KNOWLEDGE, ATTITUDE AND PRACTICES OF FARMERS REGARDING YELLOW MOSAIC VIRUS MANAGEMENT OF PUMPKIN AT DUMURIA UPAZILA IN KHULNA DISTRICT

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MS Thesis

Submitted to

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In Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

IN

PLANT PATHOLOGY

By

Student ID: MS-190811

Session: 2019-2020

Agrotechnology, Discipline
Khulna University
Khulna-9208

June, 2023

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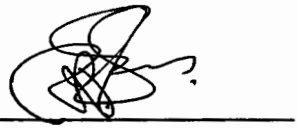

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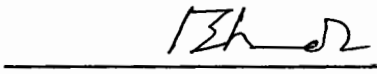

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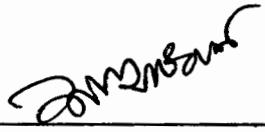

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First of all, the author is grateful to the Almighty for giving the proficiency and capacity to do the work. The author thanks all who contributed in completion of this thesis.

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The author extend his gratitude to **Prof. Dr. Mohammad Bashir Ahmed,** Agrotechnology Discipline, Khulna University, Khulna, the co-supervisor of the study for his care, support and fruitful advice during the research work. His cooperation ornamented the research and made it error free.

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ABSTRACT

Yellow Mosaic Virus (YMV) of Pumpkin causes major crop yield losses and affect production of Pumpkin. The main purpose of the study was to evaluate the knowledge, attitude and practice of the farmers regarding YMV of Pumpkin. Data were collected from randomly selected 60 pumpkin farmers through face-to-face interview from Dumuria upazila of Khulna district using a pretested interview schedule during 20-25 November, 2022. About three fourth (70%) of the respondents had medium knowledge while one fourth (25%) had low knowledge and a very few (5%) had high knowledge respectively on YMV of Pumpkin. The majority (58.3%) of the respondents had favorable attitude towards the YMV of Pumpkin while one fifth (20%) of them had highly favorable attitude and 18.3% had neutral attitude towards the YMV of Pumpkin. The majority (51.7%) of the respondents had adopted practice to a medium extent while 41.7% of the respondents was adopted practices to high extent and 6.7% of them was adopted practices to low extent related to management of the Pumpkin YMV disease. Among the 10 selected characteristics of the respondents education (0.294*), experience in farming (0.258*) and organizational participation (0.379**) showed a positive significant relationship with their knowledge about Pumpkin YMV disease. Education (0.274*) showed a positive significant relationship while farm size (-0.257*) and annual income (-0.403**) showed a negative significant relationship with attitude. Again, annual income (-0.353**) showed a negative significant relationship with practices about Pumpkin YMV disease. Age, experience in pumpkin farming, family size (person number), training and extension media contact showed non-significant relationship with the knowledge, attitude and practices.

Key words: Yellow mosaic virus of Pumpkin, Farmers' knowledge, attitude, practice

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CHAPTER I
INTRODUCTION

1.1 Background of the study

Pumpkin or sweet gourd (*Cucurbita moschata* Duch ex Poir) belongs to the family cucurbitaceae is an important vine crop grown widely as vegetables in Bangladesh (Hoque *et al.*, 2015). Pumpkin also considered as leading major vegetable crop of the subtropical regions of the world (Tadmore *et al.*, 2005). Its fruits, vines, flowers, seeds as well as thicker rinds of the matured fruits are extensively consumed by the Bangladeshi people and this is why pumpkins are cultivated both commercially as well as in the homestead areas of every part of this country. Another advantage of pumpkin cultivation is that its ripened fruits can be stored for 3-4 months easily and can be sold at higher price when the price of pumpkin goes high in the vegetable market. Pumpkin can be grown in both summer and winter season in Bangladesh. In kharif season pumpkin grown on about 12207.03 ha of land with a total production of 145205.83 metric tons and in rabi season grown on about 18023.77 ha of land with a total production of 228960.01 metric tons(BBS, 2022). Both green and ripe pumpkins are used as vegetables. Fruits of pumpkin are very nutritious (Paris, 2005) and its fruits and seeds are also a good source of β-carotene, carbohydrates, minerals, proteins and other vitamins (Yadav *et al.*, 2010). Pumpkin is therefore, believed to have the potentiality to prevent malnutrition problem in the poorer countries to some extent (Hoque *et al.*, 2015). Besides nutritional value it has got therapeutic properties (Yadav *et al.*, 2010) and pumpkin is also one of the natural sources of bioactive compounds (Antioxidants and antimicrobials) as well (Saavedra *et al.*, 2013). Due to sweeter taste its matured fruits are also used to make confectionery, beverages and alcoholic products (Yadav *et al.*, 2010).

The crop has been reported to be affected with a number of diseases. Among them viral diseases are known to cause severe yield losses. Pumpkin Yellow Mosaic Virus Disease (PYMVD) is an important disease infecting the plants at all stages of growth and is responsible for the distortion and mottling of fruits, which is unmarketable (Nath, 1994). The casual virus is designated as "Pumpkin Yellow Mosaic Virus

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Disease" (PYMVD) and occurrence of this disease was first reported by Varma (1955) from New Delhi. Epidemic of the disease is caused due to increase of whitefly populations early in the cucurbit-growing season. Disease caused by PYMV belongs to begomoviruses as a major constraint in the production of cucurbits (Varma and Malathi, 2003).

Incidence of PYVM and associated yield losses were reported to be high during February to May, when the vector population is at its peak (Muniyappa *et al.*, 2003). A yield loss of up to 90% has been recorded in pumpkin due to this disease (Singh *et al.*, 2009). Muniyappa *et al.* (2003) reported that, initial symptom appears as faint vein clearing in tertiary veins of younger leaves. This extends gradually to secondary and primary veins as prominent vein yellowing, coalescing to yellow mosaic. Vein yellowing on older leaves causes early senescence, retarding the plant growth. The leaf size gets reduced, flowers senesce prematurely and fruits become unfit for marketing (Maruthi *et al.*, 2007; Singh *et al.*, 2009).

1.2 Statement of the problem

Several diseases damage pumpkin such as yellow mosaic virus disease, powdery mildew, leaf spots, fruit rot, papaya ring spot, bacterial wilt etc. causing significant losses in productivity. In our country, there are certain important pathogen that inflict significant harm to pumpkin. In Bangladesh, 18 diseases of pumpkin have been documented, including 9 caused by fungus, 2 caused by bacteria, 2 caused by nematodes, 5 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). A yield loss of up to 90% has been recorded in pumpkin due to pumpkin yellow mosaic virus disease (Singh *et al.*, 2009). 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 mosaic virus of pumpkin?
ii. What are the characteristics of the farmers?

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iii. Is there any relationship exists between the selected characteristics of the farmer and their knowledge, attitude and management practices regarding yellow mosaic virus of pumpkin?

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 mosaic virus disease of pumpkin.
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 mosaic virus of pumpkin.

1.4 Justification of the study

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

1.5 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 mosaic virus of pumpkin. In order to conduct the study in a meaningful and manageable way, it is necessary to identify some limitations of the study. Considering the time, money, labor and other necessary resources available to the researcher, the following limitations were observed throughout the study:

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i. The study was confined only to Dumuria upazila in Khulna district. Thus the whole picture of pumpkin cultivation in Bangladesh could not be demonstrated.

ii. Sample size of the study was limited (60).

iii. The study was limited to only yellow mosaic virus of pumpkin whereas other diseases of pumpkin 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 mosaic virus of pumpkin.

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.

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CHAPTER II

REVIEW OF LITERATURE

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

2.1 Reviews related to yellow mosaic virus of pumpkin

Pumpkin yellow mosaic virus (PYMV) disease was first reported in northern India during early 1940s (Vasudeva and Lal, 1943). Later, the disease was reported from different parts of the India and the causal agent is a geminivirus, belonging to genus Begomovirus. The virus is transmitted by whitefly, *Bemisia tabaci* and is not sap transmissible (Capoor and Ahmed, 1975; Jayashree *et al.*, 1999).

Incidence of PYMV and associated yield losses were reported to be high during February to May, when the vector population is at its peak (Muniyappa *et al.*, 2003). A yield loss of up to 90% has been recorded in pumpkin due to this disease (Singh *et al.*, 2009).

Muniyappa *et al.* (2003) reported that, initial symptom appears as faint vein clearing in tertiary veins of younger leaves. This extends gradually to secondary and primary veins as prominent vein yellowing, coalescing to yellow mosaic. Vein yellowing on older leaves causes early senescence, retarding the plant growth. The leaf size gets reduced, flowers senesce prematurely and fruits become unfit for marketing (Maruthi *et al.*, 2007; Singh *et al.*, 2009).

Two species of geminiviruses, with bipartite genome, causing PYMV have been reported from India. Tomato leaf curl New Delhi virus-India (Maruthi *et al.*, 2007) has been reported from North India and squash leaf curl China virus-India, from South India. Later, bipartite Squash leaf curl Palampur virus was also reported to be associated with PYVM (Jaiswal *et al.*, 2010).

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2.1.1 Host range

Verma (1955) studied the hosts of yellow mosaic virus affecting pumpkin from Poona. He found that the virus could infect *Cucurbit moschata, Cucumis sativus, Citrullus fistula* and *Luffa acutangula.*

Capoor and Ahmad (1975) reported hosts of yellow mosaic virus affecting pumpkin from Deccan. Hosts recorded were *C. moschata, C. maxima, Citrullus vulgaris* var fistulosus, *Luffa acutangula, Callistophus chinensis, Nicotiena tabacum.* The symptoms expressed by these plants varied from mild to severe vein clearing.

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2.1.2 Management practices of yellow mosaic virus of pumpkin

2.1.2.1 Resistant cultivars and genetic resistance

The chemical management of the vector is not cost-effective since numerous sprays of insecticides are required to control aphid. Recurrent spraying also lead to health danger and ecological influence. On the contrary, use virus resistant/ tolerant varieties are the best approach to alleviate occurrence of mosaic disease in areas where the infection is a major constraint to production. Many researchers evaluated different cultivars of pumpkin against the mosaic disease in different countries (Moura, 2005).

Ghosh and Biswas (2018) observed six germplasms of pumpkin i.e. Chaitali, Pusa-Shrabani, Kumra, Chandipur-25, Pusa- Padini and Rani-Round. They were seeded under natural environmental conditions for evaluating their resistance against common mosaic disease. Out of six pumpkin varieties, two cultivars were found resistant (R), 2 moderately resistant (MR), and two moderately susceptible (MS).

2.1.2.2 Plants product and traditional method

Ondigi *et al.* (2008) found that one traditional method was popular: use of wood ash to keep pests at bay. In various parts in the four districts, other traditional methods are used to control the pests including mulching, weeding and intercropping.

Some farmers use organic and less harmful methods to repel insects such as planting the seeds with a regulated amount of coat meal as also noted by Dubey *et al.* (2010).

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Some farmers apply some ash to the soil before planting the seeds to increase the soil pH (Qin *et al.*, 2017) especially during the rainy season when ferric soils tend to be too acidic (Young, 1974). This is to favor proper crop growth since the suitable pH for good pumpkin yields ranges from 6.0 to 6.5 (Kemble *et al.*, 2000).

The primary recommendation for managing pumpkin virus diseases is to maintain proper isolation of crop from other cucurbit crops to minimize the spread of infected aphids into a pumpkin planting (Brust and Everts, 2010).

2.1.2.3 Chemical control

Some farmers spray their pumpkins with synthetic insecticides and fungicides to control pests and diseases that can lower the crop's productivity despite their side effects as also noted by Wilson and Tisdell (2001) and Walter *et al.* (2004).

2.2 Reviews related to knowledge, attitude and practice

2.2.1 Reviews related to knowledge

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.

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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 fanners was slightly favorable towards DAE.

2.2.3. Review of studies related to the use of different practices

Nakazibwe *et al.* (2019) interviewed some participants and observed that they applied manure before sowing the pumpkin seeds (27.0%). Most of the farmers weeded their gardens to remove unwanted plants (21.3%). A reasonable number of farmers reported that they mulched their gardens (15.6%). Some farmers reported that they

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spray insecticides to kill the pests such as fruit flies that would lead to heavy economic losses (10.7%). The other practices carried out by farmers to ensure good yield are good spacing (2.5%), removing rotten fruits (9.0%) applying ash (0.8%), application of coriander seeds in the hole before sowing (1.6%), application of inorganic fertilizers such as leaf and flower boosters among others (4.9%), thinning (4.1%) and using good seed.

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 famers had medium adoption while 13% and 18% had low and high adoption of modem 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 knowledge, attitude, practices (KAP).

2.3.1 Selected characteristics and knowledge

2.3.1.1 Age and knowledge

Nakazibwe *et al.* (2019) found that the majority of the farmers were above 46 years of age (50.0%) which shows that the youth are less involved in pumpkin cultivation.

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.

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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.

Nakazibwe *et al.* (2019) revealed that a considerable number of the farmers interviewed associated with pumpkin production were educated at least up to primary level (61.1 %).

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 pumpkin 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

Ondigi *et al.* (2008) found that in Jinja district of china majority of the families (59%) who practice pumpkin cultivation are medium size while in Busia and Tarime, majority are medium size to large size.

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

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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 contract 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.

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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.

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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 pumpkin farming and attitude

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

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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.

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Islam (2018) found a negative but non-significant relationship between extension media contract 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 pumpkin farming and practice

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

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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

Nakazibwe *et al.* (2019) found that most of the respondents practiced pumpkin growing on a small scale (66.7%) or intercropped (63.9%) with other crops such as sorghum, banana, beans and maize. Some of the farmers grew pumpkins alone on a large scale (27.8%).

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.

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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 contract and practice in organic farming.

2.3.3.10 Training and practice

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

Islam (2018) revealed 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 management of yellow mosaic virus of pumpkin. 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.

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

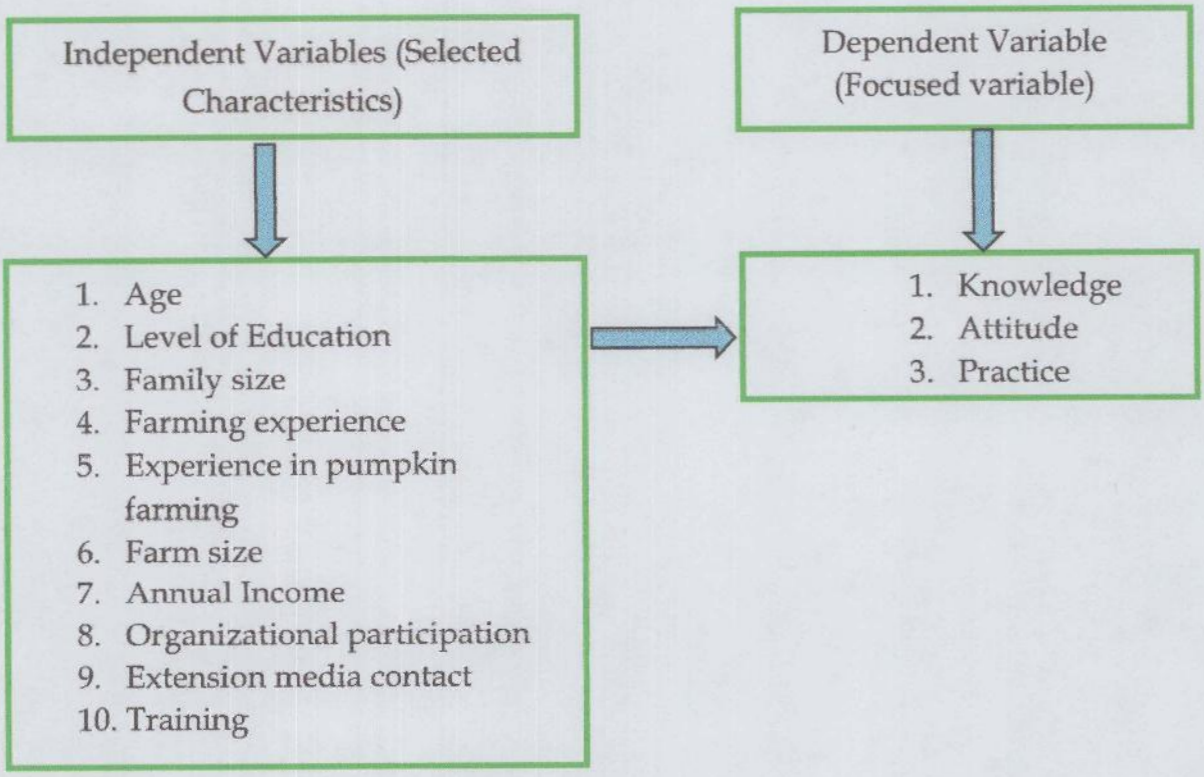

Fig 2.1: Conceptual model showing relationship between knowledge, attitude, practice and their selected characteristics (Independent variables)

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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 management of yellow mosaic virus disease of pumpkin 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 mosaic virus of Pumpkin.

3.2 Location 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 pumpkin growing area, and plays an important role in local market in Khulna.

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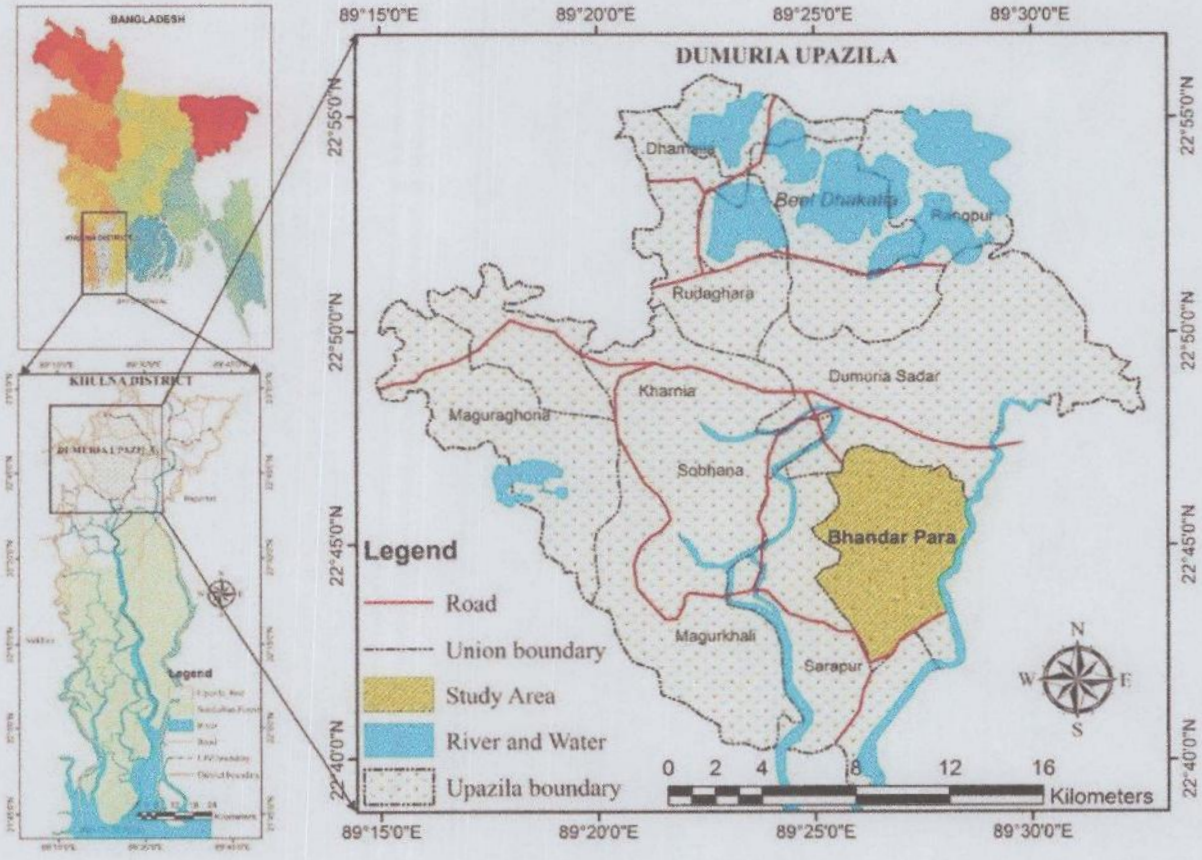

Figure 3.1: Map of Dumuria upazila

3.3 Population and sampling design

All the farmers of the selected area who were involved in the cultivation of pumpkin 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 pumpkin so that the farmer can easily identify the disease by seeing the color 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. The interview schedule was pretested and 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.

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3.5 Methods and time of data collection

The data were collected through personal interview by the researcher himself during 20-25 November, 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 pumpkin 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.

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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 pumpkin 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 mosaic virus of pumpkin.

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

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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

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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 starting 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 pumpkin cultivation

Experience in pumpkin cultivation the respondents were measured by the length covered from his/her starting years in pumpkin cultivation to the time of interview on the basis of his statement. A score of one (1) was assigned for each year of his pumpkin 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 pumpkin farming.

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Table 3.5 Categories of respondents according to their experience in pumpkin 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

Source: Krishi Dairy (2022), ALS, MoA

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.

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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 respond 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.

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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 mosaic virus of pumpkin

To determine knowledge of the respondents about yellow mosaic virus of pumpkin, 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

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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 management of yellow mosaic virus of pumpkin

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 mosaic virus of Pumpkin. 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

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3.6.3.3 Management practice of the respondents towards the yellow mosaic virus of pumpkin

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 mosaic virus of Pumpkin. 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.

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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 mosaic virus of pumpkin

Knowledge scores of the respondent farmers ranged from 5 to 20 with a mean of 9.57 and standard deviation of 2.68. The distribution of respondent farmers according to their knowledge are shown in Table 4.1. Data presented in Table 4.1 reveal that about majority (70%) of the respondents had medium knowledge followed by low knowledge (25%) and high knowledge (5%) about yellow mosaic virus of pumpkin. The findings of the present study have the similarity with the findings of Ansari (2022), he reported that three fourth (73.3%) of the respondents had medium knowledge while the rest (27.3%) of them had low knowledge on YVMV of Okra. Farhad (2003), he revealed 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 15 to 45 with a mean of 35.33 and standard deviation of 6.07. The distribution of farmers (respondents) according to their attitude is shown in Table 4.1.

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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	15	25	5-20	9.57	± 2.68
		Medium knowledge	8-14	42	70			
		High knowledge	15-20	3	5			
		Total		60	100			
2	Attitude	Highly Unfavorable attitude	1-10	0	0	15-45	35.33	± 6.07
		Unfavorable attitude	11-20	2	3.3			
		Neutral attitude	21-30	11	18.3			
		Favorable attitude	31-40	35	58.3			
		Highly favorable attitude	41-50	12	20			
		Total		60	100			
3	Practices	Low practices	1-10	4	6.7	10-29	19.58	± 3.82
		Medium practices	11-20	31	51.7			
		High practices	21-30	25	41.7			
		Total		60	100			

The data of Table 4.1 emphasize that majority (58.3%) of the respondents had favorable attitude towards the yellow mosaic virus of pumpkin while one fifth (20%) of them had highly favorable attitude and 18.3% had neutral attitude towards the yellow mosaic virus of pumpkin. The findings of the present study have the similarity with the findings of Ansari (2022), he stated that the majority (60%) of the respondents had favorable attitude while 21.7% of them had highly favorable attitude towards the YVMV 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% of

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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 mosaic virus of pumpkin of the respondents ranged from 10 to 29 with a mean of 19.58 and standard deviation of 3.82. The distribution of farmers (respondents) according to their attitude is shown in Table 4.1. The majority (51.7%) of the respondents had adopted practice to a medium extent while 41.7% of the respondents was adopting practice to high extent and 6.7% of them was adopting practice to low extent related to management of the YMV of pumpkin (Table 4.1). The findings of the present study have harmony with the findings of Ansari (2022), he found that more than half (53.3%) of the respondents had adopted medium practices while rest (47.7%) of the respondents had adopted high practices related to the management of YVMV of Okra. Rahman (2001) found that the three fourth (75%) of the farmers fell under the medium adoption while 18% fell into high and 7% 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 mosaic virus of pumpkin

Sl No	Question	Score obtained	Percentage	Ranking
1	Which is the proper pumpkin growing season?	120	100	1st
2	What is meant by pumpkin yellow mosaic virus disease management?	68	56.66	4th
3	Name two viral diseases of pumpkin?	18	15	10th
4	Cite the symptoms of pumpkin yellow mosaic virus disease?	79	65.83	2nd

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5	Which vector is responsible for pumpkin yellow mosaic virus disease spreading?	30	25	9th
6	Which is the soil sterilization procedure?	48	40	6th
7	Which are the consequences of use of high dose of pesticide to control pumpkin yellow mosaic virus disease?	54	45	5th
8	Which is the proper irrigation schedule for pumpkin yellow mosaic virus disease?	75	62.5	3rd
9	Which are the two common seed treating chemicals for making pumpkin free from yellow mosaic virus disease?	36	30	8th
10	How crop rotations help to control pumpkin yellow mosaic virus disease?	42	35	7th

The pumpkin farmers had highest knowledge about the proper pumpkin growing season followed by the knowledge on symptoms of pumpkin YMV disease, proper irrigation schedule for pumpkin YMV disease. But they had low knowledge about citing two viral pumpkin disease.

4.1.2 Rank order of farmers' attitude regarding management of yellow mosaic virus of pumpkin

Sl No	Question	Score obtained	Percentage	Ranking
1	Pumpkin are more vulnerable to diseases	204	68	4th
2	Low temperatures with high humidity causes pumpkin yellow mosaic virus disease	68	22.67	9th
3	Plant debris can cause pumpkin yellow mosaic virus disease	135	45	7th
4	Uprooting can control pumpkin yellow mosaic virus disease	285	95	1st
5	Pumpkin yellow mosaic virus disease can be identified any stage of the growth	248	82.67	2nd

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6	Cloudy Weather is responsible for pumpkin yellow mosaic virus disease	120	40	8th
7	Pumpkin yellow mosaic virus diseases are difficult to control	226	75.33	3rd
8	Pumpkin yellow mosaic virus diseases spreads easily	190	63.33	5th
9	Clean cultivation can control pumpkin yellow mosaic virus disease	184	61.33	6th
10	Pesticides are used to control pumpkin yellow mosaic virus disease	204	68	4th

Data presentation in Table 4.1.2 indicate that the pumpkin farmers had highly favorable attitude about uprooting can control pumpkin YMV disease followed by pumpkin YMV disease can be identified at any stage of the growth. But they had very unfavorable attitude about the low temperatures with high humidity causes PYMV disease (statement-2), cloudy weather is responsible for PYMV disease (statement-6) and plant debris can cause PYMV disease (statement-3).

4.1.3 Rank order of farmers' practices regarding yellow mosaic virus of pumpkin

Sl No	Question	Score obtained	Percentage	Ranking
1	Use of disease free planting material	164	91.11	1st
2	Use of resistant variety as an alternate to insecticide	78	43.33	6th
3	Maintaining cropping season properly	140	77.77	2nd
4	Following crop rotation practice to reduce intension of pumpkin yellow mosaic virus disease	72	40	7th
5	Use of rouging in field	90	50	5th
6	Use of biological weed control technique	66	36.66	9th
7	Following proper irrigation technique	122	67.77	4th
8	Burning/buried the severely infected plants	128	71.11	3rd

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9	Controlling the vector can control the disease	30	16.66	10th
10	Cultivation on alternate time may help in controlling disease	62	34.44	8th

Data contained in the Table 4.1.3 show that pumpkin farmers used disease free planting materials highly followed by maintaining cropping season properly (statement-3), following proper irrigation technique (statement-7) and burning/buried the severely infected plants (statement-8) while controlling of vector to control the disease (statement-9) was adopted to a low extent by them.

4.2 Selected characteristics of the respondents

Ten characteristics of the farmer were selected to find out their relationship with the pumpkin cultivars. The characteristics were age, educational qualification, family size, experience in farming, experience in pumpkin 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 67 years, with a mean of 45.40 years and the standard deviation was 11.39. 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	≤35	15	25	45.40	± 11.39	21	67
Middle aged	35-50	25	41.7				
Old aged	51-80	20	33.3				
Total		60	100				

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Data presented in Table 4.2 indicate that highest proportion (41.7%) of the respondents fall in the middle-aged category compared to old (33.3%) and young (25%). The present study has harmony with Biswas (2018), who 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 6.37 and standard deviation 4.34. 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	15	25	6.37	± 4.34	0	13
Primary	1-5	13	21.7				
Secondary	6-10	24	40				
Higher secondary	11-12	6	10				
Graduate	13-17	2	3.3				
Total		60	100				

Data presented in Table 4.3 show that highest proportion (40%) of the respondents belonged to the secondary education category followed by illiterate (25%), primary (21.7%), higher secondary (10%) and graduate 3.3% at Dumuria upazilla. Aliyu (2014) found harmonic result the findings also indicate that highest portion (40%) of 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 5.48 and standard deviation 2.25.The characteristics of the respondents according to their family size category is shown in Table 4.4

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Data presented in Table 4.5 reveal that majority (55%) of the respondents were high experienced followed by medium (35%) and low experience (10%) respectively. It means that most (90%) of the respondent had medium to high experience in farming.

4.2.5 Experience in pumpkin farming

The data of the Table 4.6 express that farming experience score of the respondents ranged from 1-30 years with a mean of 17.12 and standard deviation of 8.29. The characteristics of the respondents according to their experience in pumpkin farming category is shown in Table 4.6

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

Categories	Score (Years)	Respondent (60)		Mean	SD (±)	Min.	Max.
		Number	Percentage				
Low	1-10	12	20	17.12	± 8.29	1	30
Medium	11-20	20	33.3				
High	>20	28	46.7				
Total		60	100				

Data presented in Table 4.6 reveal that highest proportion (46.7%) of the respondents were high experienced compared to medium (33.3%) and low (20%) experienced in pumpkin cultivation.

4.2.6 Farm size

The observed farm size scores of the farmers (respondents) varied from 0.15 hectare to 3.25 hectares. The average farm size was 1.037 hectares and the standard deviation was 0.736. The distribution of the farmers (respondents) according to their farm size is shown in Table 4.7. The findings reveal that majority (66.7%) of the farmers possessed small sized farm, 25% possessed medium sized farm, 5% possessed large sized farm and rest 3.3% of the farmer were marginal farmer. The average farm size

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(1.037) of the respondents of the study area is higher than the national average less than 0.6 hectares (Khan, 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	1.037	± 0.736	0.15	3.25
Marginal	0.02-0.2	2	3.3				
Small	0.21-1.00	40	66.7				
Medium	1.1-3.00	15	25				
Large	>3.00	3	5				
Total		60	100				

4.2.7 Annual income

Annual income of the respondents ranged from 50 to 310 thousand BDT with a mean of 142.25 and standard deviation 61.27. 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 (1000 BDT) (TK)	Respondent (60)		Mean	SD (±)	Min.	Max.
		Number	Percentage				
Low income	<150	37	61.7	142.25	± 61.27	50	310
Medium income	150-300	21	35				
High income	>300	2	3.3				
Total		60	100				

Data presented in Table 4.8 reveal that majority (61.7%) of the respondents had low income compared to medium (35%) and high (3.3%) income.

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4.2.8 Organizational participation

The observed organizational participation score of the farmers ranged from 0 to 8 with a mean of 2.5 and standard deviation of 2.14. 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 participation	0	16	26.6	2.5	±2.14	0	8
Low participation	1-5	40	66.7				
Medium participation	6-10	4	6.7				
High participation	11-15	0	0				
Total		60	100				

Data contained in Table 4.9 indicate that majority (66.7%) of the respondents belonged to low organizational participation category while above one fifth (26.6%) and a few (6.7%) of them had no and medium 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 majority (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 12.45 with a standard deviation of 6.40. The distribution of farmers (respondents) according to their extension contact is shown in Table 4.10.

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Table 4.10 Distribution of respondents according to their extension media contact

Categories	Score	Respondent (60)		Mean	SD (±)	Min.	Max.
		Number	Percentage				
No contact	0	2	3.3	12.45	± 6.40	0	28
Low contact	1-10	28	46.7				
Medium contact	11-20	23	38.3				
High contact	21-32	7	11.7				
Total		60	100				

The findings show that about highest proportion (46.7%) of the farmers had low extension media contact followed by medium (38.3%) and high (11.7%) including 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 had contact to different extent (low to high). The findings of the present study has the similarity with Hanjabam (2013) study which pointed out that the most of the farmers had medium level of extension agency contact (76.67%) followed by high level extension agency contact (15%).

4.2.10 Training

The observed training exposure score of the farmers ranged from 0 to 2 with mean of 0.63 and standard deviation of 0.61. 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 training	0	26	43.3	0.63	± 0.61	0	2
Low training	1-2	30	50				
Medium training	3-5	4	6.7				
High training	>5	0	0				
Total		60	100				

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Data contained in Table 4.11 indicate that half (50%) of the respondents belonged to low training exposure category followed by no training (43.3%) 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 mosaic virus of pumpkin

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 mosaic virus of Pumpkin. 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 mosaic virus of pumpkin are shown in Table 4.12.

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Table 4.12 Relationship between the selected characteristics of the farmers and their knowledge, attitude and practices on yellow mosaic virus of pumpkin

Sl. No	Selected characteristics	Knowledge	Attitude	Practices
1	Age	0.208NS	0.089NS	0.142NS
2	Education	0.294*	0.274*	0.196NS
3	Family size	0.086NS	0.021NS	-0.012NS
4	Experience of farming	0.258*	0.157NS	0.216NS
5	Experience of pumpkin farming	0.090NS	-0.057NS	0.127NS
6	Farm size	-0.033NS	-0.257*	-0.233NS
7	Annual income	-0.082NS	-0.403**	-0.353**
8	Organizational participation	0.379**	0.115NS	0.226NS
9	Training	-0.202NS	-0.081NS	-.038NS
10	Extension media contact	-0.128NS	-0.189NS	-0.236NS

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 presented in Table 4.12 indicate that respondents education (0.294*), experience in farming (0.258*) and organizational participation (0.379*) showed a positive significant relationship with their knowledge about yellow mosaic virus of pumpkin. It means that the higher is the education, experience in farming and organizational participation the higher is the knowledge of the respondents on pumpkin YMV disease. The rest variables such as age, family size, experience of pumpkin farming showed positive non-significant relationship with the knowledge while farm size, annual income, training and extension media contact showed negative non-significant relationship with knowledge. Ahmed *et al.* (2009) found that organizational participation and extension contact showed a positive significant relationship with their knowledge in integrated farming.

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The education (0.274*) of the respondents showed positive significant relationship while farm size (-0.257*), annual income (-0.403**) showed negative significant relationship with their attitude about pumpkin YMV disease. It means that the higher is the education of the respondents, the higher is the favorable attitude. On the other hand the higher is the farm size and annual income the unfavorable is the attitude towards pumpkin YMV disease. The rest of the variables such as age, family size, experience of farming, organizational participation showed positive non-significant relationship with attitude while experience of pumpkin farming, training and extension media contact showed negative non-significant relationship with attitude. Shankaraiah and Swamy (2012) revealed that education, farm size, extension participation, mass media participation had positive and significant relationship with attitude of farmers.

Again, annual income (-0.353**) showed a negative significant relationship with practices about pumpkin YMV disease. It means that higher is annual income the lower is the adoption of management practices to control pumpkin YMV disease. The rest of the variables such as age, education, experience of farming, experience of pumpkin farming and organizational participation showed positive non-significant relationship with practices while family size, farm size, training and extension media contact showed negative non-significant relationship with practices.

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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 mosaic virus of Pumpkin. 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 20-25 November, 2022. Data were collected on some selected characteristics of the farmers as well as knowledge, attitude and practice regarding yellow mosaic virus of pumpkin.

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 (41.7%) of the respondents fall in the middle-aged category compared to old (33.3%) and young (25%) respectively were more interested in pumpkin cultivation (Table 4.2).

Educational qualification: Highest proportion (40%) of the respondents belonged to the secondary education category followed by illiterate (25%), primary (21.7%), higher secondary (10%) and graduate 3.3% at Dumuria upazilla (Table 4.3).

Family size (determines family type): Highest portion (46.7%) of the respondents belonged to the medium size family whereas 28.3% and 15.0% of them belonged to small and large sized family respectively (Table 4.4).

Experience in farming: Majority (55%) of the respondents were high experienced followed by medium (35%) and low experience (10%) respectively (Table 4.5).

Experience in pumpkin farming: Highest proportion (46.7%) of the respondents were high experienced compared to medium (33.3%) and low (20%) experienced (Table 4.6).

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Farm size: Majority (66.7%) of the farmers possessed small sized farm, 25% possessed medium sized farm, 5% possessed large sized farm and rest 3.3% of the farmer were marginal farmer (Table 4.7).

Annual family income: Majority (61.7%) of the respondents had low income compared to medium (35%) and high (3.3%) income (Table 4.8).

Organizational participation: Majority (66.7%) of the respondents belonged to low organizational participation category while, a few 26.6% and 6.7% of the respondents had no and medium organizational participation. However none of the respondent belong to high participation category (Table 4.9).

Extension media contact: Highest proportion (46.7%) of the farmers had low extension media contact followed by medium (38.3%), high (11.7%) 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 medium) (Table 4.10).

Training: Half (50%) of the respondents belong to low training exposure category followed by no training (43.3%) and medium (6.7%) training (Table 4.11).

5.1.2 Focus on knowledge, attitude and management practices of the respondent farmers regarding yellow mosaic virus of pumpkin

Knowledge on yellow mosaic virus of pumpkin: Majority (70%) of the respondents had medium knowledge followed by low knowledge (25%) and high knowledge (5%) about yellow mosaic virus of pumpkin (Table 4.1).

Attitude on yellow mosaic virus of pumpkin: Majority (58.3%) of the respondents had favorable attitude towards the yellow mosaic virus of pumpkin while one fifth (20%) of them had highly favorable attitude and 18.3% had neutral attitude towards the yellow mosaic virus of pumpkin (Table 4.1).

Practices of the farmers on yellow mosaic virus of pumpkin: The majority (51.7%) of the respondents had adopted practice to a medium extent while 41.7% of the

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respondents was adopting practice to high extent and 6.7% of them was adopting practice to low extent related to management of the YMV of pumpkin (Table 4.1).

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

The findings presented in Table 4.12 indicate that respondents education (0.294*), experience in farming (0.258*) and organizational participation (0.379**) showed a positive significant relationship with their knowledge about yellow mosaic virus of pumpkin. Age, family size, experience of pumpkin farming showed positive non-significant relationship with the knowledge while farm size, annual income training and extension media contact showed negative non-significant relationship with knowledge. The education (0.274*) of the respondents showed positive significant relationship while farm size (-0.257*), annual income (-0.403**) showed negative significant relationship with their attitude about pumpkin YMV disease. Age, family size, experience of farming, organizational participation showed positive non-significant relationship with attitude while experience of pumpkin farming, training and extension media contact showed negative non-significant relationship with attitude. Again, annual income (-0.353**) showed a negative significant relationship with practices about pumpkin YMV disease. Age, education, experience of farming, experience of pumpkin farming and organizational participation showed positive non-significant relationship with practices while family size, farm size, training and extension media contact showed negative non-significant relationship with practices. (Table 4.12).

5.2 Conclusion

Form the study it can be concluded that the highest proportion (41.7%) of the respondents fall in the middle-aged category and about 40% of the respondents belonged to the secondary education category. Highest proportion (46.7%) of the respondents belonged to the medium sized family and majority (61.7%) of the respondents had low income. Again, it also found that majority (66.7%) of the

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respondents belonged to low organizational participation category while highest proportion (46.7%) of the farmers had low extension media contact.

There is a little bit consistency of knowledge and attitude of the respondents with their practice related to Yellow mosaic virus of Pumpkin. As majority of the farmers (70%) had medium to low knowledge and majority of them (58.3%) had favorable attitude while majority (51.7%) of them had adopted medium practice related to yellow mosaic virus of pumpkin.

Among the 10 selected characteristics of the respondents education (0.294*), experience in farming (0.258*) and organizational participation (0.379**) showed a positive significant relationship with their knowledge about yellow mosaic virus of pumpkin. The education (0.274*) of the respondents showed positive significant relationship while farm size (-0.257*), annual income (-0.403**) showed negative significant relationship with their attitude about pumpkin YMV disease. Again, annual income (-0.353**) showed a negative significant relationship with practices about pumpkin YMV disease.

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 mosaic virus of pumpkin in Bangladesh. Future studies should be undertaken covering more dimensions in the related matters.

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CHAPTER VI
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APPENDIX- A

AGROTECHNOLOGY DISCIPLINE

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KNOWLEDGE, ATTITUDE AND PRACTICES OF FARMERS REGARDING YELLOW MOSAIC VIRUS OF PUMPKIN

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 pumpkin 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 borga (1/2)		
d	Land given to others on borga (1/2)		

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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	

08. 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					

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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 ( )

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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				
3				

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

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

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12. Attitude towards pumpkin diseases:

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

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13. Practices on pumpkin diseases:

Sl. No.	Practices	Extent of practice			
		Regularly (3)	Sometimes (2)	Rarely (1)	Not at all (0)
1.	Use of disease free planting material				
2.	Use of resistant variety as an alternate to insecticide				
3.	Maintaining cropping season properly				
4.	Following crop rotation practice to reduce intension of pumpkin yellow mosaic virus disease				
5.	Use of rouging in field				
6.	Use of biological weed control technique				
7.	Following proper irrigation technique				
8.	Burning/buried the severely infected plants				
9.	Controlling the vector can control the disease				
10.	Cultivation on alternate time may help in controlling disease				

Thank you for your nice-operation.

Signature of the data collector

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Appendix- B

Correlation between the selected characteristics of the farmers and their knowledge, attitude and practices on Yellow mosaic virus of Pumpkin

Selected characteristics	Correlation	Knowledge of pumpkin diseases	Attitude on pumpkin diseases	Practices on pumpkin diseases
Age of respondents	Pearson Correlation	.208	.089	.142
	Sig. (2-tailed)	.111	.497	.278
	N	60	60	60
Education	Pearson Correlation	.294*	.274*	.196
	Sig. (2-tailed)	.477	.034	.134
	N	60	60	60
Family size (No.)	Pearson Correlation	.086	.021	-.012
	Sig. (2-tailed)	.516	.871	.930
	N	60	60	60
Experience in farming (years)	Pearson Correlation	.258*	.157	.216
	Sig. (2-tailed)	.047	.230	.097
	N	60	60	60
Experience in pumpkin farming (years)	Pearson Correlation	.090	-.057	.127
	Sig. (2-tailed)	.495	.667	.333
	N	60	60	60

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