

**FARMERS' ATTITUDE TOWARDS INTEGRATED PEST
MANAGEMENT (IPM) PRACTICES IN VEGETABLE
CULTIVATION**

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CERTIFICATE

This is to certify that the thesis entitled “*Farmers’ Attitude Towards Integrated Pest Management (IPM) Practices in Vegetable Cultivation*” submitted to Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **Master of Science in Agricultural Extension**, embodies the result of a piece of bonafide research work carried out by **Uttam Kumar Roy**, Registration No. **07-02386** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

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DEDICATED TO
MY
BELOVED PARENTS

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ABSTRACT

The main purpose of the study was to determine and describe farmers' attitude towards IPM practices in vegetable cultivation and to explore the relationship between farmers' attitude with their twelve selected characteristics. The study was conducted in two villages of Shombhag union under Dhamrai upazila of Dhaka district. Data were collected by using an interview schedule from the randomly selected 100 respondents during 2 May to 25 May, 2015. Pearson's Product Moment Correlation Coefficient (r) was computed to explore the relationship between the selected characteristics of the farmers and their attitude towards IPM practices. The findings revealed that the highest proportion (79%) of the respondents had unfavourable attitude, while only 21 percent had favorable attitude towards IPM practices in vegetable cultivation. Among twelve selected characteristics, education, time spent in vegetable field, organizational participation, knowledge on IPM practices in vegetable cultivation, contact with IPM club and FFS, communication media exposure and training exposure had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. On the other hand, age had negative but significant relationship. Farm size, land under vegetable cultivation, annual family income and annual income from vegetable cultivation had no significant relationship with the attitude of the farmers towards IPM practices in vegetable cultivation.

CHAPTER I
INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 General Background

Bangladesh is mainly an agricultural country. The development of agriculture means development of the country. Though manpower is decreasing in the field of agriculture but still now it is the highest sector and about 47.50% of the total populations of this country are directly or indirectly involved in agricultural activities (BBS, 2014). Agriculture related sectors contribute 16.33% of the Gross Domestic Product (GDP) of the country (BBS, 2014). So it can be said that agriculture is the economic backbone of Bangladesh.

Bangladesh is an over populated country with 155.80 million people, where 1015 people live in per square kilometer (BBS, 2014). To feed this vast population we need to increase our agricultural production. Rice is our staple food but it contains mainly carbohydrate, person who consumes carbohydrate rice foods will suffer from malnutrition. On the other hand, vegetables are the cheapest source of vitamins, minerals and proteins which majority of people can buy easily. Vegetables are cultivated in 882127 acres of land and annual production of vegetable are only 2726723 metric tons (MT), (BBS, 2010). Nutritionist suggests that an adult person should eat at least 285 gm of vegetable per day for maintaining good health, but in Bangladesh an individual consumes only 70 gm per day including potato and sweet potato (Hossain *et al.*, 1990). Pest management is a major problem in vegetable production. The word 'pest' refers to organisms such as insects, pathogens, rodents etc. that cause damage or annoyance to man, his animals, crops or possessions. According to an estimate annual yield loss due to insect pest alone is 25% for vegetable production, in Bangladesh (Ahmed *et al.*, 2001).

The farmers of Bangladesh are mostly dependent on chemical pesticides to control the insect pests. Pesticide consumption in Bangladesh was 0.7 kg/ha in

2000 which is increased to 9.8 kg/ha in 2009 and at present different kinds of pesticides with 211 trade names have been registered in Bangladesh (Abdullah, 2012). By the use of chemical pesticides production is increasing but creating serious environmental and health problems. Vegetables are short duration crops, most of the chemical pesticides' residual effect remains on it even after marketing. Chemical pesticides also create new problem of pest resistance and destroy the beneficial insects. Besides, it gradually decreases soil health.

To avoid such consequences and to increase vegetable production on a biological basis, a viable alternative for pest management is needed. And Integrated Pest Management (IPM) is the best alternative strategy in reducing pest attack and at the same time producing healthy crops.

In fact, IPM is a broad ecological approach to pest control using various pest control methods in a compatible manner, that is why IPM is a holistic approach to pest control for keeping sound environment.

The ecological approach includes the following control measures:

- **Biological control:** natural enemies and pathogenic micro-organisms
- **Cultural control:** good agronomic practices
- **Use of pest tolerant or resistant crop varieties:** to keep pest production down
- **Mechanical control:** use of cross-bar in the field, use of sweeping net, use of light trap, cut the upper portion of the affected leaves etc.
- **Chemical control:** It is used as a last measure but priority is given to botanical and bio-pesticides whenever possible

In Bangladesh Integrated Pest Management (IPM) was first started in 1981 through FAO inter-country rice IPM program, which subsequently expanded through different projects and concentrated mainly on rice IPM. Subsequently efforts were undertaken to develop vegetable IPM through the vegetable IPM-ICM project in 1996-1999, UNDP/FAO-DAE IPM project in 1996-2001, DANIDA-DAE-SPPS (Strengthening Plant Protection Services) project phase 2

in 2002 to 2006 and USAID IPM CRSP (IPM Collaborative Research and Supportive Programme) in 1993-1988-to date.

From the beginning of IPM projects different trainings, practices, demonstrations had been shown to the farmers. They have tried to use it and some of them are practicing it. Many of them faced much difficulty and others take it as a good approach of their cultivation.

In the light of above discussion, the researcher was interested to conduct this study aiming at *“Farmers’ Attitude towards Integrated Pest Management (IPM) Practices in Vegetable Cultivation”*. However, a few systematic investigations have been done earlier on IPM, but not on the attitude of IPM as such. It was expected that this study would help to disseminate IPM ideas widely and clearly among vegetable growers.

1.2 Statement of the problem

Agriculture and environment are interdependent on each other. At present it has been established that agriculture is a major polluter of environment on a local, regional and global basis (Conway *et al.*, 1991). On the other hand, it has been found that in different countries of the world in addition to beneficial effects the improved agricultural practices have tremendous influence on environmental pollution and Bangladesh is not exception to this (Sana, 2003).

During the period of IPM program since 1981, it introduced Farmers’ Field School (FFS) and IPM club for training of farmers. A number of non-government organizations (NGOs) were also given training on IPM for vegetable cultivation. Most of the projects worked on vegetable IPM were extension-led projects. Many training was given to the farmers but a little study was conducted on attitude of farmers towards IPM practices in vegetable cultivation.

From that point of view, the researcher attempted the present study to seek answer to the following research questions:

- a) What was the farmers' attitude towards IPM practices in vegetable cultivation?
- b) What were the farmers' selected characteristics that were related to their attitude towards IPM practices in vegetable cultivation?

1.3 Objectives of the Study

The following specific objectives were framed out in order to give an appropriate track to the research work:

1. To determine and describe the selected characteristics of the vegetable farmers. The selected characteristics were :
 - ☞ Age
 - ☞ Education
 - ☞ Farm size
 - ☞ Land under vegetable cultivation
 - ☞ Annual family income
 - ☞ Annual income from vegetable cultivation
 - ☞ Time spent in vegetable field
 - ☞ Organizational participation
 - ☞ Knowledge on IPM practices in vegetable cultivation
 - ☞ Contact with IPM club and FFS
 - ☞ Communication media exposure
 - ☞ Training exposure
2. To determine and describe the farmers' attitude towards IPM practices in vegetable cultivation; and
3. To explore the relationships between farmers' attitude towards IPM practices in vegetable cultivation and their selected characteristics

1.4 Justification of the Study

Integrated Pest Management (IPM) was found to be less hazardous, eco-friendly, economically beneficial and considered to be a suitable innovation for pest control. It is easily operated technique which can be used by the farmers as and when necessary.

Every chemical has a residual effect and most of the vegetables are short duration crops and many of them are consumed directly. So, the residual effect of chemical pesticides remain in vegetable even after marketing. Most of the farmers use chemical fertilizer and pesticides indiscriminately without considering environmental and health issues, they are destroying our natural resources also. By the practice of IPM farmers can produce toxicant free vegetable.

Farmers of Bangladesh have lack of knowledge on IPM practices. By the support of Bangladesh government, different govt. organizations like DAE, BARI, BADC etc. and non-government organizations like BRAC, CARE were given different training on IPM practices like pheromone trap, extract of botanical product, bagging of fruits, field sanitation, food baits, light trap, yellow trap etc. in vegetable cultivation. Farmers Field School, IPM Club etc. have been also introduced to change the attitude of farmers towards IPM practices in their vegetable cultivation.

There are many studies conducted relating to knowledge and adoption of farmers on various aspects of agriculture. But very little research has been reported home and abroad to determine, how much attitude of farmers has been changed in using the IPM practices in vegetable cultivation.

Therefore, the study “*Farmers’ Attitude towards Integrated Pest Management (IPM) Practices in Vegetable Cultivation*” has been undertaken.

1.5 Assumptions of the Study

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Goode and Hatt, 1952). The following assumptions were in the mind of the researcher during conducting the study:

- a. The respondents were capable of furnishing proper responses to the questions included in the interview schedule.
- b. Views and opinions furnished by the respondents were the representative views and opinions of the whole population of the study.
- c. The responses furnished by the respondents were reliable and they truly expressed their opinions on attitude towards IPM practices in vegetable cultivation.
- d. The data collected by the researcher were free from bias.
- e. The researcher who acted as the interviewer was well adjusted to the social and cultural environment of the study area.
- f. The items included in the questionnaire to ascertain the attitude towards IPM practices were adequate to reflect the attitude towards Integrated Pest Management practices in vegetable cultivation.
- g. The respondents had almost similar background and seemed to be homogenous to a great extent.
- h. The findings were useful in choosing the clients as well as for planning, execution and evaluation of the extension program, particularly in respect of IPM.

1.6 Hypothesis of the Study

According to Karlinger (1973), a hypothesis is a conjectural statement of the relation between two or more variables. A null hypothesis states that there is no relationship between the concerned variables. The following null hypothesis was undertaken for the present study:

“There is no relationship between each of the selected characteristics of the farmers and their attitude towards Integrated Pest Management (IPM) practices in vegetable cultivation”.

1.7 Limitations of the Study

Considering time, money and other necessary resources available to the researcher, and to make the research manageable and meaningful it became necessary to impose certain limitations. The limitations were as follows:

- The study was confined to Shombhag union of Dhamrai upazila under Dhaka district.
- The study was restricted within the vegetable growers.
- For information about the study, the researcher was dependent on the data furnished by selected respondents applying Yamane’s formula during the interview with them.
- Farmers had many characteristics but only twelve (12) were selected for investigation of the study.
- The information sought by the researcher revealed the real situation to satisfy the objectives of the study.
- The researcher relied on the data furnished by the farmers from their memory during interview.

1.8 Definition of Terms

A number of key terms used throughout the study are defined below for clarity of understanding:

Attitude: Attitudes are learned, emotionally predispositions to react in a consistent way, favorable or unfavorable, towards person’s objects, situation, or ideas (Klausmeir and Ripple, 1971). Attitude in this study was as considered to be favorable, neutral or unfavorable predispositions of farmers toward IPM practices.

Integrated Pest Management (IPM): Integrated Pest Management can be defined in many ways. According to the Food and Agriculture Organization (FAO) "A pest population management system that utilizes all suitable techniques in a compatible manner to reduce pest population and maintain them at levels below those economic injury". In this study, IPM means those IPM practices generally advocated to practice in vegetable cultivation by the Department of Agricultural Extension and Bangladesh Agricultural Research Institute (BARI). Recently, IPM has been renamed as ICM (Integrated Crop Management) where IPM is a part of ICM.

Attitude towards IPM: It referred to respondent's feelings, believes, action and tendency towards various aspects of IPM strategies.

Age: Age of a respondents referred to the period of time in complete years from his/her birth to the time of interview.

Education: Education of an individual respondent was defined as the formal education received up to certain level from an educational institution (e.g. school, college, university etc) at the time of interview.

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

Land under vegetable cultivation: It referred to how much land a farmer used in vegetable cultivation.

Annual family income: It referred to the total earning of all the family members of a respondent from agricultural and non-agricultural sources (services, business, daily labor etc.) during a year.

Annual income from vegetable cultivation: It referred to how much a respondent farmer earned from different vegetable cultivation in a year.

Time spent in vegetable field: It meant that how much time a farmer spent in his/her vegetable field in a day.

Organizational participation: Organizational participation of an individual referred to his participation in various organizations as ordinary member, executive member or president/secretary within a specified period of time.

Knowledge on IPM: Knowledge on IPM referred to the understanding of the respondents about different aspect of IPM practices in vegetable cultivation.

Farmer Field School (FFS): is a group-based learning process that has been used by a number of governments, NGOs and international agencies to promote Integrated Pest Management (IPM).

IPM club: An IPM club referred to an association of farmers where one full season IPM trained farmers in FFS meet regularly and discuss about the field situations, exchange ideas and find environment friendly solutions for the problems.

Contact with IPM club and FFS: It referred to the extent of contact with IPM club and Farmers Field School (FFS) for various purposes by the vegetable growers.

Communication media exposure: The term communication media exposure as used in this study, referred to ones becoming accessible to the influence of extension education through different extension teaching methods.

Training exposure: It referred to the total number of days attended by the vegetable growers in his/her life to the training on various agriculture related subject matter.

CHAPTER II

*REVIEW OF
LITERATURE*

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this Chapter is to review the past studies conducted by different researchers related to the present study. The review of literature was undertaken to have an understanding about the attitude of the farmers towards IPM practices. As far as possible the researcher tried to review the available literature from different sources related to attitude towards IPM practices in vegetable cultivation. Unfortunately, many of these studies were not directly related to the present study. The researcher came across with some expert opinions about the concept of attitude towards IPM practices and has tried his best to collect needful information through searching relevant studies like thesis, journals, periodicals, bulletins, leaflets, internet etc. These enhanced the researcher's knowledge for better and clear understanding of the preset study.

This Chapter has been presented in three sections as follows:

Section 1: *Review of literature related to farmers' attitude towards IPM practices in vegetable cultivation.*

Section 2: *Relationship between selected characteristics and attitude of the farmers.*

Section 3: *The conceptual framework of the study.*

2.1 Review of Literatures related to Farmers' Attitude towards IPM Practices in Vegetable Cultivation

Rajinder *et al.*, (1998) illustrated that the IPM-trained farmers have applied fewer pesticides as compared to non-IPM farmers. The average frequency of pesticide application before, during and after the IPM training in six-IPM villages was 1.88, 1.64 and 1.52 per season respectively. The average pesticide expenditure of IPM-trained farmer was significantly lower than that of non-IPM farmers.

Habib (2000) conducted a study on “Attitude of Block Supervisor towards the Use of Agro-chemicals”. In his study he found that 14 percent had highly favorable attitude, 43 percent slightly favorable attitude as well as moderately favorable attitude.

Nurzaman (2000) conducted a study on “Knowledge, Attitude and Practices of FFS and non-FFS Farmers in Respect of IPM”. He found that highest percent (70%) of the respondents had medium attitude towards IPM while 19 percent had low attitude and 11 percent had high attitude.

Rashid (2001) conducted a study on “Farmers’ Attitude towards Integrated Pest Management in Phulpur Upazila under Mymensingh District”. He found that more than half (59.1%) of the respondents had medium attitude towards IPM practices compare to 25.4 percent high and 15.4 percent very high attitude towards IPM practice.

Farhad (2003) conducted a study on “Knowledge, Attitude and Practice of Rural Women in Using IPM in Vegetable Cultivation”. He observed that maximum percent (45%) of rural women had low attitude, 30 percent had medium attitude and 25 percent had high attitude towards IPM practice in vegetable cultivation.

Farhad and Kashem (2004) conducted a study on “Attitude of Rural Women towards Using IPM Practices in vegetable Cultivation”. The majority (68%) of the respondents had medium attitude while 17 percent low attitude and 15 percent high attitude in using IPM in vegetable cultivation.

Amin (2006) conducted a study on “Farmers Attitude towards Use of Pesticide”. In his study he found that 77 percent of the respondent had moderately favorable attitude, 10 percent had slightly favorable attitude and 13 percent had highly favorable attitude towards use of pesticide.

Hasan (2006) conducted a study on “Attitude of the Professional leaders, the Sub-Assistant Agriculture officer towards recommended doses of chemical

fertilizers and pesticides”. In his study he found that 28 percent of SAAO’s had highly favorable attitude, 48 percent had moderate and 24 percent had slightly favorable attitude towards recommended doses of chemical fertilizers.

Wahab (2006) conducted a study on “BRAC Beneficiaries’ Attitude towards Poultry Rearing”. He found that the highest proportion (68%) of the respondents had medium while 16 percent and 16 percent had low and high favorable attitude towards poultry rearing.

Islam (2007) conducted a study on “Attitude of Farmers towards Modern Jute Cultivation in Baliakandi Upazila under Rajbari District”. In his study he found that majority of the jute farmers (72%) had favorable to moderately favorable attitude towards modern jute cultivation.

2.2 Relationship between Selected Characteristics and Attitude of the Farmers

2.2.1 Age and attitude

Kashem (1987) in his study found that there was no relationship between the age and attitude towards community of the farmers.

Mannan (2001), Parveen (1993), Verma and Kumar (1991) found that age of the respondents had positive relationship with their attitude towards ecological agriculture.

Ali (2002), Singh and Kunzroo (1985) found that age of the farmers had negative significant relationship with their attitude in their research studies.

Chowdhury (2003) and Sarker (2002) found in their study that there was no relationship between age and attitude.

Alam *et al.*, (2004) found that there was a positive significant relationship between age of the rural women and their attitude towards homestead vegetable cultivation.

Farhad and Kashem (2004) found that there was significant negative relationship between age and attitude of rural women towards using IPM practices in vegetable cultivation.

Patel *et al.*, (2007) found negative significant relationship between age of the farmers and their attitude towards IPM strategy.

Rahman (2010) found in his study that age of the farmers had non significant relationship with attitude of the farmers towards IPM practices.

2.2.2 Education and attitude

Ali (2002) found that education qualification of Block Supervisors had negative relationship with their attitude towards attitudes of non-governmental organizations.

Chowdhury (2003), Shehrawat *et al.*, (2002), Khan (2002), Sulakshna (1988) and Kashem (1987) found that education of the farmers had a positive significant relationship with their attitude.

Farhad and Kashem (2004) found that there was positive significant relationship between education and attitude of rural women towards using IPM practices in vegetable cultivation.

Parvez (2007) concluded from his study that there was positive significant relationship between education of the farmers and their attitude towards IPM for HYVs production.

Patel *et al.*, (2007) found significant relationship between education of the farmers and their attitude towards IPM strategy.

Rahman (2010) found significant positive relationship between education of the farmers and their attitude towards IPM practices.

2.2.3 Farm size and attitude

Verma and Kumer (1991) and Karim *et al.*, (1987) found that there was positive and significant relationship between farm size and attitude of the farmers.

Habib (2000) observed in his study that family size of the BSs had no relationship with their attitude towards the use of agrochemicals.

Ali (2002), Nurzaman (2000) and Noor (1995) revealed in their studies that farm size had no significant relationship with the attitude.

Chowdhury (2003), Shehrawat *et al.*, (2002) and Sadat (2002) found that there was a positive and significant relationship between farm size and attitude of the farmers in their studies.

Parvez (2007) concluded in his study that there was no significant relationship between farm size of the farmers and their attitude towards IPM for HYVs production.

Rahman (2010) found non significant relationship between farm size of the farmers and their attitude towards IPM practices.

2.2.4 Land under vegetable cultivation and attitude

Patel *et al.*, (2007) reported that there was no significant relationship between attitude towards IPM and land under cultivation.

2.2.5 Annual family income and attitude

Iqbal (1963) in his study found that income of the farmers had significant relationship with their attitude towards improved farm practices.

Karim *et al.*, (1987) revealed that commercialization, income and credit availability of the farmers had positive relationship with their attitude towards the use of urea.

Kashem (1987) found that income of the small farmers had no significant relationship with their attitude towards community of the farmers.

Habib (2000) observed in his study that income of the BSs had significant negative relationship with their attitude towards agro-chemicals.

Siddique (2002), Nurzaman (2000) and Parveen (1993) revealed that annual income had no significant relationship with the attitude of the farmers in their studies.

Chowdhury (2003) and Shehrawat *et al.*, (2002) reported that family income of the farmers had positive significant relationship with their attitude.

Parvez (2007) concluded in his study that there was no significant relationship between annual income of the farmers and their attitude towards IPM for HVYs production.

Patel *et al.*, (2007) indicated that income of the farmers and their attitude towards IPM strategy had positive significant relationship.

Rahman (2010) found in his study that there was non significant relationship between annual income of the farmers and their attitude towards IPM practices.

2.2.6 Annual income from vegetable cultivation and attitude

Haider (2005) observed that annual income had a positive relationship with knowledge and practice of IPM in vegetable cultivation.

2.2.7 Time spent in vegetable field and attitude

No available literature was found regarding time spent in vegetable field and attitude of the farmers towards IPM practices.

2.2.8 Organizational participation and attitude

Singh *et al.*, (1985) reported that there was relationship between social participation and adoption of smokeless chula by the rural women.

Hamid (1995) observed a positive relationship between awareness of the farmers and their organization participation in case of less progressive village but found no relation in case of progressive village.

Noor (1995) observed in his study that there was positive and significant relationship between the farmers and their attitude towards the cultivation of HYV potato.

Habib (2000) observed in his study that organizational participation of the BSs had no significant relationship with their attitude towards agrochemicals.

Patel *et al.*, (2007) reported that there was no relationship between organizational participation of the farmers and their attitude towards IPM strategy.

2.2.9 Knowledge on IPM practices in vegetable cultivation and attitude

Haque (2002) found that women with more agricultural knowledge had the positive significant attitude towards homestead agriculture.

Farhad (2003) observed that knowledge of women had significant positive relationship with their attitude towards IPM practices in vegetable cultivation.

Rahman (2010) observed in his study that there was positive and significant relationship between knowledge on IPM and attitude of the farmers towards IPM practices.

2.2.10 Contact with IPM club and FFS and attitude

No available literature was found regarding contact with IPM club and FFS and attitude of the farmers towards IPM practices.

2.2.11 Communication media exposure and attitude

Ajore (1989) and Vidyashankar (1987) observed in their study that mass media exposure had a significant relationship with their attitude towards chemical fertilizer.

Bari (2000) also reported that there was no relationship between communication media exposure and attitude of the farmers towards hybrid rice ALOK 6201.

Shehrawat *et al.*, (2002), Sadat (2002) and Siddique (2002) reported in their studies that there was a significant and positive relationship between communication media exposure and attitude of the farmers.

Chowdhury (2003) observed no relationship between communication media exposure and attitude of the farmers towards crop diversification.

Rahman (2010) found in his study that there was positive significant relationship between communication media exposure of the farmers and their attitude towards IPM practices.

2.2.12 Training exposure and attitude

Habib (2000) also revealed in his study that training experience of the BSs had a positive significant relationship with their attitude towards agrochemicals.

Sadat (2002) revealed in his study that training exposure had no relationship with the attitude of both PROSHIKA beneficiaries and non-beneficiaries towards PROSHIKA.

Sarker (2002) reported that training experience of the farmers had a positive significant relationship with their attitude towards organic homestead gardening.

Chowdhury (2003) revealed in his study that training exposure had no relationship with the attitude towards crop diversification.

Rahman (2010) observed in his study that there was positive and significant relationship between training exposure and attitude of the farmers towards IPM practices.

2.3 The Conceptual Framework of the Study

Conceptual framework is the representation of the study variables. Properly constructed hypothesis of any research contain at least two variables namely, “dependent variable” and “independent variable”. A dependent variable is that which appears, disappears or varies as the researcher introduces, remove or varies the independent variables (Townsend, 1953). An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon.

In view of the prime theme of the study, the researcher constructed a conceptual framework which is self explanatory and is presented in Figure 2.1.

It was expected that the selected independent variables would be interlinked and interrelated with the dependent variable of the study.

Conceptual Framework

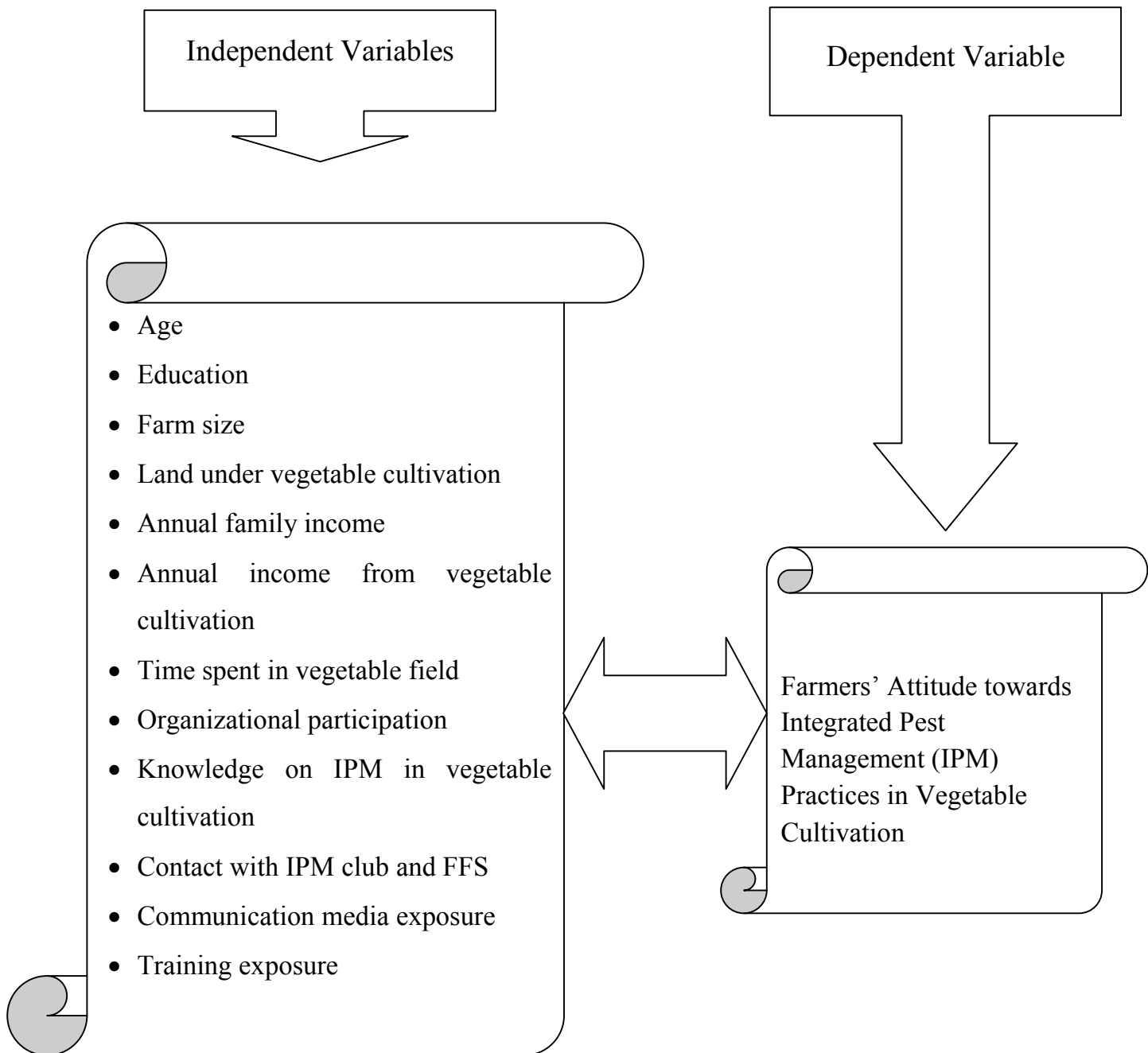


Figure 2.1 Conceptual framework for the study

CHAPTER III
METHODOLOGY

CHAPTER 3

METHODOLOGY

In any scientific research, methodology plays an important role. Appropriate methodology enables the researcher to collect valid and reliable information and to analyze the information properly in order to get the right conclusion. The methods and procedures followed in this study are described in this Chapter in the following sections.

3.1 Locale of the Study

The locale of the study was Shombhag and Goaldee village of Shombhag union under Dhamrai upazila of Dhaka district. The study area was 40 km north-west from central Dhaka and well communicated. Most of the farmers of these villages were vegetable growers. Vegetable IPM projects have been implemented here by the Department of Agricultura Extension (DAE) and local NGOs. That is why, these two villages were purposively selected. A map of Dhaka division showing Dhamrai upazila and another one showing the study area (Shombhag union) within the upazila are presented in the Figures 3.1 and 3.2 respectively.

3.2 Population and Sampling of the Study

The Researcher himself with the help of local leaders and concerned Sub Assistant Agriculture Officer (SAAO) prepared an updated list of vegetable growers of the selected villages. A total number of 255 vegetable growers were listed, where 136 were from Shombhag village and 119 from Goaldee village, which constituted the population of the study. According to Yamane's (1967) formula, the sample size was determined as 100.

In calculating sample size 10% precision level, 50% degree of variability and value of $Z= 2.57$ at 99% confidence level were chosen from the following formula:

$$n = \frac{Z^2 P(1-P)N}{Z^2 P(1-P) + Ne^2}$$

Where;

n = Sample size

N = Population size

e = The level of precision

Z = The value of the standard normal variable
at the chosen confidence level

P = The proportion or degree of variability



Figure 3.1 Map of Dhaka district showing Dhamrai upazila

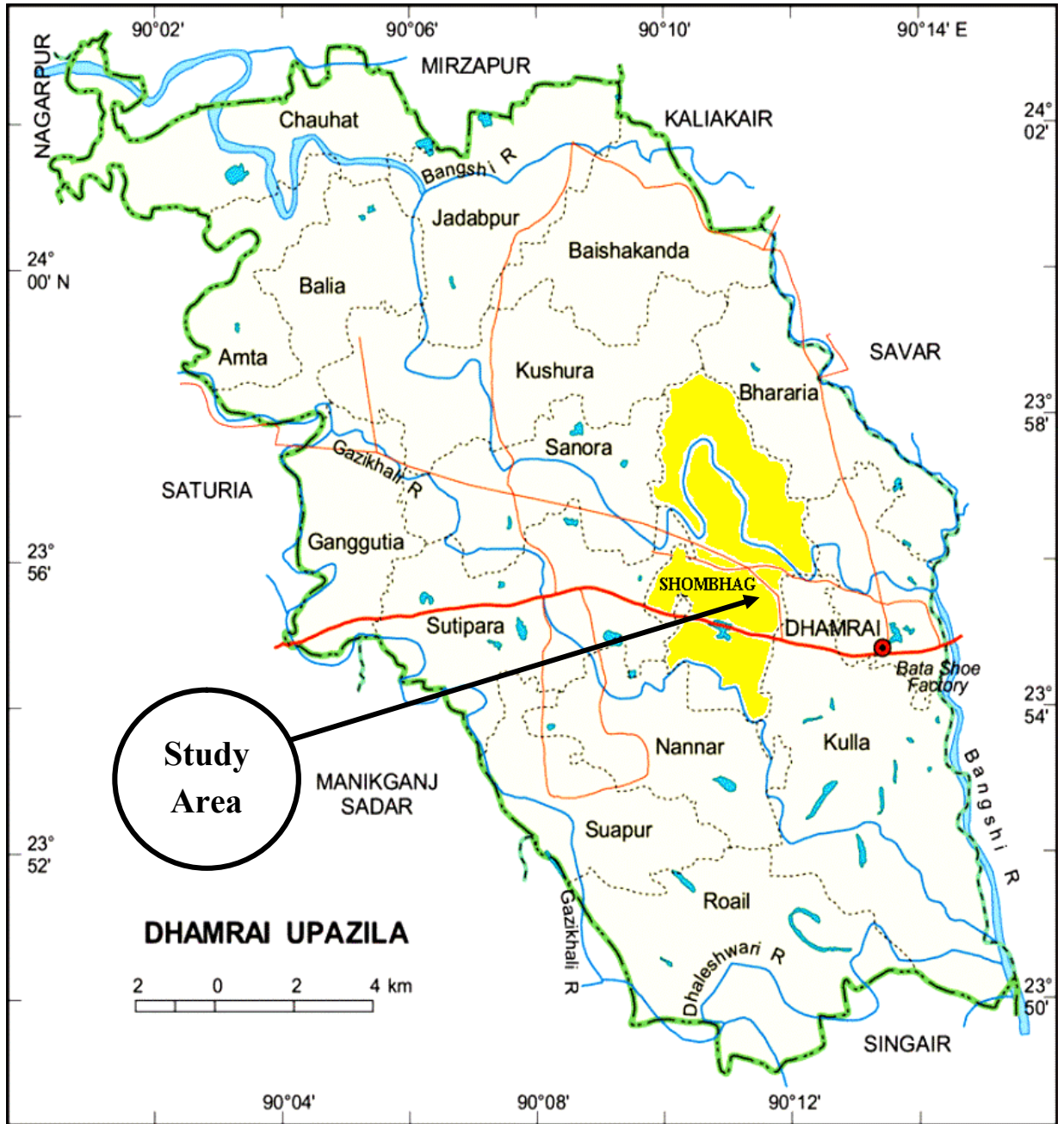


Figure 3.2 Map of Dhamrai upazila showing the study area (Shombhag union)

Hundred vegetable farmers were selected from the population following simple random sampling technique. A reserve list of 10 vegetable farmers was also prepared. Farmers in the reserve list were used only when a respondent in the original list was not available. The distribution of the sample farmers and those in the reserved list from the villages is shown in Table 3.1.

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

Name of villages	Population of the vegetable farmers	Number of vegetable farmers included in the sample	Number of vegetable farmers included in the reserve list
Shombhag	136	55	5
Goaldee	119	45	5
Total	255	100	10

3.3 Selection of the Dependent and the Independent Variables

The success of a research depends on successful selection of variables. Inappropriate and inconsistent selection of variables may lead to error in results. The researcher took adequate care in selection of the variables of the study considering personal, psychological, social and economical factors of the rural community.

Farmers' attitude towards IPM practices in vegetable cultivation was the main focus of the study and it was considered as the dependent variable.

The researcher selected twelve selected characteristics of the farmers which were presented as independent variables of the study. The independent variables were: age, education, farm size, land under vegetable cultivation, annual family income , annual income from vegetable cultivation, time spent in vegetable field, organizational participation, knowledge on IPM practices in vegetable cultivation, contact with IPM club and FFS, communication media exposure and training exposure.

3.4 Instrument for Data Collection

In order to collect valid and reliable information an interview schedule was prepared. Interview schedule was used as the research instrument. It was carefully designed keeping the objectives of the study in mind. Both open and closed form of question was used to collect information. Simple, direct question and scales were included in the interview schedule for collecting information regarding the focus of farmers' attitude towards IPM practices in vegetable cultivation.

Interview schedules were pre-tested in actual field situations before using it for final data collection among 10 respondents of the study area. Necessary corrections, modifications and additions were made in the interview schedule on the basis of results of pre-test. The interview schedule was then printed in its final forms. Necessary photocopies were then made. A copy of the interview schedule in English version has been furnished in Appendix-A.

3.5 Collection of Data

Before data collection, the researcher met the Upazila Agriculture Officer (UAO) and one of the Sub-Assistant Agriculture Officer (SAAO) of that block for necessary help and cooperation. Data were collected personally by the researcher himself through face to face interview. Interviews were usually conducted in respondents' house during their leisure period. While starting interview with any respondent, at first the researcher took all possible care to establish rapport so that he/she did not hesitate to furnish proper responses to the questions and statements included in the interview schedule. However, if any respondent felt difficulty in understanding any question, the researcher took utmost care to explain and clarify the question. Data were collected from 2 May to 25 May, 2015.

3.6 Compilation of Data

After completion of field survey all the interview schedules were complied. Local units were converted into standard unit; appropriate scoring technique was followed to convert the qualitative data into quantitative forms. The responses of the individual respondent contained in the interview schedule were transferred to an Excel sheet of computer. As soon as the data were entered into the computer, these were analyzed in accordance with the objectives of the study.

3.7 Measurement of Variables

3.7.1 Measurement of the independent variables

3.7.1.1 Age

Age of a respondent was measured in terms of actual years from his birth to the time of interview. A score of one (1) was assigned for each year of age. It was measured in complete years as reported by a respondent.

3.7.1.2 Education

Education was measured on the basis of ability of the respondents to read and write or formal education from school/college or university. It was expressed in terms of years of schooling. A score of 1 was given for passing each year in the educational institution, for example, if the respondent passed the final examination of class “X”, his/her educational score was given as 10. If the respondent did not know how to read and write, his/her education score was given as ‘0’ (zero). A score of 0.5 was given to that respondent who could sign his/her name only.

3.7.1.3 Farm size

Farm size refers to the total cultivated area either owned by a farmer or obtained from other on share cropping system or taken from others as mortgage which was used to his/her farming operation during the period of this study.

The farm size of the respondent was computed by using the following formula. The measurement unit was in hectare (ha).

$$\text{Farm Size} = A+B+\frac{1}{2}(C+D)+E+F$$

Where;

A= Homestead area (including pond)

B= Own land under own cultivation

C= Own land given to others as borga

D= Land taken from others as borga

E= Land taken from others as lease

F= Fallow land

3.7.1.4 Land under vegetable cultivation

Respondent's land under vegetable cultivation was measured in percentage. Percent of land under vegetable cultivation was calculated by the following formula:

$$\text{Land under vegetable cultivation (\%)} = \frac{\text{Land under vegetable cultivation}}{\text{Total land}} \times 100$$

3.7.1.5 Annual family income

Annual family income was measured considering last year total earnings in taka of all the family members of a respondent from agriculture, services, business, labor and other sources as contained in the Question no. 5 of the interview schedule (Appendix A). The total earnings were measured in thousand taka and a score of 1 was assigned for each one thousand taka.

3.7.1.6 Annual income from vegetable cultivation

Respondent's annual income from vegetable cultivation was measured by considering last year's total earnings from vegetable production and expressed in thousand taka.

3.7.1.7 Time spent in vegetable field

How much time a respondent spent in vegetable field was measured in hours/day considering average time spent per day.

3.7.1.8 Organizational participation

Organizational participation of the respondent was measured on the basis of the nature of his/her participation in selected eight organizations during last 10 years. Nature of participation score was computed in the following manner for each organization.

<u>Nature of participation</u>	<u>Scores assigned</u>
No participation	0
Participation as ordinary member	1
Participation as executive member	2
Participation as President/Secretary	3

Thus, the organizational participation scores of a respondent could range from 0 to 24, where '0' indicated no participation and 24 indicated very high organizational participation.

3.7.1.9 Knowledge on IPM practices in vegetable cultivation

Knowledge on Integrated Pest Management (IPM) practices of a respondent was measured by using 17 different kinds of questions in relation to various aspect of vegetable IPM practices. The score was assigned as 2 for full correct answer. However, partial score was given for partially correct response and a zero (0) score was given for a wrong or no answer. The summation of scores obtained by a respondent was the IPM knowledge score of the respondent. The IPM knowledge score could range from 0 to 34 where '0' indicated no IPM knowledge and '34' indicating very high knowledge on IPM practices in vegetable cultivation.

3.7.1.10 Contact with IPM club and FFS

Farmers, either member or non-member make contact with different IPM club and FFS (Farmers Field School). They have different purposes for contact and their extent of contact was also different. To measure contact with IPM club and FFS, the researcher selected ten purposes and to determine extent of contact the following scale was used:

<u>Extent of contact</u>	<u>Score</u>
Not at all	0
Rarely	1
Frequently	2
Regularly	3

The contact with IPM club and FFS of a respondent was therefore determined by adding the total scores against 10 selected purposes. Thus contact with IPM club and FFS scores of a respondent could range from 0 to 30, where 0 indicated no contact and 30 indicating very high contact.

3.7.1.11 Communication media exposure

The communication media exposure of the respondent was measured by the total score of media contact on the basis of his/her extent of contact with 16 selected media. Following scores were assigned for each of 16 media:

<u>Extent of contact</u>	<u>Score</u>
Not at all	0
Rarely	1
Frequently	2
Regularly	3

Thus, the communication media exposure scores of a respondent could range from 0 to 48 where '0' indicated no exposure and '48' indicated very high communication media exposure.

3.7.1.12 Training exposure

Training exposure was measured by the number of days, that a respondent had received training in his or her life before the interview. It was indicated by the total number of days of training received by a respondent under different training programs.

3.7.2 Measurement of the dependent variable

“Farmers’ Attitude towards Integrated Pest Management (IPM) Practices in Vegetable Cultivation” was the dependent variable of the study. For measuring the attitude of farmers a 5 point Likert scale with 22 statements (11 positive and 11 negative) were used. The statements were chosen from literatures, discussion with vegetable IPM experts and the concerned vegetable farmers. All the statements were arranged in a sequence of positive and negative basis to help avoiding subject bias in expressing their opinion.

Each respondent was asked to indicate his extent of agreement or disagreement against each of the statements along a 5 point scale: ‘strongly agree’, ‘agree’, ‘no opinion’, ‘disagree’ and ‘strongly disagree’. Score assigned to these responses was 5, 4, 3, 2 and 1 respectively for positive statement and the reverse scoring was assigned for negative statements. The total score of a respondent was determined by summing up the scores against all the 22 statements. The possible attitude towards IPM practices in vegetable cultivation scores of a farmer could range from 22 to 110.

3.8 Categorization

For describing the various independent and dependent variables, the respondents were classified into several categories in respect of each variable. These categories were developed by considering the nature of distribution of data and general understanding prevailing in the social system. The procedure for categorization of data in respect of different variables was elaborately discussed while describing those variables in Chapter 4.

3.9 Methods of Data Analysis

The data after collection were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. Various statistical measures such as range, mean, percentage, standard deviation were used in categorizing and describing the dependent and the independent variables. For clarity of understanding, tables were used for presentation of data. Pearson's Product Moment Coefficient of Correlation (r) was used to explore the relationship between the independent and the dependent variables. Throughout the study five percent (0.05) level of probability was used to reject any null hypothesis.

CHAPTER IV
RESULTS AND
DISCUSSION

CHAPTER 4

RESULTS AND DISCUSSION

A sequential and detailed discussion on the findings of the study has been presented in this Chapter. The Chapter is divided into three sections. In the first section, independent variables i.e. characteristics of the respondents have been discussed. The second section dealt with dependent variable (*Farmers' Attitude towards Integrated Pest Management (IPM) Practices in Vegetable Cultivation*) and finally, the relationship between the dependent and independent variables have been discussed in the third section.

4.1 Selected Characteristics of the Farmers

Twelve characteristics of the farmers were selected to describe and find out their relationships with attitude towards Integrated Pest Management (IPM) practices in vegetable cultivation. These selected characteristics were age, education, farm size, land under vegetable cultivation, annual family income, annual income from vegetable cultivation, time spent in vegetable field, organizational participation, knowledge on IPM practices in vegetable cultivation, contact with IPM club and FFS, communication media exposure and training exposure. The salient features of twelve characteristics of the respondent, each of which constituted an independent variable, are presented in Table 4.1.

Table 4.1 Salient features of the respondents' selected characteristics

Characteristics	Measuring unit	Range		Categories	Respondents		Mean	SD
		Possible	Observed		Number (N=100)	Percent (%)		
Age	Actual Years	Unknown	22-68	Young aged (≤ 35)	30	30	42.44	10.92
				Middle aged (36-50)	45	45		
				Old aged (> 50)	25	25		
Education	Years of schooling	Unknown	0-16	Illiterate (0-0.5)	40	40	4.33	4.13
				Primary education (1-5)	30	30		
				Secondary education (6-10)	28	28		
				Above secondary education (>10)	2	2		
Farm size	Actual in (ha)	Unknown	0.07 – 1.69	Marginal (< 0.2 ha)	21	21	0.41	0.34
				Small (0.2- <1.0 ha)	72	72		
				Medium (1- 3ha)	7	7		
Land under vegetable cultivation	Percent	0-100	5.17%-69.57%	Small vegetable farm ($<33\%$)	33	33	39.14	13.46
				Medium vegetable farm (33%- 45%)	34	34		
				Large vegetable farm ($>45\%$)	33	33		
Annual family Income	Thousand taka/year	Unknown	55.80-501.50	Low income (<120.00)	63	63	143.66	76.95
				Medium income (120.00-165.00)	9	9		
				High income (>165.00)	28	28		
Annual income from vegetable cultivation (Last year)	Taka/year	Unknown	10.30-69.80	Low vegetable income (<25.00)	11	11	41.38	14.65
				Medium vegetable income (25.00-55.00)	71	71		
				High vegetable income (>55.00)	18	18		
Time spent in vegetable field	hr/day	0-24	3-7	Short time spent (<4 hrs)	10	10	5.37	1.11
				Moderate time spent (4hrs-5 hrs)	34	34		
				Long time spent (>5 hrs)	56	56		
Organizational Participation	Scores	0-24	1-14	Very low participation (<5.00)	35	35	6.69	3.79
				Low participation (5.00-8.00)	42	42		
				Medium participation (>8.00)	23	23		
Knowledge on IPM practice in vegetable cultivation	Scores	0-34	8-30	Low knowledge (<11)	31	31	17.19	6.91
				Medium knowledge (11-23)	44	44		
				High knowledge (>23)	25	25		
Contact with IPM club and FFS	Scores	0-30	9-21	Low contact (<12)	20	20	15.69	3.91
				Medium contact (12- <19)	57	57		
				High contact (≥ 19)	23	23		
Communication media exposure	Scores	0-48	12-34	Low media exposure (<18)	20	20	23.87	6.43
				Medium media exposure (18-30)	65	65		
				High media exposure (>30)	15	15		
Training exposure	Days obtained	Unknown	0-7	No training (0.00 days)	71	71	0.65	1.58
				Low training (1-2 days)	23	23		
				Medium training (>2 days)	6	6		

4.1.1 Age

The age score of the vegetable farmers ranged from 22 to 68 with an average of 42.44 and standard deviation of 10.92. The respondents were classified into three categories on the basis of their age following Hossain et al., (2011) as shown in Table 4.2.

Table 4.2 Distribution of the vegetable farmers according to their age

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Young aged (≤ 35)	30	30	42.44	10.92
Middle aged (36-50)	45	45		
Old aged (> 50)	25	25		
Total	100	100		

Data indicate that the highest proportion (45%) of the respondents were middle aged compared to 30 percent being young and 25 percent old aged. Young and middle aged people generally show more favourable attitude towards trying new ideas. The extension agents can target those people in designing their extension activities.

4.1.2 Education

Education of the respondents was measured by following the procedure as discussed earlier in Chapter 3. The education ranged from 0-16, with an average of 4.33 and standard deviation of 4.13. Based on their education score vegetable farmers were classified into four categories as shown in Table 4.3.

Table 4.3 Distribution of the vegetable farmers according to their education

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Illiterate (0-0.5)	40	40	4.33	4.13
Primary education (1-5)	30	30		
Secondary education (6-10)	28	28		
Above secondary education (>10)	2	2		
Total	100	100		

It is evident from the Table 4.3 that 40 percent of the respondents were illiterate, 30 percent comprised of primary education, 28 percent comprised secondary education and 2 percent had above secondary education. Table 4.3 also indicates that 60 percent vegetable farmers are literate which is almost similar to adult literacy rate projection 2015 (61.4%) Bangladesh (UIS, 2012).

4.1.3 Farm size

The farm size score varied from 0.07 to 1.69 with an average of 0.41 and standard deviation of 0.34. Based on their farm size the farmers were classified into three categories following Hossain et al., (2011) as shown in Table 4.4.

Table 4.4 Distribution of the vegetable farmers according to their farm size

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Marginal (< 0.2 ha)	21	21	0.41	0.34
Small (0.2- <1.0 ha)	72	72		
Medium (1- 3ha)	7	7		
Total	100	100		

Data in Table 4.4 reveal that 72 percent had small farm, 21 percent had marginal farm and 7 percent had medium farm. The average farm size of the vegetable farmers of the study area (0.41 hectares) was higher than that of national average (0.06 hectares). This may be because for the consciousness of birth control of the study area which protecting them in fragmenting the cultivable land.

4.1.4 Land under vegetable cultivation

Land under vegetable cultivation score varied from 5.17 to 69.57 with an average of 39.14 and standard deviation of 13.46. Based on their land under vegetable cultivation score, the farmers were classified into three categories that were shown in Table 4.5.

Table 4.5 Distribution of the vegetable farmers according to their % land under vegetable cultivation

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Small vegetable farm (<33%)	33	33	39.14	13.47
Medium vegetable farm (33%- 45%)	34	34		
Large vegetable farm (>45%)	33	33		
Total	100	100		

Data in Table 4.5 reveal that 34 percent farmer had medium vegetable farm compared to 33 percent having small vegetable farm and the rest 33 percent having large vegetable farm. Above table represent that more than two thirds (67%) of the respondents had medium to large vegetable farm. This may because of profit from vegetable cultivation is higher than the other crops. And another is though vegetable perishable but for the good communication with the capital city markets the farmers can easily transport it and get fair price.

4.1.5 Annual family income

The annual family income score of the farmers ranged from 55.80 to 501.50 with the mean and standard deviation of 143.66 and 76.95 respectively. On the basis of income of farmers, they were classified into three categories. The categories and distribution of the respondents are shown in Table 4.6.

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

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low income (<120.00)	63	63	143.66	76.95
Medium income (120.00-165.00)	9	9		
High income (>165.00)	28	28		
Total	100	100		

Data in Table 4.6 show that 63 percent of the farmers had low annual family income, 28 percent of the respondents had high income, and 9 percent had medium income.

The annual family income of the farmers of the study area was much lower. The reason might be more than 90 percent respondents belonged to marginal to small farm size categories. The other reason might be due to the fact that most of the farmers of the study area were only engaged in agriculture. They had very low income from other sources such as service, business etc. Farmers with the low income generally hesitate to adopt new farming practices in their own farms because of their lower risk bearing ability and their inability to make necessary financial investment.

4.1.6 Annual income from vegetable cultivation

The annual income from vegetable cultivation score of the farmers ranged from 10.30 to 69.80 with the mean and standard deviation of 41.38 and 14.65 respectively. On the basis of income of the farmers from vegetable cultivation, they were classified into three categories. The categories and distribution of the respondents are shown in Table 4.7.

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

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low vegetable income (<25.00)	11	11	41.38	14.65
Medium vegetable income (25.00-55.00)	71	71		
High vegetable income (>55.00)	18	18		
Total	100	100		

Data in Table 4.7 show that 71 percent of the farmers had medium annual income from vegetable cultivation, compared to 18 percent high annual income and 11 percent low annual income. It also indicate that 89 percent of the farmer had medium to high income from vegetable cultivation.

The average annual income from vegetable cultivation of the farmers of the study area was much higher. The reason might be because more than two thirds of the respondents (67%) had medium to large vegetable farms.

4.1.7 Time spent in vegetable field

Time spent in vegetable field varied from 3 to 7 hrs/day with an average of 5.37 hrs/day and standard deviation of 1.11. Based on their time spent in vegetable field, the farmers were classified into three categories as shown in Table 4.8.

Table 4.8 Distribution of the vegetable farmers according to their time spent in vegetable field

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Short time spent (<4 hrs)	10	10	5.37	1.11
Moderate time spent (4-5 hrs)	34	34		
Long time spent (>5 hrs)	56	56		
Total	100	100		

Data in Table 4.7 indicate that majority (56%) of the respondents spent long time in vegetable field. More than one third of the respondents (34 percent) spent moderate time and only one tenth spent short time in vegetable field. The findings of the study reveal that 90 percent of the farmers spent moderate to long time in the vegetable field. This is due to high income from vegetable cultivation. The best example is the findings of the present study. The study reveal that an overwhelming majority (89%) of the respondents had medium to high income from vegetable cultivation. The another reason is that long time spent in the vegetable field ensures intensive care which ultimately yields maximum production.

4.1.8 Organizational participation

The observed organizational participation score of the respondents ranged from 1 to 14 with an average of 6.69 and standard deviation of 3.79. According to the participation scores, the respondents were classified into three categories as shown in Table 4.9.

Table 4.9 Distribution of the vegetable farmers according to their organizational participation

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Very low participation (<5.00)	35	35	6.69	3.79
Low participation (5.00-8.00)	42	42		
Medium participation (>8.00)	23	23		
Total	100	100		

Data Table 4.9 reveal that the respondents of the study area are not so much organizational participatory and social volunteer works. As a result more than three fourths of the respondents (77%) had very low to low participation in cooperative association , bazaar committee, youth club and other similar organization. Less than one fourth of the respondents (23%) had medium organizational participation. Conclusion can be drawn that (i) farmers of the study area are too busy in vegetable cultivation and they cannot make times for social work, (ii) Government and Non-government works are not people oriented and they work for their own interest only, and (iii) poor farmers do not get chance to be member of the society.

4.1.9 Knowledge on IPM practices in vegetable cultivation

Knowledge on IPM practices in vegetable cultivation scores of the farmers ranged from 8 to 30 against the possible range from 0 to 34 with an average of 17.19 and standard deviation of 6.91. On the basis of knowledge on IPM practices in vegetable cultivation, the respondents were classified into three categories as shown in Table 4.10.

Table 4.10 Distribution of the vegetable farmers according to their knowledge on IPM practices in vegetable cultivation

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low knowledge (<11)	31	31	17.19	6.91
Medium knowledge (11-23)	44	44		
High knowledge (>23)	25	25		
Total	100	100		

Data in Table 4.10 show that the highest proportion (44%) of the respondents had medium knowledge, 31 percent had low knowledge and one fourth of the respondents had high knowledge on IPM practices in vegetable cultivation.

Knowledge on anything reflects one's attitude, mental alertness and makes one familiar or acquaint with facts, objects, concepts or practices. Knowledge is quite likely to be inter-linked with education. Education enables a farmer to gain knowledge and helps him to become rational which in turn increases his perceptibility. In order to perform hygienic crop production and crop protection successfully, the respondents should have adequate knowledge on the IPM practices. However, it was observed that three fourth of the vegetable farmers (75%) in the study area had low to medium knowledge on IPM practices.

4.1.10 Contact with IPM club and FFS

Contact with IPM club and FFS scores ranged from 0 to 30 but the observed scores varied from 9 to 21 with an average of 15.69 and standard deviation of 3.91. On the basis of contact with IPM Club and FFS scores, the respondents were classified into three categories as shown in Table 4.11.

Table 4.11 Distribution of the vegetable farmers according to their contact with IPM club and FFS

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low contact (<12)	20	20	15.69	3.91
Medium contact (12- <19)	57	57		
High contact (≥ 19)	23	23		
Total	100	100		

Data in Table 4.13 show that 57 percent of the respondents had medium contact, 20 percent respondents had low contact and 23 percent had high contact with IPM club and FFS. The findings of the study indicate that an overwhelming majority of the respondents (80%) had medium to high contact with the IPM club and FFS. The reason may be that the IPM club organizers are helpful, cooperative and innovative. Whenever the respondents contact with the

club leaders they deliver information on their necessity like IPM techniques, modern cultivation procedure, symptoms of disease and insect infestation.

4.1.11 Communication media exposure

The communication media exposure score of the respondents ranged from 12 to 34 with a mean of 23.87 and standard deviation of 6.43. Based on their communication media exposure scores, the farmers were classified into three categories as shown in Table 4.12.

Table 4.12 Distribution of the vegetable farmers according to their communication media exposure

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Low exposure (<18)	20	20	23.87	6.43
Medium exposure (18-30)	65	65		
High exposure (>30)	15	15		
Total	100	100		

Data in Table 4.12 indicate that 65 percent of the farmers had medium communication media exposure while 20 percent had low exposure and 15 percent had high communication media exposure. The results clearly indicate that majority of the farmers (85%) had low to medium communication media exposure. This may be because the farmers had low exposure to interpersonal and group contact methods due to inadequate extension services. On the other hand, 40 percent of the farmers were illiterate which might hinder their access to printed media.

4.1.12 Training exposure

The training exposure score of the respondents ranged from 0 to 7 with a mean and standard deviation of 0.65 and 1.58 respectively. Based on their length of training scores, the respondents were classified into three categories. The distribution of the respondents according to their training exposure has been presented in Table 4.13.

Table 4.13 Distribution of the vegetable farmers according to their training exposure

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
No training (0.00 days)	71	71	0.65	1.58
Low training (1-2 days)	23	23		
Medium training (>2 days)	6	6		
Total	100	100		

Data in Table 4.13 indicate that the highest proportion (71%) of the respondents had no training, while 23 percent of them had low training and only 6 percent had medium training. Training helps the farmers to acquire deep knowledge and improve skills about the respected aspects. Trained farmers can cope with and handle smoothly the adverse situation in their farming practices. But data in the above table shows that most of the farmers had no training. This is because of providing training to all the farmers is a costly approach and the concerned extension organizations may not have enough resources to arrange training programs regularly.

4.2 Farmers' Attitude towards IPM Practices in Vegetable Cultivation

The observed scores for attitude towards IPM practices in vegetable cultivation ranged from 38 to 82 against the possible range of 22 to 110 with an average of 54.77 and standard deviation of 13.57. On the basis of attitude towards IPM practices in vegetable cultivation scores, the respondents were classified into three categories as shown in Table 4.15.

Table 4.14 Distribution of the vegetable farmers according to their attitude towards IPM practices in vegetable cultivation

Categories	Respondents		Mean	Standard deviation
	Number	Percent		
Unfavorable attitude (<66)	79	79	54.77	13.57
Neutral attitude (66)	0	0		
Favorable attitude (>66)	21	21		
Total	100	100		

Data in Table 4.14 show that the highest proportion (79%) of the respondents had unfavorable attitude towards IPM practices in vegetable cultivation, 21 percent respondents had favorable attitude and none of them had neutral attitude towards IPM practices in vegetable cultivation. The findings indicate that majority of the respondents had unfavorable attitude towards IPM practices in vegetable cultivation. The reason may be IPM practices require higher level of skills, formal education, frequent contact with extension personnel's, season long training. Most of the farmers in the study are lacking in all most all those motivating factors resulting to the formation of positive attitude towards IPM practices in vegetable cultivation.

4.3 Relationship between Individual Characteristics of the Farmers and Their Attitude towards IPM Practices in Vegetable Cultivation

Pearson's Product Moment Correlation Co-efficient (r) was computed in order to find out the extent of relationship between attitude towards IPM practices in vegetable cultivation and their selected characteristics. To reject or accept the null hypothesis, 1% and 5% level of probability was used.

As mentioned earlier, twelve selected characteristics of the farmers were the independent variables of the study. The variable were age, education, farm size, annual family income, annual income from vegetable cultivation, time sent in vegetable field, organizational participation, knowledge on IPM practices in vegetable cultivation, nature of contact with IPM club and FFS, communication media exposure and training exposure were independent variables, while the attitude towards IPM practices in vegetable cultivation was the dependent variable of the study.

Results of correlation have been shown in Table 4.15. Correlation co-efficient among all the variables might be seen in the correlation matrix in Appendix-B.

Table 4.15 Pearson's product moment co-efficient of correlation showing relationship between individual characteristics of the farmers and their attitude towards IPM practices in vegetable cultivation

Dependent variable	Independent variables	Computed value of co-efficient of correlation 'r'	Tabulated value at 98 df	
			0.05 level	0.01 level
Attitude towards IPM practices in vegetable cultivation	Age	-0.877**	0.196	0.256
	Education	0.936**		
	Farm size	-0.080 ^{NS}		
	Land under vegetable cultivation	-0.176 ^{NS}		
	Annual family income	-0.122 ^{NS}		
	Annual income from vegetable cultivation	-0.144 ^{NS}		
	Time spent in vegetable field	0.690**		
	Organizational participation	0.898**		
	Knowledge on IPM practices in vegetable cultivation	0.884**		
	Contact with IPM club and FFS	0.833**		
	Communication media exposure	0.820**		
	Training exposure	0.390**		

** Significant at the 0.01 level

* Significant at the 0.05 level

^{NS} Not significant

4.3.1 Relationship between attitude towards IPM practices in vegetable cultivation and age

Relationship between age and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between age and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found -0.877. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a negative trend between the concerned variables.*
- b. The observed value of "r" (-0.877) between the concerned variables was found to be greater than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis was rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that age of the farmers had significant but negative relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. This implies that young aged farmers had favorable attitude towards IPM practices in vegetable cultivation. That is, younger the respondents more the favourable attitude towards IPM practices. The young farmers have higher level of formal education, modern vision, interest, inspiration for change, readiness and ability to understand new technologies than the old aged farmers, which might have played role to have more favorable attitude towards IPM practices among young aged farmers than old aged farmers. Patel et., al., (2007) also found similar findings in their study.

4.3.2 Relationship between attitude towards IPM practices in vegetable cultivation and education

Relationship between education and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between education and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.936. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.936) between the concerned variables was found to be greater than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis was rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that education of the farmers had significant and positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. Thus it can be said that as the education increase, attitude towards IPM practices in vegetable cultivation is also increased. Higher level of education provides better ability to an individual to understand modern scientific technologies. IPM is such a technology which encompasses many complex scientific methods. To understand this, formal education provides more capability to apprehend it. Hence attitude towards IPM practices in vegetable cultivation was observed better among those

farmers who had higher level of formal education. Patel et al. (2007), Rahman (2013), Farhad and Kashem (2004) also found similar findings in their studies.

4.3.3 Relationship between attitude towards IPM practices in vegetable cultivation and farm size

Relationship between farm size and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between farm size and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found -0.080. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a negative trend between the concerned variables.*
- b. The observed value of "r" (-0.080) between the concerned variables was found to be smaller than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.05 level of probability.*
- c. The null hypothesis could not be rejected.*
- d. The relationship between the concerned variables was not statistically significant at 0.05 level of probability.*

Based on the above finding, it was concluded that farm size of the farmers had negative and non significant relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. This means that attitude towards IPM practices was observed more positive among those farmers who had small farm size but this tendency was not found up to the level of significance. Thus, it can be said that farm size of the farmers had shown no impact on their attitude towards IPM practices in vegetable cultivation.

Rahman (2010) and Parvez (2007) also found non significant relationship between farm size and attitude towards IPM practices in their studies.

4.3.4 Relationship between attitude towards IPM practices in vegetable cultivation and land under vegetable cultivation

Relationship between land under vegetable cultivation and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between land under vegetable cultivation and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found -0.176. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a negative trend between the concerned variables.*
- b. The observed value of "r" (-0.176) between the concerned variables was found to be smaller than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.05 level of probability.*
- c. The null hypothesis could not be rejected.*
- d. The relationship between the concerned variables was not statistically significant at 0.05 level of probability.*

Based on the above finding, it was concluded that land under vegetable cultivation of the farmers had non significant and negative relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. That is, land under vegetable cultivation of a farmer has no effect on attitude towards IPM practices in vegetable cultivation. The negative relation indicate that attitude towards IPM practices was observed more positive among those farmers who had less land under vegetable cultivation. The reason may be IPM practices require intensive crop care which is suitable for small farm rather than

large farm. Patel et al., (2007) also found non significant relationship between attitude towards IPM and land under cultivation in their study.

4.3.5 Relationship between attitude towards IPM practices in vegetable cultivation and annual family income

Relationship between annual family income and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between annual family income and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found -0.122. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a negative trend between the concerned variables.*
- b. The observed value of "r" (-0.122) between the concerned variables was found to be smaller than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.05 level of probability.*
- c. The null hypothesis could not be rejected.*
- d. The relationship between the concerned variables was not statistically significant at 0.05 level of probability.*

Based on the above finding, it was concluded that annual family income of the farmers had non significant and negative relationship with the attitude of the farmers towards IPM practices. That is annual family income of a farmer had no effect on attitude towards IPM practices in vegetable cultivation. The negative relation implies that attitude towards IPM practices was observed unfavorable among those farmers who had high annual income. Farmers generally having large farm have high annual income. IPM is a holistic approach which requires more time, labour which ultimately form unfavorable

attitude of the rich farmers. Parvez (2007) and Rahman (2010) also found non significant relationship between annual income of the farmers and their attitude towards IPM practices.

4.3.6 Relationship between attitude towards IPM practices in vegetable cultivation and annual income from vegetable cultivation

Relationship between annual income from vegetable cultivation and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between annual income from vegetable field and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found -0.144. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a negative trend between the concerned variables.*
- b. The observed value of "r" (-0.144) between the concerned variables was found to be lower than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.05 level of probability.*
- c. The null hypothesis could not be rejected.*
- d. The relationship between the concerned variables was not statistically significant at 0.05 level of probability.*

Based on the above finding, it was concluded that annual income from vegetable cultivation had no significant relationship with the attitude of the farmers towards IPM practices in vegetable cultivation.

4.3.7 Relationship between attitude towards IPM practices in vegetable cultivation and time spent in vegetable field

Relationship between time spent in vegetable field and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between time spent in vegetable field and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.690. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.690) between the concerned variables was found to be greater than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis could be rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that time spent in vegetable field had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. This statistical analysis indicates that with the increase of time spent in vegetable field the favourable attitude towards IPM practices by the farmers is also increased. IPM practices are multiple approach of pest control which require regular monitoring and frequent actions of implementation different pest management tools and techniques. This is why the farmers who spent more time in vegetable field had more favorable attitude towards IPM practices.

4.3.8 Relationship between attitude towards IPM practices in vegetable cultivation and organizational participation

Relationship between organizational participation and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between organizational participation and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.898. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.898) between the concerned variables was found to be higher than the tabulated value ($r = 0.1966$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis could be rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that organizational participation had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. Rahman (2010) also found similar relationship between formal group affiliation and attitude towards IPM practices in his study.

4.3.9 Relationship between attitude towards IPM practices in vegetable cultivation and knowledge on IPM practices in vegetable cultivation

Relationship between knowledge on IPM practice in vegetable cultivation and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between organizational participation and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.884. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.884) between the concerned variables was found to be higher than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis could be rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that knowledge on IPM practices in vegetable cultivation had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. It means that attitude towards IPM practices was observed more positive among those farmers who had knowledge on IPM practices than the farmers with low knowledge on IPM practices. Higher level of knowledge on IPM practices enable farmers to use those practices easily in their field which ultimately form favorable attitude towards those practices by the farmers. Farhad (2003) and Rahman (2010) also found similar findings in their study.

4.3.10 Relationship between attitude towards IPM practices in vegetable cultivation and contact with IPM club and FFS

Relationship between contact with IPM club and FFS and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between contact with IPM club and FFS and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.833. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.833) between the concerned variables was found to be higher than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis could be rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that nature of contact with IPM club and FFS had significant positive relationship with the attitude of farmers towards IPM practices in vegetable cultivation. It means that the farmers with more extent of contact with IPM club and FFS had more favourable attitude towards IPM practices than the farmers with low extent of contact. The farmers with frequent contact with IPM club and FFS getting more knowledge about IPM practices. This might be the reason to have more favorable attitude among those farmers who had more contact with IPM club and FFS.

4.3.11 Relationship between attitude towards IPM practices in vegetable cultivation and communication media exposure

Relationship between communication media exposure and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between communication media exposure and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.820. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.820) between the concerned variables was found to be higher than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis could be rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that communication media exposure had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. The statistical analysis implies that with the increase of communication media exposure of the farmers, the favorable attitude towards IPM practices in vegetable cultivation is also increased. Farmers with more exposure with communication media have more opportunity to gain clear understanding about latest technologies which might have influenced to form favorable attitude towards IPM practices in vegetable cultivation. Sadat (2002), Siddique (2002) and Rahman (2010) also found

similar significant positive relationship between communication media exposure and attitude of the farmer in their studies.

4.3.12 Relationship between attitude towards IPM practices in vegetable cultivation and training exposure

Relationship between training exposure and attitude towards IPM practices in vegetable cultivation was determined by Pearson's product moment correlation coefficient. The coefficient of correlation between training exposure and attitude towards IPM practices in vegetable cultivation was presented in Table 4.16. The coefficient of correlation (r) between the concerned variables was found 0.390. The following observations were made on the basis of the value of correlation coefficient between the two concerned variables of the study under consideration:

- a. The relationship showed a positive trend between the concerned variables.*
- b. The observed value of "r" (0.390) between the concerned variables was found to be higher than the tabulated value ($r = 0.196$) with 98 degrees of freedom at 0.01 level of probability.*
- c. The null hypothesis could be rejected.*
- d. The relationship between the concerned variables was statistically significant at 0.01 level of probability.*

Based on the above finding, it was concluded that training exposure had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. It implies that the farmers with more training exposure had more favorable attitude towards IPM practices than the farmers with low training exposure. Training increases knowledge and skills of the individual. Trained farmers are more capable of using complex practices. These might be the reasons to have more favorable attitude among those farmers who

had more training exposure. Sarker (2002) and Rahman (2010) also found similar significant positive relationship in their studies.

CHAPTER V
SUMMARY OF
FINDINGS,
CONCLUSION AND
RECOMMENDATIONS

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of findings

The findings of the study and interpretation of the results have been presented elaborately in Chapter 4. The findings of the study are now summarized below.

5.1.1 Characteristics of the farmers

Age

Age of the farmers ranged from 22 to 68 years, with an average of 42.44. Among 100 respondents, 45 percent were middle aged, 30 percent were young aged and 25 percent were old aged.

Education

Education scores of the farmers ranged from 0 to 16, with an average of 4.32. Among the 100 respondents, 40 percent were illiterate, 30 percent had primary education, 28 percent had secondary education and 2 percent had above secondary education.

Farm size

The farm size scores of the respondents ranged from 0.07 hectares to 1.69 hectares with an average of 0.41 hectares. Among the 100 respondents, highest 72 percent had small farm, 21percent had marginal farm and 7 percent had medium farm.

Land under vegetable cultivation

Land under vegetable cultivation of the respondents ranged from 5.17 percent to 69.57 percent with an average of 39.14 percent. Among the 100 respondents, 34 percent had medium vegetable farm, 33 percent had large vegetable farm and also the rest 33 percent had small vegetable farm.

Annual family income

The annual family income of the farmers ranged from 55.80 to 501.50 thousands taka with an average 143.66 thousands taka. Among the 100 respondents, 63 percent had low income, 28 percent had high income and 9 percent had medium annual family income.

Annual income from vegetable cultivation

The annual income from vegetable cultivation ranged from 10.30 to 69.80 thousands taka with an average of 41.38 thousands taka. Among the 100 respondents, 71 percent had medium income from vegetable cultivation, 18 percent had high income and 11 percent had low annual income from vegetable cultivation.

Time spent in vegetable field

Time spent in vegetable field of the farmers ranged from 3 to 7 hrs/day with an average of 5.37 hrs/day. Among the 100 respondents, 56 percent were long time spender, 34 percent were moderate time spender and 10 percent were short time spender in vegetable field.

Organizational participation

Organizational Participation scores of the farmers ranged from 1 to 14 with an average of 6.69. Among the 100 respondents, 42 percent had low participation, 35 percent had very low participation and 23 percent had medium participation.

Knowledge on IPM practices in vegetable cultivation

Knowledge on IPM practices in vegetable cultivation scores of the farmers ranged from 8 to 30 with an average of 17.19. Among the 100 respondent 44 percent had medium knowledge, 31 percent had low knowledge and 25 percent had high knowledge on IPM practices in vegetable cultivation.

Contact with IPM club and FFS

Contact with IPM club and FFS scores of the farmers ranged from 9 to 21 with an average of 15.69. Among the 100 respondents, 57 percent had medium contact, 23 percent had high contact and 20 percent had low contact with IPM club and FFS.

Communication media exposure

Communication media exposure scores of the farmers ranged from 12 to 34 with an average of 23.87. Among the 100 respondents, 65 percent had medium exposure, 20 percent had low exposure and 15 percent had high exposure to communication media.

Training exposure

Training exposure scores of the farmers ranged from 0 to 7, with an average of 0.65. Among the 100 respondents, 71 percent of the farmers had no training, 23 percent had low training and 6 percent had medium training exposure.

5.1.2 Farmers' Attitude towards IPM Practices in Vegetable Cultivation

The observed scores for attitude towards IPM practices in vegetable cultivation ranged from 38 to 82 against the possible range of 22 to 110 with an average of 54.77 and standard deviation of 13.57.

5.1.3 Relationship between attitude of the farmers towards IPM practices in vegetable cultivation and their selected characteristics

- Education, time spent in vegetable field, organizational participation, knowledge on IPM practices in vegetable cultivation, contact with IPM club and FFS, communication media exposure, training exposure and extent of use of selected IPM practices for vegetable cultivation had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation.
- Farm size, land under vegetable cultivation, annual family income, annual income from vegetable cultivation had no significant relationship with the attitude of the farmers towards IPM practices in vegetable cultivation.

- Age had negative significant relationship with the attitude of the farmers towards IPM practices in vegetable cultivation.

5.2 Conclusions

Some conclusions drawn on the basis of the findings of this study and their logical interpretation in the light of other relevant factors are furnished below:

1. The findings indicate that almost four fifth (79%) of the respondents had unfavourable attitude towards IPM practices in vegetable cultivation. This fact leads to the conclusion that overall attitude of the farmers towards IPM practices in vegetable cultivation was not satisfactory at all. There is huge scope for changing unfavourable attitude of the farmer to favorable attitude towards IPM practices in vegetable cultivation.
2. Age of the respondents had significant negative relationship with their attitude towards IPM practices in vegetable cultivation. In the study area, more than three fourth (78%) of the respondents were young to middle aged groups. Therefore, it may be concluded that there is a good ground for extension work for increasing favorable attitude of the young and middle aged farmers of the study area. It is often found that young and middle aged people show more favorable attitude towards trying new ideas.
3. Education had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation, but two fifths (40%) of the respondents were illiterate. The findings of the study lead to the conclusion that for favorable attitude towards IPM practices in vegetable cultivation the respondents need to increase their education level.
4. Time spent in vegetable field had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation and the research findings showed that 44 percent of the respondents were low to medium time spender in their vegetable field. This finding concludes that for

favorable attitude towards IPM practices in vegetable cultivation the respondents need to increase their working time more in their vegetable field.

5. Organizational participation increases the knowledge and attitude of a person. The research findings also showed that organizational participation had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. It also showed that more than three fourth (3/4) of the respondents had very low to low organizational participation. This result concludes that for favorable attitude towards IPM practices in vegetable cultivation the respondents need to further increase their participation in different organizations related to agriculture.
6. Knowledge on IPM practices in vegetable cultivation generally increases the attitude of the farmers towards IPM practices in vegetable cultivation. From this research, findings indicate that knowledge on IPM practices in vegetable cultivation had significant positive relationship with the attitude of the farmers towards IPM practices in vegetable cultivation and three fourth (75%) of the respondents had low to medium knowledge on IPM practices. The above facts lead to the conclusion that any arrangement made to increase the knowledge on IPM practices of the vegetable growers would ultimately increase the favorable attitude towards IPM practices in vegetable cultivation.
7. Contact with IPM club and FFS was an important factor to increase the positive attitude towards IPM practices of the respondents. The research result showed a positive significant relationship with the attitude of the farmers towards IPM practices in vegetable cultivation. It also showed that an overwhelming majority (80%) of the respondent had low to medium contact with IPM club and FFS. Therefore, it may be concluded that any arrangement made to increase the contact with IPM club and FFS would ultimately increase the favorable attitude towards IPM practices in vegetable cultivation.

8. Communication media now a day's have been found to act as a great factor to increase the favorable attitude of a person. This study revealed that communication media exposure had significant positive relationship with their attitude towards IPM practice in vegetable cultivation and more than 80 percent had low to medium exposure to communication media. Therefore, it may be concluded that an increase in the exposure to communication media will increase the favorable attitude of the farmers towards IPM practices in vegetable cultivation.

9. It is an established fact that skill and knowledge are developed by training. In this study, the findings indicated that training exposure had significant positive relationship with their attitude towards IPM practices in vegetable cultivation, but more than 70 percent of the farmers had no training. So it may be concluded that increase in the training exposure will increase the favorable attitude of the farmers towards IPM practices in vegetable cultivation. Besides, in order to change attitude in the required directing through training, the feedback from the farmers should be taken on a regular basis for not only on vegetables, but also on other areas of crops, livestock and fisheries.

5.3 Recommendations

5.3.1 Recommendations for Policy Implications

The following recommendations based on the findings and conclusions of the study were made:

1. Positive attitude of the farmers towards IPM practices is vital for adoption of IPM practices. But majority of the farmers (79%) had unfavourable attitude towards IPM practices in vegetable cultivation. Therefore, it may be recommended that, DAE and other rural advisory service providers should take effective steps for strengthening extension services in order to change unfavourable attitude of the farmers towards IPM practices in vegetable cultivation.
2. Age had significant negative relationship with attitude of the farmers towards IPM practices. Therefore, it may be recommended that DAE should target young and middle aged farmers to change their attitude towards IPM practices in vegetable cultivation.
3. Level of education of the farmers showed significant positive relationship with their attitude towards IPM practices. On the other hand, 40 percent of the farmers were illiterate. So, it may be recommended that adult literacy program should be designed and implemented by the Ministry of Primary and Mass Education to educate the illiterate farmers of the study area.
4. Time spent in vegetable field had significant positive relationship with attitude of the farmers towards IPM practices. Therefore, it may be recommended that DAE and other local NGOs should emphasize on spending more time in vegetable field while providing advisory services to the farmers.

5. Participation with different organization makes a person cosmopolite which ultimately facilitate to gain more knowledge and adopt new innovations. Therefore, it may be recommended that, DAE and different NGOs should form more farmers' association or organizations like IPM clubs, FFSs, Common Interest Group (CIG) etc. for increasing their participation.
6. Knowledge had played a vital role in forming favourable attitude towards IPM practices. Therefore, attempt should be taken by the DAE and local NGOs to offer various types of extension teaching methods on IPM practices. This will be helpful to increase their knowledge as well as to make favourable attitude towards IPM practices.
7. Contact with IPM club and FFS increased knowledge and favourable attitude of the farmers. Therefore, it may be recommended that Department of Agricultural Extension (DAE) should open more IPM clubs and FFSs as well as ensure farmers' access to IPM clubs and FFSs.
8. Communication media had a significant positive relationship with attitude of the farmers towards IPM practices in vegetable cultivation. So, proper steps should be taken by the concerned authority like DAE to maximize individual, group and mass contact methods like farm and home visit, results and method demonstrations and TV programs on IPM. Care should be taken to use these media in combination rather than singular use.
9. Training had significant positive relationship with attitude of the farmers towards IPM practices in vegetable cultivation. Therefore, it may be recommended that DAE should conduct more training programs on commonly used IPM practices that would make the farmers more skilled to change their attitude towards IPM practices in vegetable cultivation. Care should also be taken so that these skills can be learnt during a brief training period.

5.3.2 Recommendations for Further Study

1. This investigation explored the relationship of 12 selected characteristics of the respondents with their attitude towards IPM practices in vegetable cultivation. Therefore, it is recommended that further studies should be conducted involving other variables in these regards.
2. The present study was conducted only in two villages of Dhamrai Upazila under Dhaka district. Findings of the study need further verification through similar research in other parts of the country including different AEZs.
3. It is difficult to determine the appropriate attitude of the farmers on IPM practices in vegetable cultivation. Measurement of attitude of the farmers is not free from questions. More reliable measurement of the concerned variables is necessary for evaluating farmers' attitudes and opinions.
4. To measure the attitude towards IPM practices in vegetable cultivation, the researcher developed a scale and the validity of the scale may be verified by further studies. This would help for improvement and generalization of the scale.
5. An exhaustive study on problems faced by the farmers in adopting IPM practices in vegetable cultivation should also be undertaken. This could suggest ways to overcome the existing problems on IPM practices.
6. Findings indicated that farm size; land under vegetable cultivation, annual family income, annual income from vegetable cultivation had no relationship with attitude of the farmers towards IPM practices in vegetable cultivation. Further research is necessary to verify such relationships.

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APPENDICES

APPENDIX- A

English version of the interview schedule

Department of Agricultural Extension & Information System,
Sher-e-Bangla Agricultural University, Dhaka-1207.



An Interview Schedule on

*“Farmers’ Attitude towards Integrated Pest Management (IPM)
Practices in Vegetable Cultivation”*

(This interview schedule is entitled for a research study)

Part-A

Serial No: Date:.....
Name of the respondent:..... Contact No.:.....
Village: Union:
Thana: District:

Part-B

(Please answer the following questions. Give tick (√) marks in appropriate place)

1. Age

How old are you? Years

2. Education

Please mention your educational status

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

3. Farm Size

Please mention your farm size according to the following items:

Sl. No.	Types of land ownership	Land Area	
		Local unit	Hectare
A.	Homestead area (including pond)		
B.	Own land under own cultivation		
C.	Own land given to others as barga		
D.	Land taken from others as barga		
E.	Land taken from others as lease		
F.	Fallow land		

Farm Size = A+B+ $\frac{1}{2}$ (C+D)+E+F = ha.

4. Land under vegetable cultivation =

$$\text{Land under vegetable cultivation (\%)} = \frac{\text{Land under vegetable cultivation}}{\text{Total land}} \times 100$$

5. Annual family income

Please mention your family income from each of the following sources (last year):

Source of income		
From Agriculture		Price (Tk)
1. Crops	Production	
a) Rice		
b) Maize/ Wheat		
c) Pulse crops		
d) Oil seeds		
e) Brinjal		
f) Cucurbits		
g) Cabbage		
h) Cauliflower		
i) Bean		
j) Other vegetables		
k) Fruits		
2. Fisheries		
3. Poultry		
4. Domestic animal		
From non-agriculture		
5. Business		
6. Service		
7. Labor		
8. Others (Specify)		
Total (Tk)		

6. Annual income from vegetable cultivation (Last Year)

Name of vegetable	Production	Price (Tk)
a) Brinjal		
b) Cucurbits		
c) Cabbage		
d) Cauliflower		
e) Bean		
f) Others (Specify)		
Total (Tk)		

7. Time spent in vegetable field: hrs/day

8. Organizational Participation

Please state the nature of your participation in the following organizations:

Sl. No.	Name of the organization	Nature of participation			
		Not involved	Ordinary member	Executive member	President/ Secretary
1.	Farmers' co-operative club				
2.	Bazaar committee				
3.	Youth club				
4.	Somobay Samity				
5.	NGO association				
6.	School/ College/ Madrasa committee				
7.	Mosque/ Mondir committee				
8.	Union Parishad				

9. Knowledge on IPM practices in vegetable cultivation

Please answer the following questions:

Sl. No.	Questions	Full Marks	Marks obtained
1.	What do you mean by IPM?	2	
2.	Mention two IPM practices commonly used in vegetable cultivation.	2	
3.	Mention two harmful insects of brinjal.	2	
4.	What is sex pheromone trap?	2	
5.	How sex pheromones trap works?	2	
6.	Name two tolerant varieties of brinjal.	2	
7.	Mention two beneficial insects of cucurbit.	2	
8.	What is poison bait and how it works?	2	
9.	Mention the ingredient name used to make poison bait.	2	
10.	What is light trap?	2	
11.	How light trap is made?	2	
12.	How yellow trap works and how it is made?	2	
13.	Mention two beneficial and two harmful insect of bean.	2	
14.	Mention two IPM practices used in bean cultivation.	2	
15.	How crop rotations help you to control insect pest infestation?	2	
16.	How polythene bag can be used to protect fruits of cucurbits?	2	
17.	What do you mean by clean cultivation?	2	

10. Contact with IPM club and FFS

Please furnish the following information:

Sl. No.	Purpose of contact	Extent of contact			
		Regularly	Frequently	Rarely	Not at all
1.	To receive training				
2.	For attending meeting				
3.	To know the latest IPM techniques				
4.	To get suggestions from other members experienced about IPM				
5.	To know the modern cultivation techniques				
6.	To contact with GOs and NGOs for their service				
7.	To save money in saving scheme or collect loan				
8.	To know the tolerant varieties				
9.	To know the time to start chemical control measures				
10.	Others (specify please)				

11. Communication media exposure

Please mention the nature of contact with the following extension media:

Types of contact	Source of contact	Nature of contact			
		Regularly	Frequently	Rarely	“Not at all”
Personal Contact	Ideal farmer	≥ 5 times/month	3-4 times/month	1-2 times/month	
	SAAO	≥ 4 times/month	2-3 times/month	1 time/month	
	NGO Workers	≥ 4 times/month	2-3 times/month	1 time/month	
	Agricultural Extension Officer/ UAO	≥ 5 times/year	3-4 times/year	1-2 times/year	
	Call Center	≥ 5 times/season	3-4 times/season	1-2 times/season	
	Internet	≥ 5 times/season	3-4 times/season	1-2 times/season	
	Agricultural Input Dealer	≥ 5 times/month	3-4 times/month	1-2 times/month	
Group Contact	Participation in Group Discussion	≥ 5 times/year	3-4 times/year	1-2 times/year	
	Participation in Method Demonstration	≥ 2 times/year	1time/year	1time/2year	
	Participation in Result Demonstration	≥ 2 times/year	1time/year	1time/2year	

Types of contact	Source of contact	Nature of contact			
		Regularly	Frequently	Rarely	“Not at all”
	Participation in Field Day	≥ 2 times/year	1time/year	1time/2year	
Mass Contact	Listening to Agricultural Program in Radio	≥ 5 times/month	3-4 times/month	1-2 times/month	
	Watching Agricultural Program in Television	≥ 5 times/month	3-4 times/month	1-2 times/month	
	Observing Agricultural Fair	≥ 1 time/year	1time/2-3 years	1time/ ≥ 4years	
	Newspaper	≥ 7 times/month	3-6 times/month	1-2 times/month	
	Leaflets/ Folders /Booklets	≥ 5 times/season	3-4 times/season	1-2 times/season	

12. Training Exposure

Did you receive agriculture related training?

Yes

No

If yes, mention the following:

Sl. No.	Name of Training Course	Name of the Organization	Duration (Day)
1.			
2.			
3.			
4.			
5.			
6.			

14. Attitude towards IPM practices in vegetable cultivation

Please indicate your opinion against the following statement

Sl. No.	Statement	Degree of attitude				
		Strongly agree	Agree	No opinion	Disagree	Strongly disagree
1. (+)	IPM practices are better than only chemical control					
2. (-)	IPM practices are more costly than chemical control					
3. (+)	IPM practices are safe for natural defense					
4. (-)	Chemical control creates environmental pollution					
5. (+)	IPM practices are safe for human health					
6. (-)	Chemical controls destroy soil health					
7. (+)	Collecting and destroying of infested fruits and leaves of brinjal is easy technique					
8. (-)	Covering cucurbit with polythene bags decrease fruit color					
9. (+)	Management of sex pheromone trap is very easy					
10. (-)	Use of poison bait to control cucurbit fruit fly is ineffective					
11. (+)	Clean cultivation reduces insect infestation					
12. (-)	Sex pheromone trap is a time consuming method to control pest					
13. (+)	Use of kerosene mixed ash is effective against some insect pest like aphid, red pumpkin beetle etc.					
14. (-)	Yellow trap in bean field is ineffective to control aphids					
15. (+)	IPM practices maintain the ecological balance					
16. (-)	Optimum production cannot be maintained without application of insecticides					
17. (+)	Crop rotation reduces insect infestation					
18. (-)	Manual killing of pests in primary stage is ineffective					
19. (+)	Continuous pesticides application increase resistance to insect-pests					
20. (-)	IPM can be practiced only in small scale					
21. (+)	IPM ensure use of local resources					
22. (-)	IPM requires more technical knowledge					

Thanks for your co-operation,

Signature of the Interviewer
Date:.....

Appendix-B: Correlation matrix

Characters	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂	Y
X ₁	1												
X ₂	-.905**	1											
X ₃	.160	-.070	1										
X ₄	.226*	-.230*	-.154	1									
X ₅	.156	-.111	.935**	-.136	1								
X ₆	.199*	-.177	.669**	.419**	.693**	1							
X ₇	-.905**	-.755**	-.230*	-.248*	-.198*	-.271**	1						
X ₈	-.892**	.868**	-.137	-.166	-.165	-.146	.741**	1					
X ₉	-.925**	.914**	-.088	-.271**	-.098	-.197*	.811**	.864**	1				
X ₁₀	-.969**	.888**	-.131	-.281**	-.133	-.196	.897**	.881**	.933**	1			
X ₁₁	-.953**	.854**	-.176	-.239*	-.174	-.238*	.882**	.840**	.918**	.943**	1		
X ₁₂	-.328**	.292**	-.097	.054	-.113	-.015	.237*	.389**	.266**	.272**	.310**	1	
Y	-.877**	.936**	-.080	-.176	-.122	-.144	.690**	.898**	.884**	.833**	.820**	.390**	1

X₁: Age

X₂: Education

X₃: Farm Size

X₄: Land under vegetable cultivation

X₅: Annual family income

X₆: Annual income from vegetable cultivation

X₇: Time spend in vegetable field

X₈: Organizational participation

X₉: Knowledge on IPM practice in vegetable cultivation

X₁₀: Contact with IPM Clubs and FFS

X₁₁: Communication media exposure

X₁₂: Training exposure

Y: Attitude towards IPM practices in vegetable cultivation