, 12(1), 51-53.

Statistical Year Book of Bangladesh (2021). Bangladesh Bureau of Statistics. Ministry of Planning, Govt. of Bangladesh, Dhaka.

Tharmila, C. J., Emmanuel, C. J., Devika, M. D. C., & Michael, W. S. (2020). Detection and absolute quantification of betasatellites associated with okra yellow vein mosaic disease by qPCR. *Journal of Virological Methods*, 276, 113789.

Townsend, J.C. (1953). Introduction of Experimental Methods: International Student Edition. New York: McGraw - Hill Book Company Inc.

Venkataravanappa, V., Prasanna, H. C., Lakshminarayana Reddy, C. N., & Krishna Reddy, M. (2015a). Evidence for two predominant viral lineages, recombination and subpopulation structure in begomoviruses associated with yellow vein mosaic disease of okra in India. *Plant pathology*, 64(3), 508-518.

Venkataravanappa, V., Reddy, C. N., Jalali, S., & Reddy, M. K. (2013). Molecular characterization of a new species of begomovirus associated with yellow vein mosaic of bhendi (okra) in Bhubhaneswar, India. *European journal of plant pathology*, 136(4), 811-822.

Venkataravanappa, V., Reddy, C. N., Jalali, S., Briddon, R. W., & Reddy, M. K. (2015). Molecular identification and biological characterisation of a begomovirus associated with okra enation leaf curl disease in India. *European journal of plant pathology*, 141(2), 217-235.

Wasala, S., Senevirathne, S. I., Senanayake, J. B., & Navoditha, A. (2019). Genetic analysis of Okra Yellow Vein Mosaic Virus disease resistance in wild relative of okra *Abelmoschus angulosus* Wall. ex Wight & Arn. *Plant Genetic Resources*, 17(4), 346-351.

Yadav, S. K., & Dhankhar, B. S. (2001). Correlation studies between various field parameters and seed quality traits in okra cv. Varsha Uphar. Seed Research New Delhi, 29(1), 84-88.

Yeasmin, F., Yasmin, S., & Nahar, K. (2018). Factors influencing farmers' practices in using pesticide for vegetable cultivation at sadar upazila of Gazipur district in Bangladesh. *Progressive Agriculture*, 29(3), 259-266.

APPENDIX- A
AGROTECHNOLOGY DISCIPLINE
KHULNA UNIVERSITY
KNOWLEDGE, ATTITUDE AND PRACTICES OF FARMERS REGARDING
YELLOW VEIN MOSAIC VIRUS OF OKRA

Sample No..... Date.....

Name:Union:Block:

Village: Post:

1. Age.....years

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

a) Can't read and write

b) Can sign only

c) Class/PSC/JSC/SSC/HSC/Bachelor/Masters Pass

3. Family size

4. Experience in farming..... years

5. Experience in Okra farming..... years

6. 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	Others		
Total	$a+b+1/2(c+d)+e+f$		

7. Annual family income

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

8. Organizational participation:

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

9. 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 ()	6 times/ month ()
III.	NGO persons	Not even once in a month ()	1-2 times/month ()	3-4 times/month ()	5-6 times/month ()	6 times/ 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 Extension 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 ()	>9 times/ month ()
VIII.	See agricultural poster, advertisement	Not even once in a month ()	1-3 times/month ()	4-6 times/month ()	7-9 times/month ()	>9 times/ month ()

10. Training:

Have you received any training? Yes -----, No -----If yes, please mention the name of the training with duration you have received from different organization.

Sl. No.	Title of the training	Duration	Organization	Venue of training
1				
2				

11. Farmers' knowledge and perception regarding okra yellow vein mosaic virus disease:

Sl. No.	Question	Full marks	Marks Obtained
1	Which is the proper okra growing season?	2	
2	What is meant by okra yellow vein mosaic virus disease management?	2	
3	Name two viral diseases of okra?	2	
4	Cite the symptoms of okra yellow vein mosaic virus disease?	2	
5	Which vector is responsible for okra yellow vein mosaic virus disease spreading?	2	
6	Which is the soil sterilization procedure?	2	
7	Which are the consequences of use of high dose of pesticide to control okra yellow vein mosaic virus disease?	2	
8	Which is the proper irrigation schedule for okra yellow vein mosaic virus disease?	2	
9	Which are the two common seed treating chemicals for making okra free from yellow vein mosaic virus disease?	2	
10	How crop rotations help to control okra yellow vein mosaic virus disease?	2	

12. Attitude towards Okra diseases:

Sl. no	Statements	Degree of agreement				
		Highly agree (5)	Agree (4)	Undecided (3)	Disagree (2)	Highly Disagree (1)
1	Okra are more vulnerable to diseases					
2	Low temperatures with high humidity cause s okra yellow vein mosaic virus disease					
3	Plant debris can cause okra yellow vein mosaic virus disease					
4	Uprooting can control okra yellow vein mosaic virus disease					
5	Okra yellow vein mosaic virus disease can be identified any stage of the growth					
6	Cloudy Weather is responsible for okra yellow vein mosaic virus disease					
7	Okra yellow vein mosaic virus diseases are difficult to control					
8	Okra yellow vein mosaic virus diseases spreads easily					
9	Clean cultivation can control okra yellow vein mosaic virus disease					
10	Pesticides are used to control okra yellow vein mosaic virus disease					