TRAINING NEEDS OF THE FARMERS ON INTEGRATED PEST MANAGEMENT (IPM) PRACTICES

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CERTIFICATE

This to certify that the thesis entitled, **"TRAINING NEEDS OF THE FARMERS ON INTEGRATED PEST MANAGEMENT (IPM) PRACTICES"** submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) IN AGRICULTURAL EXTENSION & INFORMATION SYSTEM** embodies the result of a piece of bona fide research work carried out by **JHARNA RANI PAL, Registration No. 07-02630** under my supervision and guidance. No part of the thesis has been submitted for any other degree of diploma.

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

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TRAINING NEEDS OF THE FARMERS ON INTEGRATED PEST MANAGEMENT (IPM) PRACTICES

ABSTRACT

The main objective of this study was to find out the extent of training needs on Integrated Pest Management (IPM) practices by the farmers and to determine the relationship between the selected characteristics of the farmers and their training of IPM practices. The study was conducted in Rampal Upazila under Bagerhat district. One hundred farmers were selected randomly as the respondents of the study randomly out of 500 farmers. Data collected from the respondents using an interview schedule during 3rd February to 6th March 2010. Descriptive statistics such as mean, standard deviation, range and percentage were used to describe the variables under consideration. Pearson's Product Moment Correlation Coefficient (r) was used to explore the relationship between the selected characteristics of the farmers and their training needs of IPM practices. The data revealed that only 62 percent of the farmers were medium user of IPM training while 25 percent low and 13 percent of the respondents were high to use IPM practices. In the study group nearly 60 percent farmers were middle aged (41-50 yrs). Majority of the farmers 83 percent had secondary level of education compared to other categories. About 71 percent respondents had medium size family (5-6) members. The findings also revealed that training of IPM practices by the farmers had no significant relationship with their education, farm size, family size, annual family income, extension media contact, while cosmopoliteness had positive significant relationship. In respect of problems confrontation, the findings revealed that the majority (62 percent) of the farmers faced medium confrontation while 18 percent faced high and 20 percent faced low problems confrontation during training of IPM practices. Among the ten selected problems, " lack of quality seed" ranked first in order while " criticize to other farmers for training of IPM practices" ranked least.

CHAPTER 1
INTRODUCTION

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INTRODUCTION

1.1 General Background

Bangladesh is basically an agricultural country. Agriculture plays a vital role in capital formation. The majority of the population lives in the villages of whom about 63.2 percent are engaged in agriculture and related activities (BBS, 2002). About 67 percent of the labor forces are employed in agriculture of which 59 percent is employed in the crop sector (BBS, 2005). Thus agriculture contributes significantly towards ensuring food security, employment generation, poverty alleviation, and raising standard of living and increasing export earnings.

However, there are several constraints on the way to increasing production. One of the main constraints is the pest and diseases. The annual yield loss due to insect pests alone is 16% for rice and 25% for vegetables. Therefore for increasing crop production it is important to reduce the crop loss caused by pests and diseases (Anonymous, 2005).

In Bangladesh, chemical control has been the principal method of pest control. Although pesticides may provide temporary relief from pest problems, long-term dependency on pesticides is not desirable. It is now widely accepted that indiscriminate use of pesticides not only creates serious environmental and human health problems but also promotes development of pest resistance to insecticides, destroys beneficial insects, upsets the balance between the pests and their natural enemies leading to the increase in the population of the target pests and even the creation of new pest problems.

IPM is a broad ecological approach to pest control using various pest control tactics in a compatible manner. In the present day usage, IPM is not limited to dealing with pesticides and management. In fact, IPM is a holistic approach to crop production based on sound ecological understanding and in this sense; IPM could even be termed as an Integrated Crop Management (ICM).

The following elements can be used as components of an IPM system.

⇔ Biological control: natural and pathogenic microorganisms.

⇔ Cultural control: good agronomic practices.

⇔ Use of pest tolerant or resistant crop varieties.

⇔ Mechanical control: hand picking, flooding to minimize the incidence of insect pest.

⇔ Physical Methods: by regulating heat, cold, humidity, sound and using energy light trap.

⇔ Chemical control: selective based on economic thresholds. It is used as a last method but priority is given to botanical and bio-pesticides whenever possible.

⇔ Sanitation/Housekeeping control: reducing pest food, water and harborage

⇔ Habitat modification

⇔ Moisture control: importance techniques (ventilation plastic soil covers etc).

In Bangladesh, IPM activities started in 1981 with the introduction of the first phase of FAO's Inter country programme on rice. However, it was the introduction of the second phase of rice IPM by Inter Country Programme in 1987 that IPM activities began to expand and IPM became a popular topic among people from all walks of life. From 1989 to 1995 ICP played a strong catalytic role in prompting the IPM community, provided IPM training to build the training capacity of the Department of Agricultural Extension (DAE) staff, and introduced Farmers Field School (FFS) for training the farmers. A number of persons from NGOs were also given training on Integrated pest Management. As a result of the success of this progamme and on the basis of the needs for IPM in Bangladesh, number of IPM projects executed by Government departments and NGOs have come into existence in Bangladesh.

Environmental pollution from pesticides and fertilizers

Environmental pollution is the act of introducing into the environment some extraneous substances or energy that may result in unfavorable change. The pollution can cause among others health problem; economic problem and ecological problem. Farming and the environment have always been closely interlinked in Bangladesh. We depend on the environment, as the resources of land, water, sunlight and biological organisms for any farming enterprise. The environment of the world is slowly degrading due to the industrial and agricultural emissions and the people are very anxious about the degradation as this may cause serious damage to lives on the earth. It has been found in different countries of the world that in addition to the beneficial effect, the improved agricultural practices have tremendous relevance to environmental pollution. The improved technologies including fertilizers and pesticides create some problems in the soil and environments (Bouwman, 1990)

To get higher yield, many farmers use fertilizers on HYV crops heavily.
A typical crop response to the fertilizer application indicates that the rate of utilization decreases in the heavily fertilized land. Evidences show that only 30 – 40 per cent of the fertilizer used in the crop land is utilized by the plant,

Pesticides create numerous hazards or problems to the human health and environment and perhaps as many as 25 million agricultural workers are poisoned each year by the pesticide and some 20,000 deaths can be directly attributed to agro-chemical use.

Status of the IPM in Bangladesh

Pests are living organisms when present in sufficient number cause events and processes that people dislike. Pests have been a problem as long as agriculture has existed as an industry. The primary pests are insects, diseases and weeds. Intensive farming and warm humid climate of the country are favorable for the rapid developments of pests and diseases. In Bangladesh, insect's infestation is more serious than diseases in agricultural crops. One hundred and seventy five insects have been recorded in Bangladesh that feed

on rice plant, of these 22-23 species have been found to be more damaging for the rice crop.

The following findings indicate the benefit of IPM practices in Bangladesh:

i)Rahaman (1993) found that IPM farmers reduced the number of pesticide use application upto 89 percent and at the same time yield increased to 10 percent.

ii) Sattar and Uddin (1996) reported that the IPM trained farmers reduced the number of pesticide application upto 88 percent while at the same time yield was increased to 9 percent.

In order to receive such benefit and significant impact, at present IPM activities have been undertaken by the Department of Agricultural Extension (DAE) through DAE-DANIDA-SPPS, DAE-UNDP/FAO, and DAE-CAD project.

1.2 Statement of the Problem

Agriculture and environment has a close relationship. We are dependent on the environment as well as agriculture and increased production. In agricultural field, we use different pesticides. It has been found in different countries of the world that in addition to beneficial effects, the improved agriculture practices have tremendous influence on environmental pollution and Bangladesh is no exception to this (Sattar, 2004)

The rapid increase in the use of pesticides in agriculture in recent years created bad impact on environment. Firstly- pesticide use can have adverse health effect for farm workers and others exposed. Secondly, it might contaminate ground and surface water, harming down-stream users of the pesticide leached to the water sources have also been for causing regular outbreaks of epidemic disease in fishes (Ziauddin, 2004).

Since the farmers have not enough knowledge about the types of adverse effect of the pesticides they are using them in a large scale and injudiciously. Such application of pesticides has been damaging our valuable natural resources such as land, fishes, beneficial insects, beneficial soil microorganisms and some beneficial plants. That is why the soil organic matter has been reduced. The use of sulfur pesticides increases the acidity

of the soil. Farmers often do not use pesticides in accurate doses and thus resistance of insects grows to the insecticides in the pest population. This resistance creates serious harm to the crops. To control these resistant pests a higher doses of insecticides are needed and thereby cost of production increases and damages environmental balance as well as. So, it is essential to reduce the excess use of pesticide through popularizing practices of Integrated Pest Management.

IPM practices are an excellent strategy for pest control. To reduce environmental hazard, economic inputs and increase crop production as well as increasing farmers life style.

The primary function of knowledge is to make sense of the information taken in the process of sensation. The study of knowledge is, therefore, expected to reveal how the farmers use IPM practices for crop production. Therefore, it is quite logical to assume that knowledge of the farmers on practice of IPM have relationship with their various social, cultural and psychological factors. It is therefore, necessary and of course, logical to undertake a research on this aspect.

In view of the above reasons and facts, the present study is an attempt to find answers to the following questions:

1. What is the level of farmers' training on use of IPM practices?
2. What are the farmer's characteristics?
3. Are there any relationships between the selected characteristics of the farmers with their adverse effects of farmer's training on using agro-chemicals?

1.3 Objectives

In order to give proper direction to the study the following specific objectives are formulated:

1. To determine and describe the extent of training needs of the farmers on IPM practices.
2. To determine and describe the selected characteristics of the farmers using IPM practices. The selected characteristics were:
    - Age
    - Education
    - Family size
    - Extension media contact
    - Farm size
    - Annual family income
    - Organizational participation
    - Cosmopoliteness
    - Innovativeness

3. To explore the relationships between the extent training needs of IPM method with the selected characteristics of the farmers.

4. To determine the problems faced by the farmers in using IPM practices.

1.4 Justification of the study

The main focus of the training is to enable participants to design and implement pest management plans beyond pesticide spraying after having received instruction on the components of IPM. Training sessions emphasized that spraying offers only a temporary solution to pest problems and that implementing IPM approaches, such as matching a plant to its proper site conditions or understanding pest biology to determine the optimal

time in a pest's life cycle for pesticides to be most effective, offers more permanent solutions to pest problems.

The study is to assess the use of IPM practices by the farmers in crop cultivation. Men depend on environment and agriculture. IPM that is less hazardous to the environment and economically benefited is a suitable innovation for the farmers to control the pest. However, farmers of Bangladesh lack adequate knowledge on Integrated Pest Management. Lack of consciousness on environmental issues, they are destroying our natural resources.

The effect of following unscientific method leads many hazards to over all environment and the whole ecology. As a result we are facing scarcity of drinking water, distraction of natural enemies, deterioration of soil quality, increase health hazard and loss of biodiversity. Ultimately indiscriminate and unscientific practices in crop production which lead to such serious problem.

IPM medicates the farmers to utilize the readily available source of tolerant genetic resource, modem cultivation practices, mechanical means of control, biological measures of control, organic, green manuring and bio-fertilizer to the pollution and improve the environment. There is an urgent need to understand the potential and limits of IPM so that appropriate development choices can be made.

There are many studies conducted relating to knowledge and attitude of farmers on various aspects of agriculture. But very little research has been reported home and abroad to determine the use of IPM practices by the farmers.

Most of the farmers of Bangladesh are poor. They could hardly spend the money for expensive toxic pesticides. IPM helps farmers to utilize the readily available source of biological control agents. Above all, IPM has an ample scope, making the farmer less reliance on chemical control. Through improving IPM practices in the field, farmers could reduce the harmful effects of pesticide in their agricultural field. Today DAE also

try to introduce Integrated Pest Management (IPM) practices. But they are not satisfied. Because large number of insecticide are importing in our country and the farmers can easily buy this insecticide in low price. That's why the researcher thinks one of the issues that the farmers needs to training on IPM practices.

1.5Assumption

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Goode, 1945). The following assumptions were in the mind of the researcher during conduction of the study.

(a) The respondents included in the sample were capable of furnishing of proper responses to the questions set-up in the interview schedule.

(b) The items included in the questionnaire to ascertain the practices of IPM were adequate to reflect the practices of IPM.

(c) The respondents had almost similar background and seemed to be homogenous to a great extent.

(d) The information sought by the researcher revealed the real situation to satisfy the objectives of the study.

(e) The researcher who acted as interviewer was well adjusted to the social environment of the study area. Hence the data collected by the researcher were free from bias.

(f) The findings were useful in choosing the clients as well as for planning, execution and evaluation the extension programme.

(g) The responses furnished by the respondents were reliable.

(h) Views and opinions furnished by the respondents were the representative views and opinion of the whole population of the study.

1.6 Scope and Limitations of the Study

The social objectives of the nourishment, health and environmental quality can be attained efficiently by the implementation of IPM practices than through current crop protection practices. IPM is necessary for its effectiveness and economic advantages in the short run. It is necessary to know the existing level of adoption of IPM practices

among the farmers and the factors influencing the adoption of IPM practices and various other related matters. The present study was undertaken to have an understanding of the use of IPM practices and to determine the relationship with selected characteristics of the farmers. Considering the time, money and other necessary resources available to the researcher and to make the research manageable and meaningful it was necessary to impose certain limitations. The limitations of the study are noted as below:

1. The study was conducted in Rampal upazila under Bagerhat district.
2. Characteristics of the farmers were many and varied but in the present study only 9 characteristics were selected. This was done to complete the study within limited resources and time.
3. The study was restricted within the farmers who had at least some cultivable land under own cultivation.
4. For information about the study, the researcher was dependent on the data furnished by randomly selected respondents during the interview with them.
5. The researcher relied on the data furnished by the farmers from their memory during interview.
6. The findings of the study will have general application to other parts of the country with similar socio-economic and cultural condition of the study area. This will not be helpful for the students, extension of another area for formulating policies for extension services.

1.7 Definition of the Key Terms Used

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

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

Education: Education of an individual farmer was defined as the level of formal education received by that individual from an educational institute (e.g. school, college and university etc) at the time of interview.

Family size: Family size of a farmer referred to the total number of members including the respondent himself/herself, spouse, children and other dependents, who live and eat together in a family unit.

Farm size: Farm size referred to indicate the cultivated area either owned by a farmer or cultivated on borga system, the area being estimated in terms of full benefit to the farmer. The full area of land taken on lease by a farmer was taken into consideration for computing has effective farm size. This was done in consideration that the farmer gets full benefit from such land.

Annual family income: It refers to the total annual earning of all the family members of a respondent from agricultural and other non-agricultural sources (Services, business, daily labour etc.) during a year.

Organizational participation: Organizational participation of an individual refers to his participation in various organizations as ordinary member, executive committee member or executive officer within a specified period of time.

Extension media contact: It refers to an individual's exposure to or contact with different information sources and personalities being contacted for technology dissemination among the farmers.

Innovativeness: Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting now ideas than other members of a social system (Rogers, 1995a). It was measured on the basis of time dimension.

Cosmopoliteness: It refers to the degree to which an individual's orientation is external to his own social system.

IPM practices: IPM practices in respect of cultivation of any crop refer to those practices, which are advocated by competent authority. This practices if use is helpful for improving the yield and/or quality of crop.

Integrated Pest Management: IPM is the selection, integration and implementation of pest control based on predicted economic, ecological and sociological consequences. 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 that economic injury."

Problem: It means any different situation, which requires some actions to minimize the gap between "what ought to be" and "what is". The term problem refers to different difficulties faced by the farmers at the time of practicing use of IPM in crop cultivation.

Training: Organized activity aimed at imparting information and/or instructions to improve the recipient's performance or to help him or her attain a required level of knowledge or skill.

Training needs: It refers to one's need for gaining knowledge and skills regarding the different aspects of reduces pest population and maintain them in crop cultivation. Here the training needs of the farmers was studied in eleven aspects like insect control by hand sweep, use of light trap for insect control, practice of crop rotation and cultivation of healthy seed etc.

CHAPTER II

REVIEW OF LITERATURE

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REVIEW OF LITERATURE

Review of the literatures relevant with the objectives of this study are presented in this Chapter. The present study is mainly concerned with the training needs on the use of Integrated Pest Management practices by the farmers and its relationships with their selected characteristics. An effort was made to know the findings of the past researches. Accordingly, the researcher made an extensive search of past studies that could be made available. But unfortunately none of this study was in relating to the present study. However, the researcher come across with some review of literature regarding Integrated Pest Management as well as some studies that dealt with the relationship of characteristics of the individuals with their use of Integrated Pest Management practices as far as available have been presented. It is likely that higher the adoption of a practice by a farmer, the higher will be his knowledge about that practices. On the other hand, the higher the knowledge of a farmers about a practice the less will be his need for training about that particular practice. This Chapter is divided into two sections. The first section deals with the review of studies related to the use of different practices and the second section deals with the relationships between verities characteristics and their use of Integrated Pest Management practices.

2.1 Review on study relating to Training Needs

Judge (1967) while presenting a paper at the CENTO Conference on Agricultural Extension at Ankara, mentioned that training program for preparation of Agricultural Extension workers must include the following areas:

1. A general education program with emphasis on knowledge and understanding of the basic science.
2. An understanding of agricultural procedures, process and their relationships with other segments of the economy of the area in which he is to work.
3. Specific agricultural knowledge, which will contribute to increase agricultural production.

Hussain et al. (1990) undertake a study on the training need of farm house wives and revealed that most of the house wives were interested in receiving on different aspects of agricultural and livestock production. The house wives from smaller farm groups needed more training on different aspects of agricultural and livestock production compared to larger groups.

Miah and Hossain (1990) conducted a study on training need of the female block supervisors FBSs and revealed that 46 percent of the FBSs felt medium necessity of training wile the rest demanded higher extent of training need in seven areas of their job responsibilities included: agricultural extension, motivation, leadership, homestead gardening and nutrition, backyard poultry development, food processing and preservation and bee keeping.

Rahman (1995) is his study reported that majority of the subject matter officers (SMOs) felt very much to have training on pest and disease control, seed production, fruit production, vegetable production, principles and methods of teaching, preparation of training materials and planning, execution and evaluation of agricultural extension plan. However, the respondents expressed that the training on fertilizer management, irrigation and general crop production were not so necessary for them. Considering overall training needs of the subject matter officers the study also revealed that three-fifths of the SMOs had high level of training needs, as compared to 42 percent having medium level of needs.

Ali and Hossain (1989) found that the teachers of Bangladesh Agricultural University expressed substantial need of training for their career development, which cannot be fulfilled only by earning academic degree. Two important fields of training as indicated by them were research and extension.

Ramaswamy (1997) reported that 4050 farmers from 81 IPM schools spent Taka 816/ha on pesticides during one cropping season before receiving IPM training. The same 4050 farmers, after receiving IPM field training, control their pests through IPM skills. They

reported that the naturally available parasitoids and predators suppressed the pest population. This was possible for adopting cultivation practices and controlling of pests by mechanical means and without spending money. They spent Taka 110/ha on pesticides and thus 87 percent reduction in pesticides use was achieved by using IPM knowledge.

Finding of the research studies regarding the extent of training need the use of Integrated Pest Management practices as presented above indicate that the use of Integrated Pest Management practices in the rural areas of Bangladesh is not very encouraging. Till today, most of the farmers do practice traditional methods to a greater extent. This fact indicates that the extension workers have enormous scope to enhance the use of Integrated Pest Management practices among the farmers.

2.2 Relationship between Farmers Characteristics and their training needs of Integrated Pest Management practices.

Very few studies dealing with relationships of individuals' characteristics and their training need were available in course of review of literature.

2.2.1 Age and Training needs on IPM practices

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that age had no significant and positive relationship with the use of IPM practices.

Khan (1993) in his study found that age of the farmers was significantly related with their adoption of insecticides. He also found that with the increase of age of the farmers, the adoption of insecticides reduces i.e., age was negatively related with adoption.

Khan (2003), Rahman (2004) and Singh (2005) observed that there was significant and positive relationship between age of the farmers and their use of IPM practices.

Sarker (1983) found that age of the farmers had a significant negative effect on their poultry problem confrontation.

Ali and Anwar (1987) reported that age of farmers had significant relationship with cattle problem confrontation.

Mutaleb (1995) in his study that age of the farmers had no relationship with their adoption of improved potato technologies.

Hossain (1999) conducted at study to determine the farmers perception of the effects of agrochemical on environment. He found that age of the farmers had no relationship with their adoption of fertilizer.

2.2.2 Education and Training needs on IPM practices

Shamsuzzoha (1969) undertook a study on cotton growers and found a significant relationship between education level and degree of adoption of demonstrated practices. He found that the farmers with high school education had significantly higher degree of adoption of demonstrated practices that the grades school and collage education farmers.

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that education had positive and significant relationship with their use of IPM practices.

Aurangozeb (2002) conducted a study on adoption of integrated farming technologies by the rural women in RDRS. He found that there was a positive relationship between education and their adoption on integrated farming technologies.

Sarker (1997) conducted a study to determine the relationship between selected characteristics of potato growers and their adoption of improved potato cultivation practices in five village of comilla district. He found that education of potato growers had significant relationship with their adoption of improved potato cultivation practices.

2.2.3 Family size and Training needs on IPM practices

Rahman (1974) in a study on attitudes of farmers towards high yielding variety of rice and organizational effectiveness of accelerated rice production program (ARPP) in Bangladesh found that size of family of both ARPP scheme farmers and non scheme farmers had no significant relationship with their attitude toward HYV rice. However, analysis of data indicated negative trend in both the cases.

Ali at al (1986) in their study found that adoption of improved sugarcane production techniques significantly increased with increased family size.

Mustafi et al. (1987) in their study found that number of family members had no significant effect on adoption of Modern varieties of rice in Bangladesh.

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that family size had no relationship with their use of IPM practices.

Pal (1995) in his study in North Bengal sugar Mills observed that family size of the farmers had no significant relationship with their adoption of recommended practices in sugarcane cultivation.

Okora and obibuaka (1992) found that family size of the farmers had positive relationship with their adoption of recommended management practices.

Mutaleb (1995) revealed in his study that adoption of the improved potato technologies Had positive relationship with family size of the respondents.

2.2.4 Farm Size and Training needs on IPM practices

Islam (2002) conducted a study on adoption of modem agricultural technologies by the farmers of Sandwip. He observed that farm size of the farmers had a positive significant relationship with their adoption of modem agricultural technologies.

Okoro and obibuaka (1992) studied adoption of recommended practices among small holders in IMO state, Nigeria. The findings of the study indicated a positive relationship between the farm size and adoption of recommended management practices.

Mohammad (1974) undertook an investigation on the farmers adoption of insect control measures and related aspects. He reported that farm size of the farmers had low association with their adoption of insect control measures.

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that farm size had no relationship with their use of IPM practices.

2.2.5 Annual Income and Training needs on IPM practices

Islam (2002) conducted a study on adoption of modem agricultural technologies by the farmers of Sandwip. He observed that the annual income of the farmers had no relationship with their adoption of modern agricultural technologies.
Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that annual income had positive and significant relationship with their use of IPM practices.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in PDRS. He found that there was a positive significant relationship between annual income of the respondents and their adoption of integrated homestead farming technologies.

Mohammad (1974) undertook an investigation on the farmers adoption of insect control measures and related aspects. He reported that annual income of the farmers had low association with their adoption of insect control measures.

Beal and Sibley (1967) in their combined study on the adoption of agricultural relationship between value of principal crop score and the farm practices adoption score.

2.2.6 Extension Media Contact and Training needs on IPM practices

Mutalab (1995) showed that extension contact of the farmers had positively related with their adoption of improved potato technology.

Islam (2002) conducted a study on adoption of modern agricultural technologies by the farmers of Sandwip. He found that extension media contact of the farmers had no significant relationship with their adoption of modern agricultural technologies.

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that extension media contact had positive and significant relationship with their use of IPM practices.

Juliana, et al (1991) studied on relationship between characteristics of cotton growers and their adoption level of IPM practices. They reported that in respect of all three categories of farmers, their extent of adoption associated positively and significantly with extension media contact.

Aurangozeb (2002) conducted a study on adoption of integrated homestead farming technologies by the rural women in PDRS. He found that there was a positive significant relationship between contact with extension media of the respondents and their adoption of integrated homestead farming technologies.

2.2.7 Organizational Participation and Training needs on IPM practices

Sarker (1997) conducted a study to determine the relationship between selected characteristics of potato growers and their adoption of improved potato cultivation practices in five village of comilla district. He observed that participation of the potato growers had no significant relationship with their adoption of improved potato cultivation practices.

Mohammad (1974) undertook an investigation on the farmers' adoption of insect control measures and related aspects. He reported that organizational participation of the farmers had significant and positive association with their adoption of insect control measures.

Hoque (1993) in this study observed a positive relationship between organizational participation of the cane growers and their adoption of pest management practices.

Mutalab (1995) found that organizational participation of the farmers had no relationship with their adoption of improved potato technology.

Islam (1993) found that organizational participation of the potato growers had positive relationship with their adoption of recommended doses of fertilizer and plant protection measures.

2.2.8 Innovativeness and Training needs on IPM practices

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that innovativeness had no positive and significant relationship with their use of IPM practices.

Islam (2002) in his study related that innovativeness of the farmers had significant positive relationship with their adoption of modern agricultural technology.

Mohammad (1974) undertook an investigation on the farmers' adoption of insect control measures and related aspects. He reported that innovativeness of the farmers had positive and significant association with their adoption of insect control measures.

Hossain (1999) found a positive significant relationship between innovativeness of the farmers and their adoption of fertilizer and also observed no relationship with adoption of pesticides.

2.2.9 Cosmopoliteness and Training needs on IPM practices

Roy (1997) conducted a study on the adoption of IPM practices by the Boro rice growers in sadar thana of Magura District. He found that cosmopoliteness of the Boro rice growers had positive and significant relationship with their adoption of IPM practices.

Haque (1993) found that cosmopoliteness of the farmers had positive relationship with adoption of BR-14 during Boro-season.

Rabbany (2003) conducted a study on use of IPM practices by the farmers in rice cultivation. He found that cosmopoliteness of the farmers had positive and significant relationship with their use of IPM practices.

Islam (1993) found a significant relationship between cosmopoliteness of the farmers and their adoption of plant protection measures in potato cultivation.

2.3 Conceptual framework

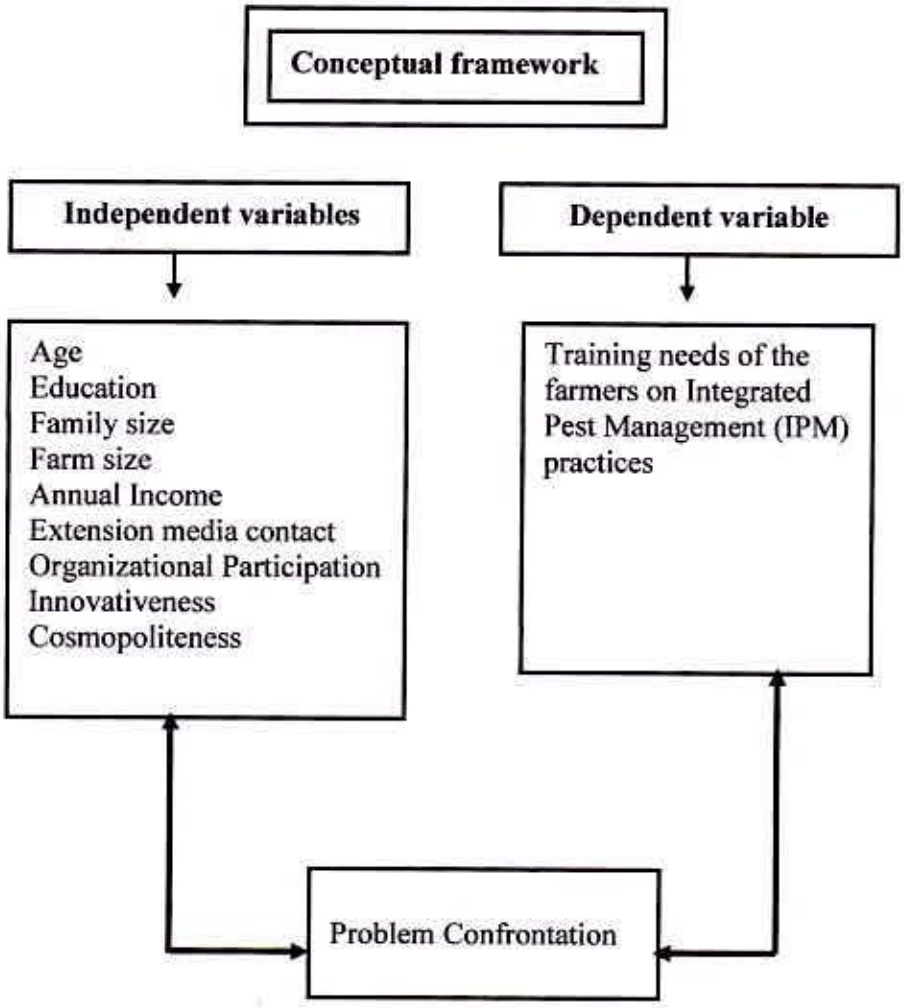

Figure 2.1 Conceptual framework of the study

CHAPTER III
METHODOLOGY

CHAPTER III
METHODOLOGY

Methods and procedures used for collection and analysis of data are very important in any scientific investigation that's require a very careful consideration on the part of the researcher. Methodology should be such as would enable the researcher to collect valid and reliable data and to analyze the same properly to arrive at correct decision. Methods and procedures used in this piece of research will be discussed in this chapter.

3.1 Locale of the study

This study was conducted at Gilatala village of Bashtoly union in Rampal Upazila under Bagerhat District. This union was selected as the venue for collecting information. Rampal Upazila is so far from Bangladesh Agricultural Research Institute (BARI) Bangladesh Rice Research Institute (BRRI) and Central Extension Resources Development Institute (CERDI). For this reason the farmers of this area not well exposed about various agricultural development and latest technologies. Now it is imperative that the farmers of this area may have different training needs on different agricultural development activities. This is the reason behind the selection of this area as the locale of the study. The map of the study area have shown in the figure 3.1.

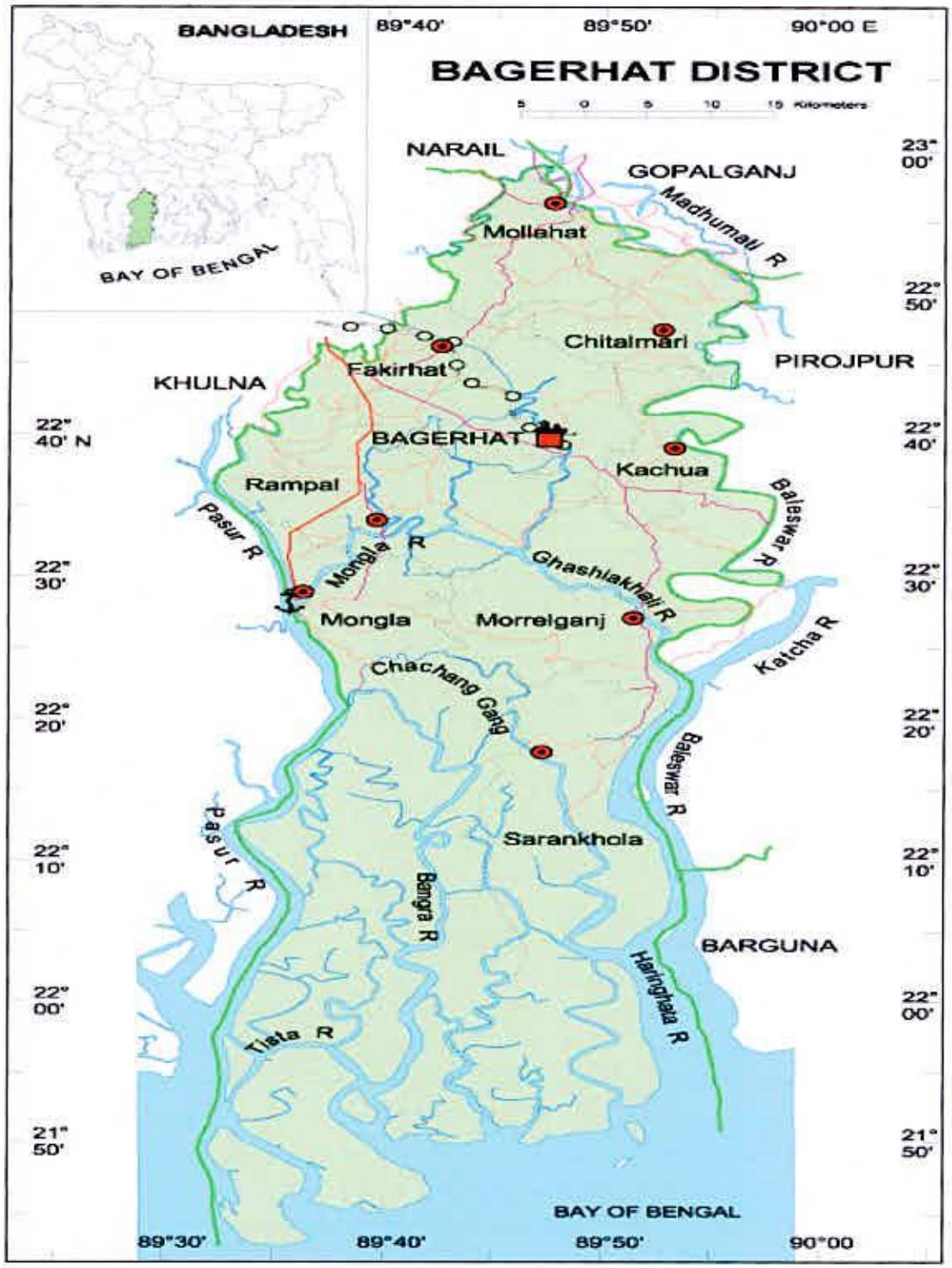

Figure 3.1 A map of Bagerhat District showing study area

3.2 Populations and Sampling Design

One village was selected from selected union. List of the farmers of this village were prepared. Population of farmers in the study area was about 500. From the entire population, 100 farmers were selected through systematic random sampling.

A reserve list of respondents was also prepared so that farmers of the list could be used of for interviewing if the farmers included in the original sample were not available during data collection period. Care was taken to include at least one farmer from each village under reserve list (Table 1)

Table 3.1: Population and sample of farmers in Gilatala village of Bashtoly union under Rampal Upazila

Union	Village	Population of farmers	No. of farmers included in sample	No. of farmers included in reserve list
Bashtoly	Gilatala	500	100	10

3.3 Instrument for Collection of Data

An interview schedule was used as the research instrument in order to collect relevant information from the respondents. The schedule was carefully designed and prepared in Bengali, keeping the objectives of the study in view. It contained both open and closed form questions. The questions were arranged systematically.

3.4 Pre- testing of the Interview Schedule

The interview schedule was pre-tested with 15 farmers and then final shape was given to the interview schedule according to the experience of pre-test. The pre-testing facilitated the researcher to examine the suitability of different questions and status of the instrument in general. The final revised version of the instrument was prepared on the basis of suggestions and comments of the appropriate authority. An English version of the interview schedule is enclosed at Appendix-1 of this thesis.

3.5 Time and Procedure of Data Collection

Data were collected by the researcher himself during 3rd February to 6th March, 2010. To get valid and pertinent information, the researcher made all possible efforts to explain the purpose of the study to the respondents. Interviews were conducted with the respondents in their homes. While starting interviews with any respondent, the researcher took all possible care to establish rapport with him so that he did not feel hesitant or hesitate to furnish proper responses to the questions and statements in the schedule. The questions were clearly explained wherever the respondent felt any difficulty in understanding properly. Before data collection Upazila Agriculture Officer (UAO) and Junior Agriculture Extension Officer (JAEO) of the Rampal sadar Upazila extended necessary help and co-operation in connection with data collection.

3.6 Compilation of Data

After completion of field survey, data from all the interview schedule were compiled, tabulated and analyzed according to the objectives of the study. In this process, all the responses in the interview schedule were given numerical code values. Local units of measurement were converted into standard units. The responses to the questions in the interview schedule were transferred to master sheet to facilitate tabulation. As soon as the data were entered into the computer, these were analyzed in accordance with the objectives of the study.

3.7 Categorization of Data

For describing the independent and dependent variables the respondents were classified into appropriate categories. In developing categories, the investigator was guided by the nature of data and general considerations prevailing in the social system. The procedures for categorization have been discussed while describing the variables in the relevant Chapter.

3.8 Variables and their Measurement

In a descriptive social research the selection of variables constitute an important task. In this connection, the investigator looked into the literature to wider his understanding about the nature and scope of the variables involve in the research studies. A variable is any characteristic which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). A well organized piece of research usually contains at least two important variables, viz. an independent and a dependent variable. An independent variable is that factor which is manipulated by the experimenter in its attempts to ascertain the relationship to an observed phenomenon. A dependent variable varies as the experimenter introduces, removes or varies the independent variables (Townsend,1953).

The dependent variable is often called the criterion or predicted variable. Where as the independent variables is called the treatment, experimental or antecedent variable. (Dalen,1977)

3.8.1 Measurement of Independent Variables

Ten characteristics of farmers were selected as independent variables of this study. Procedure followed is measuring the independent characteristic are briefly discussed below:

3.8.1.1 Age

Age of an individual referred to a period of time form his birth to the day of interview. The age was measured in terms of years on the basis of response of the farmers.

3.8.1.2 Education

Education was measured as the ability of an individual respondent to read and write or the level of formal education received from educational institution. A score of one (1) was given for each year of successful schooling. If a respondent passed the S.S.C examination, his education score was given as 10, if passed the final examination of class seven (VII), his education score was given as 7. If a respondent did not know how to read and write his education score was given as '0' (zero).

3.8.1.3 Family size

Family size of a farmer was determined on the basis of the total number of members in his/her family. The family members included himself/herself spouse, sons, daughter and other dependents. The scoring was made by the actual number of family members expressed by the respondents. For example if a respondent had five members in his/her family score was given as 5.

3.8.1.4 Farm size

It referred to indicate the cultivated area either owned by a farmer or cultivated on borga system, the area being estimated in terms of full benefit to the farmer. The full area of land taken on lease by a farmer was taken into consideration for computing has effective farm size. This was done in consideration that the farmer gets full benefit from such land. The farm size was measured in items of acres by using the flowing formula:

$$L_t = A_1 + \frac{1}{2}(A_2 + A_3) + A_4$$

L_t = Total land possessed.
A_1 = Own land under own cultivation.
A_2 = Land taken from others on borga.
A_3 = Own land given to others on borga.
A_4 = Land taken from others on lease.

3.8.1.5 Annul income

Annual income of a respondent was measured in taka on the basis of yearly earnings of his/her family from agriculture and non –agriculture and non-agricultural sources. For determining agricultural income of a respondent, first, annual production of different farm out puts like crops, livestock, fisheries etc, was ascertained. Then the total market prices of the above items were determined on the basis of prevailing market price of the items at the time of interviewing. Income of the respondent and other members of his/her family from non-agriculture sources (services, business etc) was also determined. Yearly earnings from agriculture and non-agriculture sources were added together to obtain the total income of the respondents. A score of 1 was given for each 1000 Tk.

3.8.1.6 Contact with extension sources

Contact with extension sources of respondent was measured according to the nature of his/her contact with different extension sources. The extent of contact was determined against (5) five point scales as not at all, rarely, occasionally, frequently and regularly and score was assigned to represent the same as 0, 1, 2, 3,and 4 respectively. The scale used for determining the extension contact score of individual given below.

Possible range was 0-60. Table 3.2 shows the measurement procedure for extension contact.

Table 3.2 Measurement of respondents contact with extension sources.

Extension sources	Extent of contact		Scores assigned
Individual contact			
Sub-assistant Agricultural Officer	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
NGO worker(s)	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
Local leader	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
Block Supervisor(BS)	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
Upazila Agricultural Officer	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
Friends/ Neighbor	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
Group contact			
Participation in group discussion	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0
Participation in Method,Result demonstration	Regularly	13-15 times/month	4
	Frequently	9-12 times/month	3
	Occasionally	5-8 times/month	2
	Rarely	1-4 times/month	1
	Not al all	0 times/month	0

Participation in Field Day	Regularly Frequently Occasionally Rarely Not al all	13-15 times/month 9-12 times/month 5-8 times/month 1-4 times/month 0 times/month	4 3 2 1 0
Participation in training	Regularly Frequently Occasionally Rarely Not al all	13-15 times/month 9-12 times/month 5-8 times/month 1-4 times/month 0 times/month	4 3 2 1 0
Mass contact			
Listening Agricultural program in radio	Regularly Frequently Occasionally Rarely Not al all	13-15 times/month 9-12 times/month 5-8 times/month 1-4 times/month 0 times/month	4 3 2 1 0
Watching Agriculture related program in television	Regularly Frequently Occasionally Rarely Not al all	13-15 times/month 9-12 times/month 5-8 times/month 1-4 times/month 0 times/month	4 3 2 1 0
Reading agriculture magazine	Regularly Frequently Occasionally Rarely Not al all	13-15 times/month 9-12 times/month 5-8 times/month 1-4 times/month 0 times/month	4 3 2 1 0

The extension media contact of a respondent was, therefore, determined by adding the total responses against 15 selected extension media. The extension contact score could range from 0 to 60, 0 indicating 'no contact' and 60 indicating 'very high' contact.

3.8.1.7 Organizational Participation

Organizational participation of the respondent was measured on the basis of the nature of his participation and duration of his participation in different organizations. Organizational participation score was computed in the following manner for participation in each organization.

Organizational participation score = $\sum$ P x D

Where,

P= Nature of Participation score

D= Duration score

Table 3.3 Participation score was computed in the following manner:

Nature of Participation	Scores assigned
No participation	0
Participation as ordinary member	1
Participation as executive committee member	2
Participation as executive committee officer	3

3.8.1.8 Innovativeness

According to Rogers (1995) innovativeness is the degree of adoption a new technology to which an individual or other unit of adoption is relatively earlier than the other member of the social system. Innovativeness of a respondent was measured by computing a innovativeness score on the basis of his/her extent of use 8 selected modern Agricultural practices. Scores were assigned on the basis of time dimension in the following manner.

Table 3.4 Innovativeness score was computed in the following manner:

Adoption	Score assigned
Non adopted	0
After 4 and above years	1
Within 3-4 years	2
Within 2-3 years	3
Within 1-2 years	4
Within 1 year	5

Innovativeness score of a respondent was obtained by adding his/her score for all the items. As10 innovations were selected for the study, so the possible innovativeness score of the respondents could range from 0 to 40, 0 indication no innovativeness and 40 indication very high innovativeness.

3.8.1.9 Cosmopoliteness

Cosmopoliteness is defined as a person's orientation outside his social system. Asocial system has been defined as any social structure composed of social interactions and the cultural factors in which the members interact more with members than with non-members while participating in the organization as an ongoing concern.Cosmopoliteness of a respondent was measured in terms of his or her nature of out side visit (Seven different places) external to his own social system. For this purpose, four-point rating scale was used (Table 2). This cosmopoliteness score of a respondent could range from 0 to 21, while 0 indication no cosmopoliteness and 21 indication very high cosmopoliteness.

Table 3.5 Measurement of Cosmopoliteness of the respondent:

Place of visit	Name of visit	Scores assigned
Visit of market/relatives/friends/familiar home outside of your own village	Regularly (≥ 5 times/month) Occasionally (3-4 times/month) Rarely (1-2 times/month) Not at all (0 time/month)	3 2 1 0
Visit of ward commissioner's office	Regularly (≥ 5 times/month) Occasionally (3-4 times/month) Rarely (1-2 times/month) Not at all (0 time/month)	3 2 1 0
Visit to Upazila Sader	Regularly (≥ 5 times/3month) Occasionally (3-4 times/3month) Rarely (1-2 times/3month) Not at all (0 time/3month)	3 2 1 0
Visit to other than own Upazila Sadar	Regularly (≥ 5 times/6month) Occasionally (3-4 times/6month) Rarely (1-2 times/6month) Not at all (0 time/6month)	3 2 1 0
Visit to Upazila agricultural office	Regularly (≥ 5 times/6month) Occasionally (3-4 times/6month) Rarely (1-2 times/6month) Not at all (0 time/6month)	3 2 1 0
Visit of Upazila/ district agricultural fair	Regularly (≥ 5 times/year) Occasionally (3-4 times/year) Rarely (1-2 times/year) Not at all (0 time/year)	3 2 1 0
Visit to Divisional town (Khulna, Dhaka etc).	Regularly (≥ 5 times/ year) Occasionally (3-4 times/ year) Rarely (1-2 times/ year) Not at all (0 time/ year)	3 2 1 0

3.8.2 Measurement of dependent variable

Training needs on Integrated Pest Management (IPM) practices was the dependent variable of the study. The training needs score of the respondents were computed on the basis of the respondent's extent of training needs on 10 IPM practices as perceived by them.

A four point rating scale as 'high training needs', 'moderate training needs', 'low training needs' and 'no training needs' with the score as 3, 2, 1 and 0 respectively was used to measure the training needs of each practices.

As 10 IPM practices were selected for the study, so the range of training needs on IPM practices score of a respondent could vary from 0 to 30, where 0 indicated no training and 30 indicated very high training needs on IPM practices.

However, besides having calculated the 'extent of training needs of IPM practices' score for each of the 100 respondents, an effort was also made to compare the relative use of these practices. An IPM Practices Use Index (IPUI) for each practice was developed to fulfill this objective using the following formula:

IPUI= N1 x 3 + N2 x 2 + N3 x 1 + N4 x 0

Where,

IPUI= Integrated Pest Management Practice Use Index

N1= Number of farmers needs high training needs on IPM practices

N2= Number of farmers needs moderate training needs on IPM practices

N3= Number of farmers needs low training needs on IPM practices

N4= Number of farmers needs no training needs on IPM practices

3.9 Statement of the hypothesis

As defined by Goode and Hatt (1998) "A hypothesis is a proposition, which can be put to a test to determine its validity. It may seem contrary to, or in accord with common sense. It may prove to be correct or incorrect. In any event, however, it leads to an empirical test." In studying the relationship between the variables, research hypothesis are formulated which state the anticipated relationship between the variables. However, for statistical test it becomes necessary to formulate null hypothesis. A null hypothesis states that there is no relationship between the concerned variables. If a hypothesis is rejected on the basis of a statistical test, it is assumed that there is a relationship between the concerned variables.

3.10 Statistical Treatment

The data after collection were coded, complied, 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 selected personal characteristics of the respondents. For clarity of understanding tables were used for presentation of data, Coefficient of correlation (r) test was used to explore the relationship between independent and dependent variables. Throughout the study five percent (0.05) level of probability was use to accept or reject any null hypothesis.

CHAPTER IV

RESULTS AND DISCUSSION

CHAPTER IV

RESULTS AND DISCUSSION

In this Chapter, the findings of the study and interpretation of the results have been presented according to the objectives of the study. This Chapter has been divided into four sections. The first section deals with the selected individual characteristics of the farmers while the second section deals with the extent of training need of farmers on use of IPM practices in crop cultivation. The third section deals with the relationships between the farmers selected characteristics and their training needs of use of IPM practices. Finally, in the fourth section, the problems confronted by the farmers in using IPM practices in crop cultivation.

4.1 Selected Characteristics of the Respondents (Independent variables)

In this section the findings of the farmers selected characteristics have been discussed. The selected characteristics were (i) Age (ii) Education (iii) Family size (iv) Farm size (v) Annual family income (vi) Extension media contact (vii) Organizational participation (viii) Innovativeness (ix) Cosmo politeness (x) Knowledge on IPM.

4.1.1 Age

Age of the respondents ranged from 36-57 years with the average of 46.17 and standard deviation of 5.20. Based on their age, the respondents were classified into three categories as shown in the Table 4.1.

Data presented in the table indicates that the highest proportion (60 percent) of the farmers were in middle group ranged from 41-50 years, while 19 percent and 21 percent belonged to young and old aged category. However, the data also revealed that 79 percent of the respondents of the study area are young to middle aged category. Young people are generally receptive to new ideas and things. However, they might have valuable opinion in regard to training of IPM practices. Therefore, the extension worker should give proper attention to include the young and middle aged groups in their programmes.

4.1 Salient feature of the respondents with their characteristics (N=100).

Sl. No	Characteristics	Scoring System	Range		Categories	Farmers		Mean	Standard Deviation
			Possible	Observed		No.	Percent		
1.	Age	Actual year	-	36-57	Young aged (up to 40)	19	19	46.17	5.20
					Middle aged (41-50)	60	60		
					Old (above 50)	21	21		
2.	Level of Education	Year of schooling	-	0-13	Illiterate (0)	1	1	8.31	2.01
					Primary level (1-5)	4	4		
					Secondary (6-10)	83	83		
					Above secondary (>10)	12	12		
3.	Family Size	Numbers	-	3-7	Small (up to 4)	17	17	5.35	0.925
					Medium (5-6)	71	71		
					Large (above 6)	12	12		
4.	Farm Size	Hectares	-	0.202-1.450	Marginal (0.02-0.4)	13	13	0.58	0.21
					Small (0.41-1.0)	81	81		
					Medium (1.01-2.5)	6	6		
5.	Annual Income	Computed Score (in Thousand)	-	49-175	Low (up to 80)	11	11	109.5	24.76
					Medium (81-120)	63	63		
					High (above 120)	26	26		
6.	Organizational Participation	Scale Score	0-21	0-16	No participation (0)	5	5	6.21	3.15
					Low participation (1-5)	40	40		
					Medium participation (6-10)	47	47		
					High participation (>10)	8	8		
7.	Extension Media contact	Scale Score	0-60	8-31	Low (8-15)	25	25	17.37	3.06
					Medium (15-20)	66	66		
					High (above 20)	9	9		
8.	Innovativeness	Scale Score	0-40	16-27	Low (16-20)	30	30	21.73	2.33
					Medium (20-25)	64	64		
					High (above 25)	6	6		
9.	Cosmopoliteness	Scale Score	0-21	2-15	Low (up to 6)	26	26	8.12	2.49
					Medium (7-11)	65	65		
					High (above 11)	9	9		

4.1.2 Education

Educations of the farmers were measured by the level of his formal education i.e. higher grade (class) passed by him. The education score of the respondents ranged from 0 to 13 with the average of 8.31 and standard deviation 2.01. Based on their level of education, the farmers were classified into 4 categories as shown in the Table 4.1.

The data indicate that the majority (83 percent) of the farmers had secondary level of education while 1 percent farmers were illiterate, 4 percent had primary level and 12 percent had above secondary level of education. The present literacy rate of the country is 65.5 percent (Population census: 2001, BBS). The findings indicate that in the study area, the literacy rate seems to be higher than the national average.

4.1.3 Family Size

The family size of the respondents ranged from 3 to 7, with an average of 5.35 and standard deviation 0.925. The data in Table 4.1 indicate that majority of the respondents fell into medium (71 percent) family category, while 12 and 17 percent had large and small family size respectively. However, 83 percent of the respondents had medium to large family size.

The data also indicate that the average family size (5.35 persons) in the study area was higher than the national average of 4.8 persons (BBS, 2001).

4.1.4 Farm Size

The farm size of the farmers in the study area varied from 0.202-1.45 ha. Majority (81 percent) of the respondents had small farm size compared to 13 and 6 percent with marginal and medium farm size of the respectively. The average farm size of the respondents was 0.58 ha with standard deviation 0.21. Findings show that maximum growers of the study area had small farm size. It may be due to high population.

4.1.5 Annual Income

Annual family income score of the respondents ranged from 49-175 (in thousand0 with an average of 109.5 and standard deviation 24.76. On the basis of the annual family income, the respondents were classified into three categories as shown on Table 4.1.

Data presented in Table 4.1 indicated that the highest proportion (63 percent) of the respondent had medium annual family income, while 11 percent low income and 27 percent had high income. As a result, the most (89 percent) of the respondents in the study area were medium to high income earners.

The average income of the respondents in the study area was much higher than the average per capital income of the country i.e. 378 U.S. dollar (BBS. 2004). This might be due to the fact that the respondents in the study area were not only engaged in agriculture but also earn from other sources, such as service, business etc. Higher annual income of the respondents allow them to invest more in farming operations which ultimately leads them to come in contact with media. Therefore, it can be inferred that the more the annual income possessed by the respondent, the higher would be favorable training of use of IPM practices in crop cultivation.

4.1.6 Extension Media Contact

Contact with extension media of the respondents could range from 8-31 against the possible range of 0 to 60. The average contact with extension media score was 17.37 with the standard deviation 3.06. On the basis of their score, the respondents were classified into three categories as shown in Table 4.1.

Data presented in Table 4.1 indicate that majority (66 percent) of the respondent had medium contact with extension media while 25 percent had low and 9 percent high contact with media.

The findings of the study indicated that most (75 percent) of the respondents had medium and high contact with extension media. Extension contact is an effective source of receiving information about recent and improved technologies. This is an important variable in this research study.

4.1.7 **Organizational Participation**

The observed organizational participation score of the respondents ranged from 0 to 21 and the possible range of 0 to 16.The mean score was 6.21 with the standard deviation 3.15. Based on the organizational scores, the respondents were classified into four categories as shown in Table 4.1. Data contained in Table 4.1 revealed that the highest proportion (47 percent) of the respondents had medium organizational participation as compared to 40 percent low participation, 5 percent no participation and 8 percent having high participation. The study reveals that most (87 percent) of the respondents in the study area were in medium to low organizational participation categories.

4.1.8 Innovativeness

The observed innovativeness scores of the respondents ranged from 16-27 against the possible range of 0-40. The average and standard deviation were 21.73 and 2.33 respectively. Based on the innovativeness scores the respondents were classified into three categories as shown in Table 4.1.

Data presented in Table 4.1 indicate that over whelming majority (64 percent0 of the respondents had medium innovativeness as compared to 30 percent low and 6 percent high innovativeness. Data also revealed that majority (94 percent) of the respondents were under medium to low innovativeness. The innovativeness also refers to proneness of an individual to accept new ideas and practices.

4.1.9 Cosmopoliteness

The observed innovativeness scores of the respondents ranged from 2 to 15 against the possible range of 0 to 21. The mean score was 8.12 with the standard deviation of 2.49. Based on the cosmopoliteness scores, the respondents were classified into three categories as shown in Table 4.1.

Data contained in the Table 4.1 show that 65 percent of the respondents had medium cosmopoliteness as compared to 9 percent having high and only 26 percent low cosmopolitaness. Data also revealed that that majority (74 percent) of the respondents

were under medium to high cosmopoliteness. Because this study was conducted in educated area and the researcher observed that the most the farmers were engaged in various type of social organizations, it was not surprising to get such a picture of cosmopoliteness.

4.2 Dependent Variable

As noted earlier, the training needs of farmers on use of IPM practices was considered as the dependent variable of the study. Observed practices of IPM scores of the farmers ranged from 10 to 25 against the possible range of 0 to 33. The average and standard deviation were 17.39 and 2.91 respectively. Based on the possible scores, the farmers were classified into three categories as shown as Table 4.2.

Table 4.2. Distribution of respondents according to their Training on IPM practices

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 15)	**25**	**25**	**17.39**	2.91
Medium (16-20)	62	62		
High (above 20)	13	13		

Data contained in the Figure 2. indicated that highest proportion (62 percent) of the farmers had medium training needs on IPM practices where 13 percent and only 25 percent had high and low training needs of IPM. Practices.

4.2.1 Comparison among the extent of use of selected IPM practices

In order to compare among the selected IPM practices regarding their extent of use of IPM training. Use Index (IPUI) was developed following the formula as described in chapter 3. The IPULs along with their associated ranks appear in Table 4.3.

Table 4.3 Comparison of identified IPM practices used by the farmers

SL	Area of Training	Degree of training					
		H	M	L	N	IPUI	Rank
1.	Cultivation of healthy seed	43	32	17	8	210	1
2.	Practice clean cultivation for controlling insect	23	58	15	4	200	2
3.	Use of light trap for insect control	20	55	25	0	195	3
4.	Practice of crop rotation	27	47	18	8	193	4
5.	Vegetable cultivation in ails	30	37	21	12	185	5
6.	Cultivation of resistant variety	16	19	25	75	135	6
7.	Insect control by hand sweep	16	28	21	35	125	7
8.	Collection and destroy egg and larval for controlling insect pest by hand	26	19	39	36	115	8
9.	Preparation of compost	26	32	25	18	101	9
10.	Practice organic farming	35	15	16	18	84	10

Abbreviations: H= High training needs, M=Moderate training needs, L=Low training needs, N = No training needs, IPUI = IPM Practices Use Index

Among the 10 identified IPM practices "Cultivation of healthy seed" ranked first and indicated highest extent of training by the farmers. The 2nd, 3rd, and 4th position in the rank order were "Practice clean cultivation for controlling insect", "Use of light trap for insect control," and "Practice of crop rotation" respectively.

It was found that Practice organic farming was relatively complex and costly and less popular among the farmers. This was indicated by low IPUI values. Again the top five practices in the rank order were found popular among the farmers.

4.3 Relationship between the selected characteristics of respondents and their training needs of IPM practices.

The purpose of this section is to explore the relationship between the selected characteristics of the farmers and their training needs of IPM practices in crop cultivation. The selected characteristics constituted the independent variables, which were age, education, family size, farm size, annual income, organizational participation, extension media contact, innovativeness, cosmopoliteness and knowledge on IPM practices. Extent of training on Integrated Pest Management practices on crop cultivation was the dependent variables. Pearson's product moment correlation co-efficient 'r' has been used to test the null hypothesis. The null hypothesis was stated in Chapter 3. The summary of the result of the correlation coefficient analysis has been presented in Table 4.4.

Table 4.4: Co-efficient of Corrrelation showing relationship between selected Characteristics of the farmers and their training needs on IPM practices.

Characteristics of the respondents	**Correlation coefficient (r) with training of IPM practices**	**Table Value**	
Age	0.014 NS	0.05	0.01
Education	-0.075 NS		
Family size	-0.078 NS		
Farm size	0.107 NS		
Annual income	0.129 NS		
Extension media contact	0.096 NS	0.199	0.255
Organizational participation	-0.001NS		
Innovativeness	-0.005 NS		
Cosmopoliteness	0.327**		

NS= Non-significant

*=Significant at 0.05 level

**= Significant at 0.01 level

d.f. = 98, N= 100

4.3.1 Relationship between age of the farmers and their training needs of IPM practices.

The relationship between age of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between age of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = 0.014 which led to the following observations.

⇔ Firstly, the relationship showed a positive trend.

⇔ Secondly, moderate relationship was found to exist between the two variables.

⇔ The computed value of 'r' (0.014) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the age of the farmers had no significant relationship with their training needs.

4.3.2 Relationship between education of the farmers and their training needs of IPM practices.

The relationship between education of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between education of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = -0.075 which led to the following observations.

⇔ Firstly, the relationship showed a negative trend.

⇔ Secondly, a negligible relationship was found to exist between the two variables.

⇔ The computed value of 'r' (-0.075) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the education of the farmers had no significant relationship with their training needs. But the relationship is negative trend so it could said that higher is the education lower is the training need and vice verse.

4.3.3 Relationship between family size of the farmers and their training needs of IPM practices.

The relationship between family size of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between family size of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = -0.078 which led to the following observations.

⇔ Firstly, the relationship showed a negative trend.

⇔ Secondly, a negligible relationship was found to exist between the two variables.

⇔ The computed value of 'r' (-0.078) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the family size of the farmers had no significant relationship with their training needs. But the relationship is negative trend so it could said that higher is the family size lower is the training need and vise verse.

4.3.4 Relationship between farm size of the farmers and their training needs of IPM practices.

The relationship between farm size of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between farm size of the farmers and their training needs in IPM practices". As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = 0.107 which led to the following observations.

⇔ Firstly, the relationship showed a positive trend.

⇔ Secondly, a moderate relationship was found to exist between the two variables.

⇔ The computed value of 'r' (0.107) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the farm size of the farmers had no significant relationship with their training needs. It can be assumed that farm size had no impact on the training needs of the farmers on IPM practices.

4.3.5 Relationship between annual income of the farmers and their training needs of IPM practices.

The relationship between annual income of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between annual income of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = 0.129 which led to the following observations.

⇔ Firstly, the relationship showed a positive trend.

⇔ Secondly, a moderate relationship was found to exist between the two variables.

⇔ The computed value of 'r' (0.129) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the annual income of the farmers had no significant relationship with their training needs. It can be assumed that annual income had no influence on the training needs of the farmers on IPM practices.

4.3.6 Relationship between extension media contact of the farmers and their training needs of IPM practices.

The relationship between extension media contact of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between extension media contact of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = 0.096 which led to the following observations.

⇔ Firstly, the relationship showed a positive trend.

⇔ Secondly, a moderate relationship was found to exist between the two variables.

⇔ The computed value of 'r' (0.096) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the extension media contact of the farmers had no significant relationship with their training needs. It indicates that extension media contact had no influence on training needs of IPM practices.

4.3.7 Relationship between organizational participation of the farmers and their training needs of IPM practices.

The relationship between organizational participation of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between o organizational participation f the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = -0.001 which led to the following observations.

⇔ Firstly, the relationship showed a negative trend.

⇔ Secondly, a negligible relationship was found to exist between the two variables.

⇔ The computed value of 'r' (-0.001) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the organizational participation of the farmers had no significant relationship with their training needs. It indicates that organizational participation had no influence on training needs of the farmers on IPM practices. . But the relationship is negative trend so it could said that higher is organizational participation lower is training need and vise verse.

4.3.8 Relationship between innovativeness of the farmers and their training needs of IPM practices.

The relationship between innovativeness of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between innovativeness of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = -0.005 which led to the following observations.

⇔ Firstly, the relationship showed a negative trend.

⇔ Secondly, a negligible relationship was found to exist between the two variables.

⇔ The computed value of 'r' (-0.005) was smaller than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was accepted.

⇔ The correlation co-efficient between the two concerned variables was not significant.

The findings imply that the innovativeness of the farmers had no significant relationship with their training needs. But the relationship is negative trend so it could said that higher is the innovativeness lower is the training need and vise verse.

4.3.9 Relationship between cosmopoliteness of the farmers and their training needs of IPM practices.

The relationship between cosmopolitaness of the farmers and their training needs in IPM practices was examined by testing the following null hypothesis: " There is no relationship between cosmopolitaness of the farmers and their training needs in IPM practices".

As shown in Table 4.3, the co-efficient of correlation between the concerned variables was computed and found to be 'r' = 0.327 which led to the following observations.

⇔ Firstly, the relationship showed a positive trend.

⇔ Secondly, a moderate relationship was found to exist between the two variables.

⇔ The computed value of 'r' (0.327) was greater than the table value (r=0.199) with 98 degrees of freedom at 0.05 level of probability.

⇔ Hence, the concerned null hypothesis was rejected.

⇔ The correlation co-efficient between the two concerned variables was significant.

The findings imply that the extension media contact of the farmers had significant relationship with their training needs. It implied that cosmopolitaness had influence on training needs of the farmers on IPM practices.

4.4 Problem Confronted by the Farmers in using IPM practices in crop cultivation.

Problem confrontation by the farmers in using IPM practices in crop cultivation was investigated in this place of research. Ten problems were selected with the consultation of concerned personnel. The problems score ranged from 17 to 26 against the possible range of 0 to 30. The average was 21.24 and standard deviation was 2.15 as shown in Table 4.5

Table 4.5. Distribution of respondents according to their problem confronted on IPM practices

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 19)	20	20	21.24	2.15
Medium (20-23)	62	62		
High (above 23)	18	18		

Data presented in Table 4.5 indicates that the majority (62 percent) of the farmers had medium problems while 18 percent had high problems and 20 percent had low problems faced.

In order to ascertain the extent of severity of problem confronted by the farmers in using IPM practices, Problem Confrontation Index (PCI) was computed. The PCI of any problem could range from 0 to 300, where 0 indicated no problem and 300 indicated high problem. However, the computed Problem Confrontation Index of the 10 problems ranged from 41 to 239 and has been arranged in rank order according to their problem indices, which appears in Table 4.6.

Table 4.6: Ranking of the problems confronted by the farmers in training needs on Integrated Pest Management practices.

SL No.	Problems	Frequency of problem confronted (N=100)					
		H	M	L	N	PCI	Rank
1.	Lack of quality seed	56	28	15	1	239	1
2.	Lack of resistant variety	55	26	16	3	233	2
3.	Lack of pesticides with short residual effect	53	30	12	5	231	3
4.	Time consuming in mechanical control of the pest	51	31	14	4	229	4
5.	Expensive in using light trap	32	37	16	15	186	5
6.	Lack of knowledge about AESA	12	21	65	2	143	6
7.	Lack of knowledge about the beneficial insects and harmful insects	8	37	26	29	124	7
8.	Lack of co-operation among the farmers	5	14	71	10	114	8
9.	Unavailability of organic farming practices	5	10	61	24	96	9
10.	Criticize from other farmers for use of IPM practices	0	0	41	59	41	10

Abbreviations:

H=High, M= Medium, L=Low, N=Not at all, PCI= Problem Confrontation Index

Data contained in Table 4.6 indicate that the farmers confronted highest problem in "Lack of quality seed" as indicated by its PCI of 239. This is the main problem of the farmers in using IPM practices. The second and third problems confronted by them are "lack of resistant variety" and "lack pesticides with short residual effect" respectively. In this way, comparatively less problem confronted by the farmers is "criticize to other farmers for training of IPM practices" that means it is not a serious problem for farmers in using IPM practice.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

5.1.1 Selected characteristics of the farmers (Independent variables)

The major findings of the study are summarized below:

Age:

Age of the respondents ranged from 36-57 with an average 46.17 years. The highest proportion (60 percent) of the respondents was middle aged while 19 percent of them fell in the young category and only 21 percent fell in the old category.

Education:

Education score of the respondents ranged from 0-13 with the average of 8.31. The highest proportion (83 percent) of the respondents was secondary level followed by 1 percent illiterate.

Family size:

The family size scores of the farmers ranged from 3-7. The average was 5.35 with a standard deviation of 0.925. The findings revealed that 71 percent of the farmers had medium family compared too more different than 12 percent of them having large family. The proportion of small family was 17 percent.

Farm size:

The farm size of the respondents varied from 0.202- 1.45. The average farm size was 0.58 hectares with a standard deviation of 0.21. It was found that 81 percent of the farmers possessed small farms compared to 13 and 6 percent having marginal and medium farms respectively.

Annual income:

The observed annual gross income of the respondents ranged from 49-175 (thousand) having the average of 109.5 and standard deviation was 24.76. From the above Table 4.1, it was observed that the highest proportion 63 percent of the respondents had medium income while 11 percent respondents had low income and 26 percent had high income.

Extension media contact:

Contact with extension media of the respondents could range from 8-31 against the possible range of 0 to 60. The average contact with extension media score was 17.37 with the standard deviation 3.06. Data presented in Table 4.1 show that majority (66 percent) of the respondent had medium contact with extension media while 25 percent had low and 9 percent high contact with media.

Organizational Participation:

The observed organizational participation score of the respondents ranged from 0 to 21 and the possible range of 0 to 16.The mean score was 6.21 with the standard deviation 3.15. Data contained in Table 4.1 indicate that the highest proportion (47 percent) of the respondents had medium organizational participation as compared to 40 percent low participation, 5 percent no participation and 8 percent having high participation.

Innovativeness:

The observed innovativeness scores of the respondents ranged from 16-27 against the possible range of 0-40. The average and standard deviation were 21.73 and 2.33 respectively. Data presented in Table 4.1 indicate that over whelming majority (64 percent0 of the respondents had medium innovativeness as compared to 30 percent low and 6 percent high innovativeness. Data also revealed that majority (94 percent) of the respondents were under medium to low innovativeness.

Cosmopoliteness:

The observed innovativeness scores of the respondents ranged from 2 to 15 against the possible range of 0 to 21. The mean score was 8.12 with the standard deviation of 2.49.

Data contained in the Table 4.1 show that 65 percent of the respondents had medium cosmopoliteness as compared to 9 percent having high and only 26 percent low cosmopolitaness. Data also revealed that that majority (74 percent) of the respondents were under medium to high cosmopoliteness.

5.2 Conclusions

Based on the finding and logical interpretation of their meaning in light of relevant facts prompted the researcher to draw the following conclusions:

1. Most of the IPM trained farmers (62 percent) in the study area had medium training needs of IPM practices, while 13 percent had high practices and there was only 25 percent of the respondent fell in low practices category. The finding might be a good scenario for undertaking IPM programme for present and future. Assuming that the finding have a general applicability through out the country, it could be concluded that the farmers of Bangladesh are welcoming and getting used to IPM practices.
2. Among the ten selected practices, the farmers were found having good extent of IPM practices on a number of practices. Again practices do not exert immediate benefits and somewhat complex and expensive were found relatively less popular. So, IPM training should be simple and less expensive. Thus it could be concluded that appropriate motivational campaign is necessary for making farmer understand the benefits of all the IPM training.
3. The findings indicate that majority (79 percent) of the farmers were young to middle aged. Age of the farmers had no significant relationship with their training needs of IPM practices. It may be concluded that all aged group farmers are equally concerned about IPM strategy.
4. The findings indicate that the farmers had no significant relationship with their education, family size, farm size and organizational participation. However, cosmopoliteness had significant positive relationship.

5.3 Recommendations

Empirical evidence discussed so far highlighted based on findings and conclusions drawn following recommendations are put forwarded for consideration of the authorities concerned.

5.3.1 Recommendations for policy implications

1. Sustainable agricultural development cannot be imagined keeping the agro-environment imbalanced. Nowadays the environment has been much polluted in many ways. Use of agro-chemicals (i.e. insecticides, pesticides) is one of the threat to healthy environment. Hence the concerned agencies policy makers and individuals needs to take initiatives to use Integrated Pest Management practices for healthy environment.
2. Contact with change agent, cosmopoliteness and organizational participation helps an individual to work in cooperation with others for solution of various problems. It is therefore, recommended that step should be taken to encourage contact between change agents and the farmers with local organizations. They should also be encouraged to establish organizations, which will be helpful to the farmers to get new ideas, and facts that would make them enable to take necessary action.
3. As an overwhelming majority of the farmers were in medium to high users of Integrated Pest Management training category, DAE should carefully consider the finding. Thus Integrated Pest Management programmes should be strengthened and the horizon should be broaded. At the same time proper strategy and realistic work plan should be developed in order to popularize Integrated Pest Management practices.
4. In the study area, only Government extension service providers as DAE's contact was only found through the root level extension workers but there were other extension contacts but those contacts were not sufficient at the field level. Therefore, it is recommended that attempt should be taken by the private and

public extension, research and development organizations for using Integrated Pest Management training in crop cultivation.

5. Legislation against smuggling of foreign insecticides (especially Indian insecticides) needs to be formulated to protect smuggling. Steps should be taken by the Government to stop the use of highly toxic and long residual effective insecticides.

5.3.2 Recommendations for further study

A small piece of study as has conducted cannot provide all information for the proper understanding of the extent of use of IPM practices in crop cultivation. Therefore, the following suggestions are being put forward for further research:

1. The study was conducted at Rampal upazila under Bagerhat district. Findings of this study need verification by similar research in other areas of the country.
2. The present study was conducted overing only 10 characteristics of the farmers. Further study may be conducted considering other characteristics of the farmers.
3. This study investigated the relationship of 10 variables only, which enter in simple correlation analysis only. Further studies should be conducted in stepwise multiple regression analysis and path analysis contribution, and to explore the direct and indirect effects of all the variables under investigation.
4. Further research may be conducted with farmer's problem confrontation in practicing of IPM.

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Appendix-A

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University

Dhaka-1207

An Interview schedule for a research study entitled

TRAINING NEEDS OF THE FARMERS ON INTEGRATED PEST MANAGEMENT (IPM) PRACTICES

Name of the respondent: ..... Serial No.....

Village/Mahallah: ..... Block: .....

Ward No: ..... Thana: .....

District: .....

Please answer the following questions

1. **Age**

   What is your present Age? ..... years

2. **Education**

   Please mention your educational status from the following:

   a) I can not read and write

   b) I can sing only

   c) I did not go to school but can read and write which will be equal To ..... class.

   d) I read up to ..... class/passed

3. **Family size**: ..... Members

4. Farm size

Please furnish information on your area of land according to Ownership

SL. No	Nature of ownership	Area	
		Local unit	Hectare
1.	Homestead		
2.	Own land under own cultivation		
3.	Land taken from others on borga		
4.	Land given to others on borga		
5.	Land taken from others on lease		
6.	Land given to others on lease		
7.	Others (specify)		
	Total:		

5. Training received

Have you attended any agricultural training programme?

Yes ....., No .....

If yes, please mention the following information.

Name of training course	**Name of organization**	**Duration of training (days)**
a)		
b)		
c)		
d)		

6. Annual income

Please mention your family income in Taka from the following sources:

Source of income		Total price (TK)
A. From Agricultural Sources	1. From Agricultural crops	
	Paddy	
	Wheat	
	Maize	
	Sugarcane	
	Jute/Dhaincha	
	Potato	
	Pulse	
	Fruits and vegetables	
	Oilseed Crops	
	Others	
	2. Cattle rearing (dairy)	
	3. Goat rearing	
	4. Poultry rearing	
	5. Fish culture	
	6. Sericulture	
	7. Nursery	
B. From Non-agricultural Sources	1. Service	
	2. Business	
	3.Daily labour	
	4. Others	
	Total	

7.Extension media contact

Please indicate your extent of contact following media:

SL. No	Communication media	Extent of communication				
		Regularly 7days/wek	Frequently 5-7days/week	Occasionally 3-5days/week	Rarely 1days/week	Not at all 0days
Individual contact						
1	Friends/Neighbor					
2	Block Supervisor (BS)					
3	Upazila Agriculture Officer/Additional Agriculture Officer/Agriculture Extension Officer					
4	NGO Workers(s)					
5	Local leader					
6	Agricultural input dealer(s)					
7	Other govt. extension work (e.g. health workers. BRDB's field Officer etc.)					
Group contact						
1	Participation in group discussion					
2	Participation in demonstration meeting (Result & method demonstration)					
3	Participation in Field Day/Farmers Rally					
4	Participation in training					
5	Others					
Mass Contact						
1	Listening agricultural program in radio					
2	Watching agriculture related program in television					
3	Reading agricultural magazine (Krishi Katha/Leaflet/Booklets ets.)					

8. Organizational participation

Please mention the nature and duration of your participation in the following organization:

SL. No.	Nature of organization	No participation	Nature and duration of participation		
			Ordinary Member (Years)	Executive Committee Member (years)	Executive Committee Officer (years)
1.	Farmers' Co-operative Society				
2.	Youth Club/sports club/village club/ IPM club				
3.	School Committee				
4.	Mosque/Temple Committee				
5.	NGO Society				
6.	Madrasha Committee				
7.	Others				

9. Innovativeness

Please indicate of use regarding the following modern methods/practices:

SL. No.	Name of innovation	Use					
		Adoption Within 1 year	Adoption within 1-2 years	Adoption within 2-3 years	Adoption within 3-4 years	Adoption after 4 and above years	Non adoption
1.	Use of homestead vegetable						
2.	Use of poultry-fish culture						
3.	Use of green manure in crop cultivation						
4.	Use of light trap for insect control						
5.	Use of organic fertilizer						
6.	Seed treatment using chemicals						
7.	Use of maize hybrid variety						
8.	Use of bamboo buster						

10. Cosmopolite ness

Please indicate how frequently you visit the following places with a specific period:

SL. No	Place of visit	Nature of visit			
		Regular	Occasionally	Rarely	Not at all
1.	Visit to market/relatives/friends/familiar home outside of your own village	≥7 times/ month	3-6 times/ month	1-2times /month	0 time/ month
2.	Visit to ward commissioner's office	≥5 times/ month	3-4 times/ month	1-2 times/ month	0 time/ month
3.	Visit to Upazila Sader	≥5 times/ month	3-4 times/ month	1-2 times/ month	0 time/ month
4.	Visit to other than own Upazila Sadar	≥3 times/ year	2 times/ year	Once/year	0 time/ year
5.	Visit to Upazila agricultural office	≥4 times/ year	2-3 times/ year	Once/year	0 time/ year
6.	Visit to Upazila/ district agricultural fair	≥3 times/ year	2 times/ year	Once/year	0 time/ year
7.	Visit to Divisional town (Khulna, Dhaka etc).	≥3 times/ year	2 times/ year	Once/year	0 time/ year

11. Dependent Variable:

Training needs on use of IPM practices:

SL. No	Area of Training	Extent of training needs			
		High training needs	Moderate training needs	Low training needs	No training needs
1.	Insect control by hand sweep				
2.	Use of light trap for insect control				
3.	Practice of crop rotation				
4.	Collection and destroy egg and larval for controlling insect pest by hand				
5.	Cultivation of healthy seed				
6.	Cultivation of resistant variety				
7.	Practice organic farming				
8.	Vegetable cultivation in ails				
9.	Preparation of compost				
10.	Practice clean cultivation for controlling insect				

12. Problems confronted in use of IPM practices

Please mention the frequency of confronted in use of IPM practices:

SL. No	Problems	Extent of problem confronted			
		High	Medium	Low	Not at all
1.	Lack of resistant variety				
2.	Lack of quality seed				
3.	Expensive in using light trap				
4.	Time consuming in mechanical control of the pest				
5.	Lack of pesticides with short residual effect				
6.	Lack of knowledge about the beneficial insects and harmful insects				
7.	Unavailability of organic farming practices				
8.	Lack of knowledge about AESA				
9.	Lack of co-operation among the farmers				
10.	Criticize from other farmers for the use of IPM practices				

Thank you for your kind co-operation in data collection.

Signature of interviewer

Date .....

Appendices-B

Correlation co-efficient of the dependent and independent variables (N=100)

Variables	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Y_1
X_1	1										
X_2	-.032	1									
X_3	.409**	.153	1								
X_4	-.037	.419**	.182	1							
X_5	-.035	.360**	.120	.331**	1						
X_6	.132	.478**	.284**	.758**	.307**	1					
X_7	.000	.057	.207*	.252*	.116	.252*	1				
X_8	-.021	.088	.141	.164	.124	.179	-.008	1			
X_9	-.167	-.010	-.157	.220*	.111	.131	.099	.176	1		
X_{10}	.147	.176	.240*	.176	.157	.308**	.133	.422**	.218*	1	
Y_1	.014	-.075	-.078	.107	.063	.129	.096	-.001	-.005	.327**	1

* Significant at 0.05 level of probability; ** Significant at 0.01 level of probability ^{NS} = Non-significant

Legend:

X_1 = Age
X_2 = Education
X_3 = Family Size
X_4 = Farm Size
X_5 = Training Received
X_6 = Annual Income
X_7 = Extension Media Contact
X_8 = Organizational Participation
X_9 = Innovativeness
X_{10} = Cosmopoliteness
Y_1 = Training of IPM Practices