

**USE OF INTEGRATED PEST MANAGEMENT
PRACTICES BY THE FARMERS OF BRAHMANBARIA
DISTRICT**

BY

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Certificate

This is to certify that the thesis entitled, “Use of Integrated Pest Management Practices by the Farmers of Brahmanbaria District” submitted to the faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE in AGRICULTURAL EXTENSION**, embodies the result of a piece of bona fide research work carried by **Mohammad Mosharaf Hossain, Roll No. 00784, Registration No. 26306/00784** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

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

Dated:

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**Dedicated to
My
Beloved Parents**

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LIST OF ABBREVIATIONS

AEIS	Agricultural Extension and Information System
AEO	Agriculture Extension Officer
ASA	Association of Social Advancement
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BAU	Bangladesh Agricultural University
BBS	Bangladesh Bureau of Statistics
BER	Bangladesh Economic Review
BINA	Bangladesh Institute of Nuclear Agriculture
BRRI	Bangladesh Rice Research Institute
BSMRAU	Bangabandhu Sheikh Mujibur Rahman Agricultural University
DAE	Department of Agricultural Extension
<i>et al.</i>	and others
FAO	Food and Agriculture Organization
FFS	Farmer Field School
GDP	Gross Domestic Product
GO	Government Organization
HYV	High Yielding Variety
ICP	Integrated Country Program
IPM	Integrated Pest Management
IPUI	IPM Practice Use Index
NGO	Non-Government Organization
RDRS	Rangpur Dinajpur Rural Service
SAAO	Sub-Assistant Agricultural Officer
SPSS	Statistical Package for the Social Sciences
TMSS	Thengamara Mohila Sabuj Sangha
UAO	Upazila Agriculture Officer



Use of Integrated Pest Management (IPM) Practices by the Farmers of Brahmanbaria District

ABSTRACT

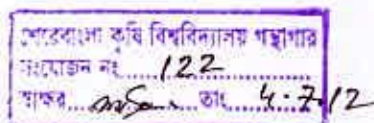
The main purpose of the study was to ascertain the adoption and extent of use of IPM practices by the farmers of Kuti union in Brahmanbaria district. Attempts were also made to describe some of the selected characteristics of the respondents and to explore the relationships between selected characteristics of the respondents and their extent of use of IPM practices. The study was conducted in two villages namely Kuti and Lashiara at Kuti union of Kasba upazila under Brahmanbaria district. Out of 500 farmers, 100 respondents were selected randomly and proportionately at the rate of 20 percent. Data were collected by using interview schedule during the period from 1st December, 2008 to 30th December, 2008. Extent of use of IPM practices by the respondents was ascertained through a four point rating scale. Coefficient of correlation (r) was computed in order to explore the relationships between selected characteristics of the respondents and their extent of use of IPM practices. Adoption quotient was computed and it was determined as 78.45. An IPM Practice Use Index (IPUI) was computed which ranged from 0 to 300. Among the 12 selected practices, “water management” ranked first having IPUI is 286 and “use of light trap for insect control” ranked last having IPUI is 12. The possible extent of use of IPM practices score of a respondent ranged from 0 to 36, where the observed score was found 14-26 with an average 19.38 and standard deviation 2.34. It was observed that majority of the respondents (53 percent) had medium use, 22 percent had low use and 21 percent of them had high use of IPM practices. The findings revealed that age, level of education, farm size, organizational participation, cosmopolitaness and knowledge on IPM practices of the respondents had positively significant relationships with their extent of use of IPM practices. Family size, annual family income, extension media contact and innovativeness of the respondents had statistically non-significant relationships with their extent of use of IPM practices.



Chapter I
Introduction

CHAPTER I

INTRODUCTION



1.1 General Background

Bangladesh is one of the least developed countries in the world. It has a population of nearly 140.6 million having the current population growth rate of 1.41 with an area of 147570 sq kilometers. Near about 49.5 million people are involved in labour forces of its total population. About 48.1% of its labour forces are employed in agriculture. Minimum 32% and maximum 52% of its population live in extreme poverty line with a per capita GDP of 554 US dollar annually (BER, 2008; Uddin, 2008).

In Bangladesh, IPM activities first started in 1981 with the introduction of the 1st phase of FAO's inter-country programme (ICP) on IPM in rice crop. However, it was in 1987 that IPM activities began to expand and became a popular topic among people from all walks of life. From 1989 to 1995, the ICP played a strong catalytic role in promoting the IPM concept and approach among the government officials and donor community. This programme provided IPM training to build the training capacity of the Department of Agricultural Extension (DAE) and introduced Farmer Field Schools (FFS) for training of farmers. A number of persons from the non-government organizations (NGOs) were also given training on IPM. As a result of the success of this programme and on the basis of the need for IPM in Bangladesh, a number of IPM projects in rice and vegetables came into existences and executed by different government departments and NGOs. However, to ensure a significant and positive impact of IPM at the national level, still a large number of farmers need to be trained in IPM and furthermore, they should practice IPM in their fields on a continual a basis (Anonymous, 2002).

Integrated Pest Management (IPM) practices are seen as the way forward to achieve sustainable agricultural production with less damage to the environment. It is commonly referred to as a diverse mix of approaches such as biological control, cultural control, genetically control etc. to manage pest and keep them below damaging levels. The following elements can be used as components of an IPM system:

- ❖ **Biological control:** Biological control of pest may be defined as the eradication or suppression of insects or other noxious pests by using their natural enemies such as frogs, birds etc.
- ❖ **Mechanical control:** Hand picking, use of hand net, beating and hooking, use of light trap, burning etc.
- ❖ **Cultural control:** Use of pest tolerant or resistant crop varieties (such as BRRI Dhan-31) use of healthy seeds and seedling, using optimum tillage and eradicate weeds timely, use of proper fertilizer in appropriate dose and time, timely irrigation etc.
- ❖ **Chemical control:** use of attractant, use of repellent, use of insecticides, use of anti-feedents etc. chemical control is used as a last treatment but priority is to given to botanical and bio-pesticides.

In this study, the researcher tried to ascertain the extent of use of some selected IPM practices by the farmers. The findings of the study may provide valuable guidelines for the researchers, planners, policy makers and other government as well as non-government organizations to ensure the expansion and co-ordination for a sustainable IPM programme in Bangladesh.

1.2 Statement of the Problem

In Bangladesh, chemical control has been the primary method of pest control in the past. Up to 1974, the government promoted the use of pesticides by supplying them free of cost to farmers (100 percent subsidy). The subsidy was reduced to 50 percent in 1974. The government withdrew subsidy completely in 1979 and the pesticide business was transferred to the private sector. However, to deal with emergency situations, the government should maintain a buffer stock of 15-20 metric ton of pesticides. After the withdrawal of subsidy, although the use of pesticide declined during early years, their use has been on the increase again reaching 14340 metric tons of formulated products or 2462 metric tons of active ingredients in 1999 costing over one billion Taka in foreign exchange (Anonymous, 2002).

However, our farmers have been using pesticides to increase cropping intensity as well as crop production. The use of pesticides has been increasing rapidly over the past two decades in Bangladesh. Although pesticides may provide temporary relief but excessive use of pesticides and the long term dependency on chemical pesticides lead to serious environmental and human health problems both the growers and consumers of crops.

Pesticides can easily dissolve with water and that is why it pollutes the soil surface water and also contaminates ground water through infiltration and percolation. Besides, rain water also mixes with this pesticide and pollutes pond, canal and other water bodies and damages our natural resources such as fishes, beneficial insects, microorganisms etc. Therefore, an alternative method is needed to achieve sustainable agricultural production with less damage to the environment. Hence, integrated pest management (IPM) practices are now being considered as the most appropriate one to control pest.

In this regard, the study aimed to find out the answer of the following questions:

- What is the extent of use of IPM practices by the farmers?
- What are the characteristics of the farmers?
- What are the relationships between selected characteristics of the farmers and their extent of use of IPM practices?

Thus in view of the foregoing discussion, the researcher undertook a piece of study entitled **“Use of Integrated Pest Management (IPM) Practices by the Farmers of Brahmanbaria District”**.

1.3 Specific objectives

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

1. To ascertain the extent of use of IPM practices by the farmers.
2. To determine and describe the selected characteristics of the farmers.
3. To explore the relationships between selected characteristics of the farmers and their use of integrated pest management (IPM) practices.

The selected characteristics include:

- i. Age
- ii. Level of education
- iii. Family size
- iv. Farm size
- v. Annual family income
- vi. Organizational participation
- vii. Extension media contact
- viii. Cosmopolitaness

- ix. Innovativeness
- x. Knowledge on IPM



1.4 Assumptions

An assumption has been defined as the supposition that an apparent fact or principle is true in the light of the available evidences (Goode and Hatt, 1952). The following assumptions were in mind of the researcher at the time of conducting the study.

1. The respondents included in the sample were capable of furnishing proper responses to the questions in the interview schedule.
2. The responses furnished by the respondents were valid and reliable.
3. The views and opinions furnished by the respondents included in the sample were the representative of the whole population of the study area.
4. The researcher who acted as interviewer was well adjusted to the social environment of the study area. Hence, the data collected by the researcher from the farmers were free from any biasness.

1.5 Scope and Limitations of the Study

The present study was undertaken to have an understanding about the extent of use of integrated pest management (IPM) practices by the farmers. Findings also revealed the relationships between selected characteristics of the farmers and their use of IPM practices. It becomes necessary to impose certain limitations to make the research manageable and meaningful from the practical point of view. Besides, the researcher also considered the

time, money and other necessary resources available to him for conducting the study. The limitations were as follows:

1. The study covered only one union namely Kuti under Kasba upazila of Brahmanbaria district. So, the findings of the study should be treated cautiously to generalize mainly for the Kasba upazila of Brahmanbaria district.
2. The study area was confined to one union namely Kuti under Kasba upazila of Brahmanbaria district.
3. There were about 500 farmers in the study area, but only 100 farmers were considered for this study.
4. Characteristics of the respondents farmers were many and varied but only 10 characteristics of the farmers were selected for examining the relationships with the dependent variable of the study.
5. The researcher depended on data as furnished by the selected respondents of the study area.
6. Use of IPM practices by the farmers could be measured in various ways. However, in this study, extent of use of IPM practices by the farmers was measured by using a four point rating scale.
7. The findings of the study will be particularly applicable to the farmers of Kuti union under Kasba upazila of Brahmanbaria district.
8. The findings may also have implication to other areas of Bangladesh where the physical, socio-economic cultural and geographical conditions are similar with that of the study area.

1.6 Definition of Different Terms

Age

Age of a respondent refers to the period of time in completed years from his birth to the time of interview. Therefore, it was measured in terms of years.

Level of education

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

Family size

Family size refers to the total number of members including the respondent himself, spouse, son, daughter and other dependent fully or partially on the respondent's income, who live and eat together in the same family unit.

Farm size

Farm size refers to actual operating land of a respondent had under his authority. It included homestead area, cultivated area owned by a respondent, area taken from others or given to others on barga system, and area taken from others on lease.

Annual family income

The annual family income refers to the total earnings of the respondents and the members of his family both from agricultural and non-agricultural sources during a year. It was expressed in Taka.

Organizational participation

Organizational participation of an individual referred to his contact with and participation in various organizations and was measured on the basis of the nature of his involvement and extent of participation.

Extension media contact

It is considered as the individual's exposure to or communication with different sources of information both agencies and persons who are known to disseminating information and technologies to the farmers.

Innovativeness

The term innovativeness refers to the degree to which an individual is relatively earlier in adopting new ideas than other members of a social system (Rogers, 1995).

Knowledge on IPM

Knowledge on IPM refers to the understanding of the respondents about different strategies of pest management.

Cosmopolitaness

It was defined as the degree to which an individual's orientation is external to a particular social system. Empirically, it is referred to the number of times a person pays visits to places other than his locality.

Respondents

The farmers who have answered the questions by an interviewer for a social survey in the study area.

Integrated Pest Management (IPM) Practices

The definition of IPM from the National IPM Network is as follows:

"IPM is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks".



Chapter II

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

This chapter deals with a brief review of previous research studies relating to adoption as well as use of IPM practices. Pertinent literature representing this study was not readily available. However, the researcher tried his level best to collect necessary information through searching relevant studies, journals and periodicals, bulletins etc. that enhanced the researcher's knowledge for better and clear understanding of the present study. The review of researches directly or indirectly related to the present study will be presented in two major sections as follows:

Section 1: General review related to adoption of IPM practices

Section 2: Review of relationships between selected characteristics of the respondents and their adoption of IPM practices

2.1 General review related to adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Raggur district. He reported that 82 percent of the farmers were high users while 10 percent of them were medium and 8 percent were low users of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. His study revealed that majority i.e. 57 percent of the farmers were medium users of IPM while 39 percent were high and 4 percent of the respondents were low users of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. His study revealed that only 20 percent vegetables growers were high user of land and 45 percent and 35 percent of the vegetable growers were medium and low user of land for IPM practices respectively.

·Rahman (2001) conducted an investigation on Knowledge, attitude and adoption of Alok-6201 hybrid rice by the farmers of sadar upazila in Mymensingh district. The study revealed that the 75 percent of the farmers fell under medium adoption while 18 percent had high adoption and 7 percent had low adoption in Alok-6201 hybrid rice cultivation.

·Chowdhury (1997) conducted an investigation on adoption of selected BINA technologies by the farmers of Boyra union in Mymensingh district. The study revealed that 58 percent of the respondents had no adoption of BINA technologies and 42 percent were adopted BINA technologies.

·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 55 percent of the Boro rice growers had medium adoption of IPM technology, while 25 percent had high adoption and only 20 percent of them had low adoption of IPM practices.

·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 farmer, 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.

·Muttaleb (1995) studied that extent of adoption of improved technologies of potato cultivation by the farmers in Haibatpur union under sadar thana of Jessore district. The study revealed that 8 percent of the potato growers had high adoption of improved technologies while 43 percent had medium and 49 percent of them had low adoption.

Khan (1993) carried out a study on adoption of insecticides and related issues in the village of Pachon union under Madaripur district. He observed that among the respondent farmers, 7 percent had no adoption while 57 percent had low adoption and 32 percent of them had medium adoption and only 4 percent had high adoption of insecticides.

Rahman (1986) studied the extent of adoption of four improved practices namely, use of fertilizers, line sowing, irrigation and use of insecticides in transplanted Aman rice cultivation in two villages of Mymensingh district. The analysis revealed that 22 percent of the rice growers adopted all the four practices in combination against 49 percent adopted 3 practices. Again 22 percent adopted 2 practices, while 5 percent adopted only one practice and 2 percent of the farmers were found to adopt none of the practices.

2.2 Review of relationships between selected characteristics of the respondents and their adoption of IPM practices

2.2.1 Age and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He observed a non-significant relationship between age of the farmers and their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He observed a negatively significant relationship between age of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found that age of the vegetable growers had no significant relationship with their adoption of IPM practices.

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

Sardar (2002) conducted a study on adoption of Integrated Pest Management practices by the farmers under PETRRA project of RDRS. He found that age of the farmers had a negatively significant relationship with their adoption of Integrated Pest Management practices.

Aurangozeb (2002) conducted a study on adoption of Integrated homestead farming technologies by the rural women in RDRS. He found that there was a significant negative relationship between age of the respondents and their adoption of integrated homestead farming technologies.

Chowdhury (1997) observed that the age of the farmers had no significant relationship with their adoption of selected BINA technologies.

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.

Hoque (1993) observed that age of the sugarcane growers had a negative relationship with their adoption of insecticides.

2.2.2 Level of Education and adoption of IPM

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He found a positively significant relationship between level of education of the farmers and their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He found a positively significant relationship between level of education of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found a positively significant relationship between level of education of the vegetable growers and their adoption of IPM practices.

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

Sardar (2002) conducted a study on adoption of Integrated Pest Management practices by the farmers under PETRRA project of RDRS. He found that education of the farmers had a positively significant relationship with their adoption of Integrated Pest Management practices.

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

Nuruzzaman (2000) found that education of the FFS and non-FFS farmers were positively correlated with their adoption of integrated pest management 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 education of the Boro rice growers had a positive and significant relationship with their adoption of IPM practices.

Hoque (1993) observed that education of the sugarcane growers had positive relationship with their practice of pest management.

Khan (1993) studied on the adoption of insecticides and related issues in the villages of Pachan union of Magura district. He found that education of the farmers' had positive relationship with their adoption of insecticides.

Singh (1991) observed that education of the farmers was not associated with the level of adoption of plant protection measures.

2.2.3. Family Size and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He reported that family size of the farmers had no significant relationship with their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He found a non-significant relationship between family size of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He observed a positively significant relationship between family size of the vegetable growers and their adoption of IPM practices.

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

Rahman (2001) in his study found that family size of the farmers had no significant relationship with their adoption of Alok-6201 hybrid rice.

Chowdhury (1997) observed that the family size of the farmers had positive and significant relationship with the adoption of selected BINA technologies.

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 family size of the Boro rice growers had no significant relationship with their adoption of IPM practices.

2.2.4. Farm Size and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He found that farm size of the farmers had no significant relationship with their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He observed a positively significant relationship between farm size of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found a positively significant relationship between farm size of the vegetable growers and their adoption of IPM practices.

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

Aurangozeb (2002) conducted a study on adoption Integrated homestead farming technologies by the rural women in RDRS. He found that there was no relationship between homestead area of the respondents and their adoption of integrated homestead farming technologies.

Sardar (2002) conducted a study on adoption of Integrated Pest Management practices by the farmers under PETRRA project of RDRS. He found that farm size of the farmers had a positive and significant relationship with their adoption of Integrated Pest Management practices.

Rahman (2001) in his study found that there was a significant and positive relationship between farm size of the farmers and their adoption of Alok-6201 hybrid rice.

Chowdhury (1997) observed that the farm size of the farmers had positive and significant relationship with their adoption of selected BINA technologies.

Khan (1993) observed that farm size of the respondents was positively related to the adoption of insecticides.

2.2.5. Annual Family Income and adoption IPM practices

. Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He found a positively significant relationship between annual family income of the farmers and their use of IPM practices.

. Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He found a positively significant relationship between annual family income of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He observed a positively significant relationship between annual family income of the vegetable growers and their adoption of IPM practices.

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

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

Sardar (2002) conducted a study on adoption of Integrated Pest Management practices by the farmers under PETRRA project of RDRS. He found that annual family income of the farmers had no significant relationship with their adoption of Integrated Pest Management practices.

Rahman (2001) in his study found a significant and positive relationship between annual income of the farmers and their adoption of Alok-6201 hybrid rice.

Chowdhury (1997) observed a positive and significant relationship between annual income of the farmers and their adoption of selected BINA technologies.

..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 annual family income of the Boro rice growers had no significant relationship with their adoption of IPM practices.

2.2.6. Organizational participation and adoption of IPM practices

..Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He found a positively significant relationship between organizational participation of the farmers and their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He observed a non-significant relationship between organizational participation of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found a positively significant relationship between organizational participation of the vegetable growers and their adoption of IPM practices.

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

Chowdhury (1997) found a positive and significant relationship between organizational participation of the farmers and their adoption of selected BINA technologies.

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

2.2.7. Extension media contact and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He found a positively significant relationship between extension media contact of the farmers and their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He observed a positively significant relationship between extension media contact of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found a positively significant relationship between extension media contact of the vegetable growers and their adoption of IPM practices.

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

Sardar (2002) conducted a study on adoption of Integrated Pest Management practices by the farmers under PETRRA project of RDRS. He observed that contact with RDRS personnel of the farmers had a positive and significant relationship with their adoption of Integrated Pest Management practices.

Rahman (2001) in his study found a significant and positive relationship between extension contact of the farmers and their adoption of Alok-6201 hybrid rice.

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 extension media contact of the Boro rice growers had significant and positive relationship with their adoption 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 the three categories of farmers, their extent of adoption associated positively and significantly with extension media contact.

Singh (1991) observed in his study that mass contact of the farmers had significant relationship with their level of adoption of plant protection measures.

2.2.8. Cosmopolitanism and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He observed a positively significant relationship between cosmopolitanism of the farmers and their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He observed a positively significant relationship between cosmopolitanism of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found a positively significant relationship between cosmopolitanism of the vegetable growers and their adoption of IPM practices.

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

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

Rahman (2001) in his study found a significant and positive relationship between cosmopolitanism of the farmers and their adoption of Alok-6201 hybrid rice.

Hossain (1999) in his study found a significant and positive relationship between cosmopolitanism of the farmers and their adoption of fertilizer.

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 cosmopolitanism of the Boro

rice growers had significantly positive relationship with their adoption of IPM practices.

Khan (1993) found a positive relationship between cosmopolitanism of the farmers and their adoption of insecticides.

2.2.9 Innovativeness and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He found a positively significant relationship between innovativeness of the farmers and their use of IPM practices.

Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He observed a positively significant relationship between innovativeness of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He observed a positively significant relationship between innovativeness of the vegetable growers and their adoption of IPM practices.

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

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

2.2.10. Knowledge and adoption of IPM practices

Hossain (2006) conducted a study on use of integrated pest management practices in rice field by the farmers in Tapodhan union under Rangpur district. He observed a positively significant relationship between knowledge of the farmers and their use of IPM practices.

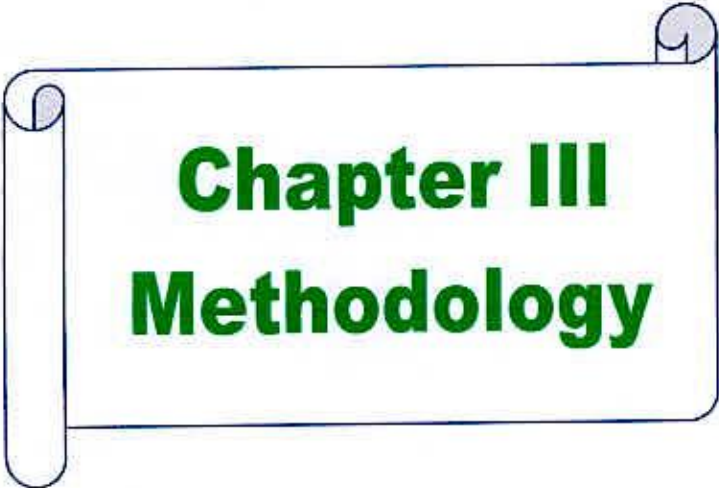
Kausar (2006) conducted a study on use of integrated pest management practices by the farmers in crop cultivation. He found a positively significant relationship between knowledge of the farmers and their use of IPM practices.

Mia (2005) conducted a study on adoption of integrated pest management practices by the vegetable growers of Magura district. He found a positively significant relationship between knowledge of the vegetable growers and their adoption of IPM practices.

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

Sardar (2002) revealed that agricultural knowledge of the farmers had positively significant relationship with their adoption of Integrated Pest Management practices.

Stuart (1991) conducted a study in Los Banos, Philippines on the problems faced by the farmers in relation to the adoption of IPM practices and reported that unavailable technical knowledge had significantly associated with the extent of adoption of IPM practices.



Chapter III
Methodology

CHAPTER III

METHODOLOGY

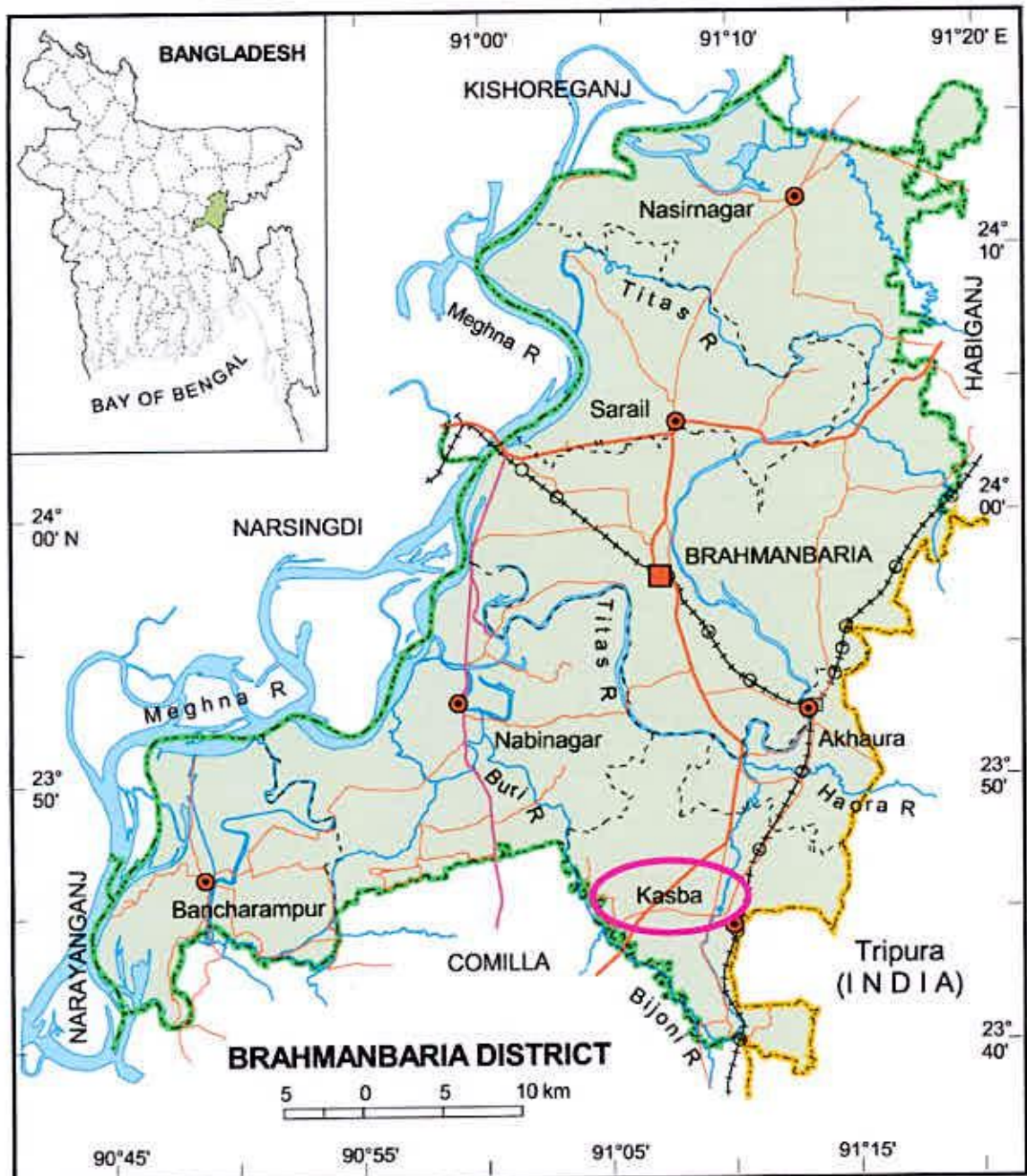
The methodology used in conducting any research is critically important and deserves careful consideration. Appropriate methodology enables the researcher to collect valid and reliable information in order to arrive at a meaningful conclusion.

Various methods, tools and techniques were used for collection and compilation of data during different stages of the study. An interview schedule having both closed and open-ended questions were used to collect valid and reliable information. Methods and procedures followed in conducting this piece of research work are discussed in this chapter.

3.1 Locale of the Study

The study was conducted in two villages namely Kuti and Lashiara at Kuti union of Kasba upazila under Brahmanbaria district. It is situated in the mid eastern side of the country. There are 10 unions in Kasba upazila under Brahmanbaria district. Out of these 10 unions Kuti union was selected purposively as the locale of the study. For clear understanding about the locale of the study, a map of Brahmanbaria district and a map of Kasba upazila have been presented in Figures 3.1 and 3.2 respectively.



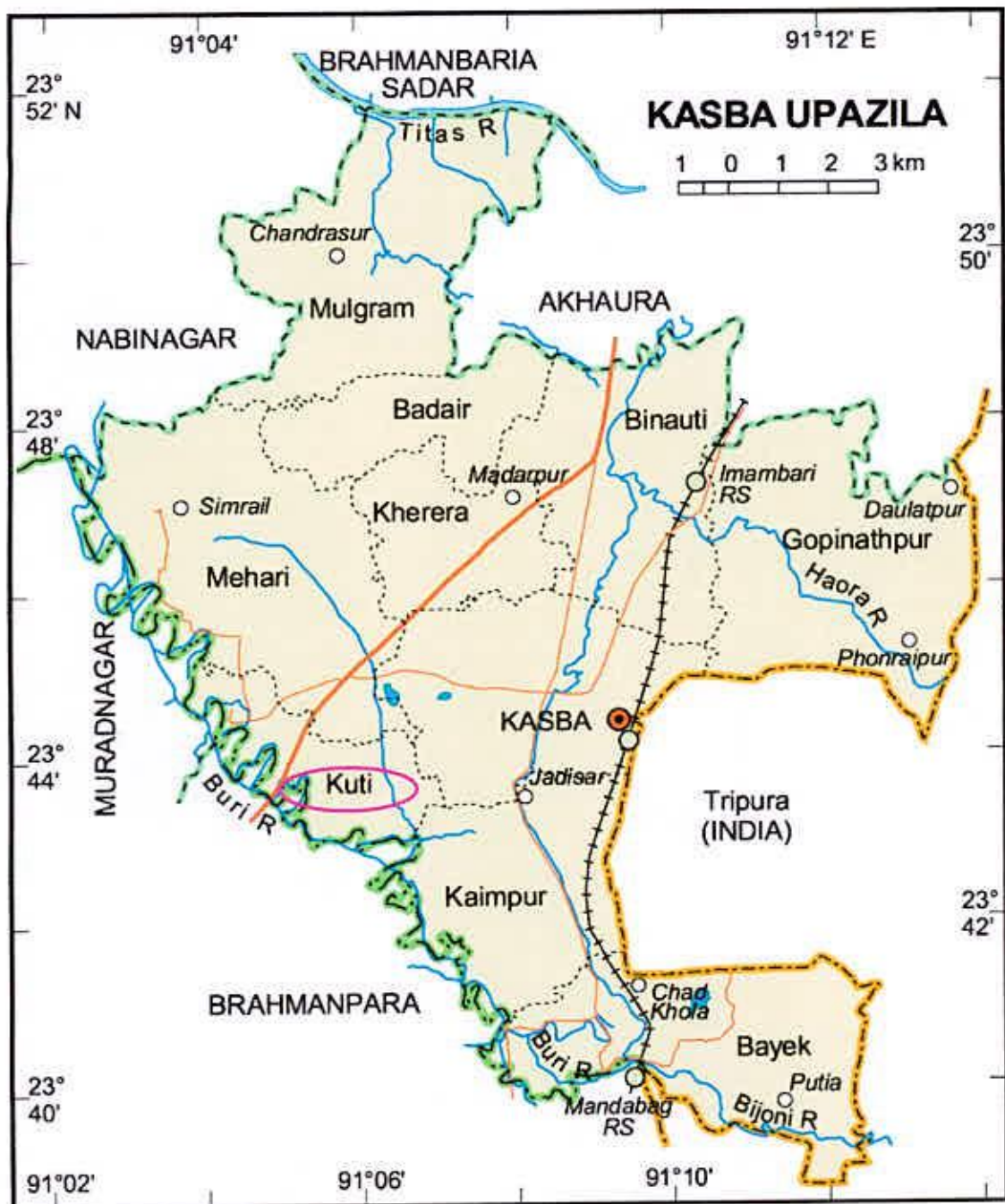


Source: Banglapedia, 2006

Fig. 3.1 A map of Brahmanbaria district showing Kasba upazila

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37562



Source: Banglapedia, 2006

Fig. 3.2 A map of Kasba upazila under Brahmanbaria district showing Kuti union

3.2 Population and Sampling Design of the Study

Simple random sampling method was used to select the villages of Kuti union under the study. Two villages namely Kuti and Lashiara from this union were selected by using simple random sampling method. Data were collected from a sample rather than whole population as have been presented in Table 3.1. An updated list of all the farmers of the selected two villages was prepared with the help of the Sub-assistant Agricultural Officer. The prepared list comprised of 500 farmers. Twenty percent of farmers were selected randomly and proportionately from each of the selected villages as sample by using a table of Random Numbers. Thus 100 farmers constituted the sample of the study. A reserve list of 10 farmers was also prepared randomly and proportionately from each of the selected village considering 1 percent of the sample size. If any farmer were not available in the original sample list during data collection, then the farmers from the reserve list could be met for interview.

Table 3.1. Distribution of population and sample of the farmers in Kuti union of Kasba upazila under Brahmanbaria district

Sl. No.	Name of The Villages	Total Population	Sample Size	Respondents Included in Reserve List
1.	Kuti	340	68	7
2.	Lashiara	160	32	3
Total		500	100	10

3.3 Selection of Variables of the Study

The selection and measurement of variables constitute an important task in any scientific research. The hypothesis of research contains at least two important elements namely an “independent variable” and a “dependent variable”.

An independent variable is that factor which is manipulated by the researcher in his attempt to ascertain its relationship to an observed phenomenon. A dependent variable is that factor which appears, disappears or varies as the researcher introduces, removes or varies the independent variables (Townsend, 1953).

The relevant available literature, discussions with supervisor, co-supervisor, teachers, experts as well as research fellows in the relevant field and finally time and resources available to the researcher were the primary basis for selecting the variables.

In the present study, the researcher selected ten characteristics of the farmers' as the independent variables. The selected characteristics of the farmers were – age, level of education, family size, farm size, annual family income, organizational participation, extension media contact, innovativeness, knowledge on IPM and cosmopolitaness.

The extent of use of IPM practices as well as adoption of Integrated Pest Management Practices (IPM) by the farmers were the main focus of the study. A conceptual framework of the study has presented below in the Figure 3.3.

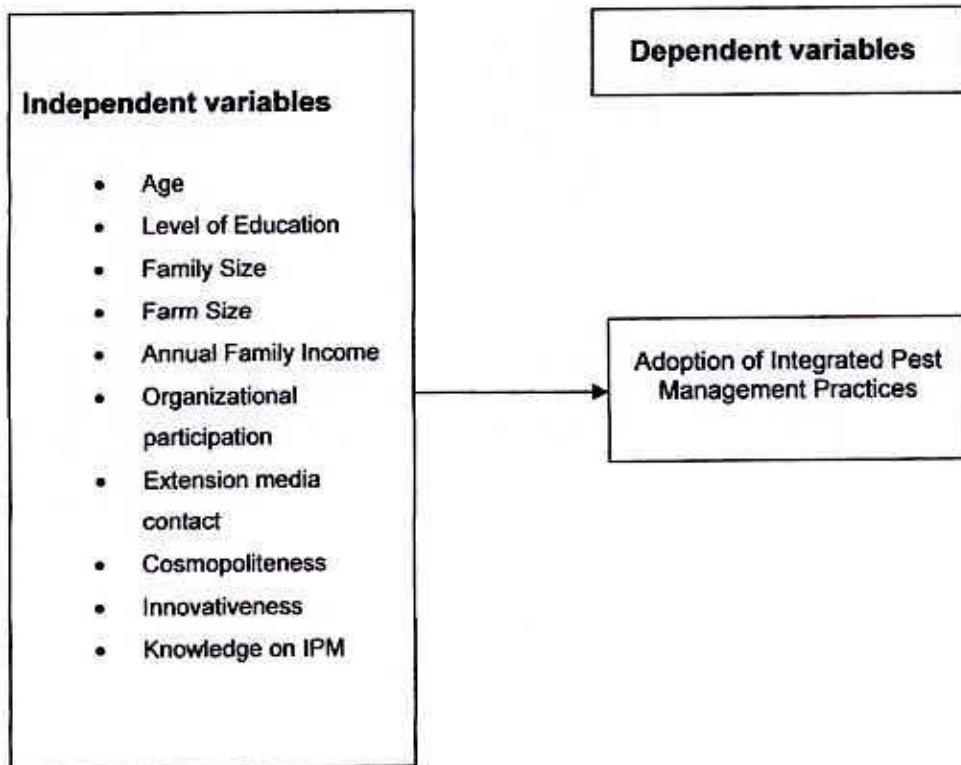


Fig. 3.3 A conceptual framework of the study

3.4 Measurement of Independent Variables

Twelve characteristics of the farmers were selected as independent variables of the study. The characteristics include:

- (i) Age
- (ii) Level of education
- (iii) Family size
- (iv) Farm size
- (v) Annual family income
- (vi) Organizational participation
- (vii) Extension media contact
- (viii) Cosmopolitanness
- (ix) Innovativeness
- (x) Knowledge on IPM

The procedures followed in measuring those characteristics are described below:

3.4.1 Age

Age of a respondent was referred to the period of time in completed years from his birth to the time of interview. Therefore, it was measured in terms of years. A score of 1 was given for each year of respondent's age. For example, if a respondent's age was 30, then his score was taken as 30.

3.4.2 Level of Education

Education was measured on the basis of the ability of the respondent to read and write or formal education (school/college/Madrassa) received up to a certain standard. It was ascertained in terms of year of schooling. A score of 1 was given for passing 1 year of schooling. For example, if a respondent passed the final examination of class I, his education score was taken as 1. In this way, score 2 was given for passing class II, score 3 was given for passing class III. Therefore, a score of 10 was given for passing S.S.C. examination, a score of 12 was given for passing H.S.C. examination and a score of 14 was given for passing under

graduate examination. The respondent who cannot read and write was given as “0” score and also given a score as 0.5 who do not know how to read or write but able to sign their name only.

3.4.3 Family Size

Family size of the farmers was measured by the total number of his family including himself, spouse, son, daughter and other dependent fully or partially on the respondent’s income. For example, if a respondent has 5 members in his family, then his family size score was given as 5.

3.4.4 Farm Size

Farm size was measured in terms of actual operating land of a respondent had in his authority. It included homestead area, cultivated land owned by a respondent, land taken from others or given to others on borga system, land taken from others on lease.

The farm sizes of the respondents were computed in terms of hectares using the following formula:

$$F_s = A_1 + A_2 + A_3 + 1/2(A_4 + A_5) + A_6$$

Where,

F_s = Farm size

A_1 = Homestead area

A_2 = Own pond

A_3 = Own land under own cultivation

A_4 = Own land given to others on borga system

A_5 = Land taken from others on borga system

A_6 = Land taken from others on lease



The total area of land thus obtained by a respondent farmer was considered as the farm size score of the respondent. For example, if a respondent was found having 0.65 hectare of land, then his score was assigned as 0.65 to measure this variable.

3.4.5 Annual Family Income

The annual family income has been used to refer to the total earnings of the respondents and the members of his family both from agricultural and non-agricultural sources during a year. It was expressed in Taka. The total earning in taka of a respondent was converted into score to measure this variable. The method of ascertaining income from agriculture involved two phases. At first, the yield of all crops in the preceding year was noted and then all the yields were converted into cash income according to the prevailing market price. Income from non-agricultural sources like service, business and other sources of the respondents or his family members were included. A score of 1 was given for every thousand taka. For example, if a respondent annual family income was calculated as 50,000 taka, then his score was assigned as 50 to measure this variable.

3.4.6 Organizational Participation

Organizational participation of the respondents was measured by using the following formula:

$$OP = D_g \times S_g + D_e \times S_e + D_o \times S_o$$

Where,

OP = Organizational participation score

D_g = Duration (year) of participation as general member

D_e = Duration (year) of participation as executive member

D_o = Duration (year) of participation as executive officer

S_g = Assigned score as general member

S_e = Assigned score as executive member

S_o = Assigned score as executive officer

Assigned score for participation in any organization is given below:

Nature of Participation	Assigned Score
No participation	0
General member	1
Executive member	2
Executive officer	3

For example, if a respondent obtained OP was 5, then his score was assigned as 5.

3.4.7 Extension Media Contact

The extension media contact of a respondent was measured on the basis of his extent of contact with 14 selected media. A four point rating scale was used to measure this variable. Each respondent indicated the extent of contact with 14 selected media by checking any one of the four responses which were quantified as 3 for “frequently”, 2 for “occasionally”, 1 for “partially” and 0 for “not at all”. Scores obtained for use of all the 14 selected media by a respondent were summed together to compute his extension media contact score. Thus, the extension media contact score of a respondent could range from 0 to 42, where 0 indicates no extension contact and 42 indicates a very high extension contact.

3.4.8 Cosmopolitaness

Cosmopolitaness of a respondent was measured on the basis of score obtained by him. A four point rating scale was used to measure this variable. Each respondent was asked to indicate his frequency of visit to external and outside of his own social system in 7 different places by checking any one of the four responses i.e. not at all, partially, occasionally and frequently which were quantified as 3 for “Regularly”, 2 for “Occasionally”, 1 for “Rarely” and 0 for “Not at all”. Cosmopolitaness of a respondent could range from 0 to 21 where 0 indicates no cosmopolitaness and 21 indicate a very high cosmopolitaness.

3.4.9 Innovativeness

Innovativeness of a respondent was measured by computing an innovativeness score on the basis of his extent of use of 10 selected agricultural practices. Scores were assigned on the basis of time dimension as follows:

Period of Adoption	Assigned Score
Do not adopt	0
≤ 1 year	1
More than 1 year – 2 years	2
More than 2 years – 4 years	3
> 4 years	4



Total innovativeness score of a respondent was measured by adding his score in all the 10 items. As 10 innovations were selected for the study, thus the possible innovativeness score of the farmers could range from 0 to 40 where 0 indicates no innovativeness and 40 indicates a very high innovativeness.

3.4.10 Knowledge on IPM

Knowledge on IPM practices of a respondent was measured by asking him 20 questions related to various pest management practices. Scores were assigned for correct responses of different questions. Each question contains 1.25 marks. According to nature of answering, the respondent could get “1.25”, “1” and/or “0” score for “correct”, “partially correct” and “incorrect” answer or responses respectively to each question. Thus, the knowledge on IPM practices score of a respondent could range from 0 to 25 where 0 indicating no knowledge and 25 indicating a very high knowledge.

3.5 Measurement of Dependent Variable

The extents of use of IPM practices as well as adoption of Integrated Pest Management Practices (IPM) by the farmers were the main focus of the study. A four point rating scale was used to measure the extent of use of IPM practices. Each respondent was asked to indicate the extent of use of IPM in each of the 12 practices by checking any one of the four responses such as not at all, partially, occasionally and frequently which were quantified as 3 for “frequently”, 2 for “occasionally”, 1 for “partially” and 0 for “not at all”. Thus the IPM practices score of a respondent could range from 0 to 36, where 0 indicates use of no practices and 36 indicates frequent use of different IPM practices.

For study the comparative use of IPM practices by the respondents in 12 different practices, an IPM Practice Use Index (IPUI) was computed by using the following formula:

$$\text{IPUI} = \text{PI} = (P_f \times W_f) + (P_o \times W_o) + (P_p \times W_p) + (P_{np} \times W_{np})$$

Where,

P_f = Percentage of farmers used IPM practices frequently

P_o = Percentage of farmers used IPM practices occasionally

P_p = Percentage of farmers used IPM practices partially

P_{np} = Percentage of farmers used IPM practices not at all

W_f = Assigned score for frequent practice

W_o = Assigned score for occasional practice

W_p = Assigned score for partial practice

W_{np} = Assigned score for no practice

As the numbers of the farmers were 100 and they were converted into percentage, so the index for any item of IPM technology in 4-types of use could range from 0 to 300, where 0 indicates no use of IPM technologies and 300 indicate frequent use of IPM technology in the field.

Adoption of IPM practices by the farmers was measured on the basis of their adoption of different kinds of IPM practices. Among 12 recommended practices, the respondent farmer may adopt one or more for a period of time. Score of adoption of the farmers was calculated on the basis of their adoption of how many practices and how many years. For the period of adoption, the following scores were assigned:

Score	Period of Adoption
0	0 year of adoption
1	1 year of adoption
2	2 year of adoption
3	≥ 3 year of adoption

For example, if a respondent farmer adopted 3 practices for 1, 2 and 3 years respectively, his adoption score could be $(1 \times 1) + (1 \times 2) + (1 \times 3) = 6$. The adoption score of 12 practices could range from 0 to 36, where 0 indicating adoption of no practices and 36 indicating adoption of all practices of IPM in the field.

3.5.1 Measurement of Adoption Quotient

Adoption could be measured in different ways. Bose (1965) developed an Adoption Index by asking the farmers how many improved practices recommended by the extension service they had adopted and for how many years.

On the basis of adoption quotient formula forwarded by Bose (1965), a modified formula was developed by M.H. Bhuiyan, Professor, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka-

1207, (Mia, 2005). To measure the extent of adoption of IPM practices by the farmers, the formula is given below:

$$\text{Adoption Quotient} = \frac{\text{Mean score of IPM adoption} / \text{Mean adoption period}}{\text{Number of practices}} \times 100$$

More the adoption quotient, more the adoption of IPM practices.

3.6 The Research Instrument for Data Collection

According to the objectives of the study, an interview schedule was prepared for collection of actual and relevant information. Simple and direct questions as well as both open ended form and closed forms of questions were included in the interview schedule to ascertain the dependent and independent variables. Then the final draft was prepared in Bangla in order to make it understandable to the respondents.

The draft interview schedule was pre-tested in actual field situation before using the same for final collection of data. Ten (10) respondents of the study area were interviewed by using the draft interview schedule. On the basis of pre-tested experiences necessary corrections, additions, alternations as well as re-arrangements were made in the interview schedule. Then the final draft was prepared and multiplied. A copy of English version of the interview schedule is presented in the Appendix – A.

3.7 Collection of Data

The data were collected personally by the researcher himself in a face-to-face contact with the individual respondent by using the interview schedule. An introductory visit was made with the SAAO (Block Supervisor) in which the aims and objectives of the study were explained to the most of the sample respondents.

This introductory visit helped the researcher to have a friendly orientation to the respondent farmers. Brief information regarding the nature and purpose of the study was given to the respondents before taking actual interview so that they did not feel any hesitation to give proper responses to the questions included in the interview schedule.

The respondents were interviewed at their leisure time so that they could give proper information in a cool mind. Questions were asked systematically and whenever any respondent farmer felt any difficulty in understanding any question, the researcher tried to explain and clarify them properly as his level best. The information supplied by the respondents was recorded directly on the interview schedule. The information was also checked in order to minimize errors. The data collection took 30 days from 1st December, 2008 to 30th December, 2008.

3.8 Compilation of Data

After completion of the field survey, the collected raw data were scrutinized to find out the errors and omissions and to make sure that they were entered as complete as possible and well arranged to facilitate coding and tabulation. Local units were converted into standard units. Appropriate scoring technique was followed to convert the qualitative data into quantitative forms. Finally the scores obtained from the respondents were first transferred to a master sheet and then the same scores were entered in the computer with the help of SPSS programme to find out the relationships among the variables as well as analyzed in accordance with the objectives of the study.

3.9 Categorization of Data

For describing the independent and dependent variables, the respondents classified data into different categories in respect of each variable. These categories were developed on the basis of score obtained by the respondents. Generally, categories were made as high, medium and low. Besides, the researcher was also guided by

the nature of data and prevailing social research system. The procedures of categorization have been described in chapter IV while describing the variables.

3.10 Hypotheses of the Study

3.10.1 Statement of hypothesis

As defined by Goode and Hatt (1952), 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. Hypothesis may be divided into two categories, namely research hypothesis and null hypothesis.

3.10.2 Research hypothesis

The following hypothesis was formulated for empirical verification:

“There are relationships between each of the 10 selected characteristics of the farmers and their adoption in integrated pest management practices (IPM). The selected characteristics of the farmers were – age, level of education, family size, farm size, annual family income, organizational participation, extension media contact, cosmopolitaness, innovativeness and knowledge on IPM.

3.10.3 Null hypothesis

For statistical testing of the research hypothesis, they were converted into null form. The null hypothesis was as follows:

“There are no relationships between each of the 10 selected characteristics of the farmers and their adoption in integrated pest management (IPM) practices”. The selected characteristics of the farmers were – age, level of education, family size,

farm size, annual family income, organizational participation, extension media contact, cosmopolitaness, innovativeness and knowledge on IPM practices.

3.11 Statistical analysis

Collected data from the respondents were compiled, tabulated and analyzed in accordance with the objectives of the study. Various statistical measures such as number, frequency distribution, percentage, range, mean, standard deviation and rank order etc. were used in describing the selected independent and dependent variables. For clarity of understanding, tables were used in presenting data in chapter IV.

Pearson's Product Moment Co-efficient of Correlation (r) tests was computed in order to explore the relationship between selected characteristics of the farmers and their adoption in integrated pest management practices (IPM).

Throughout the study, five percent (0.05) level of significance was used to reject any null hypothesis. If the calculated value of correlation coefficient (r) was equal to or greater than tabulated value at designated (5%) level of significance for the relevant degrees of freedom, then the null hypothesis was rejected and it was concluded that there was significant relationship exist between the concerned variables.

On the other hand, when the calculated value of correlation coefficient (r) was found to be smaller than the tabulated value at the designated (5%) level of significance for the relevant degrees of freedom, then the null hypothesis could not be rejected and hence, it was concluded that there was no relationship exist between the concerned variables. Coefficient of correlation values significant at 0.05 level was indicated by one asterisk (*) and at 0.01 level or above by two asterisks (**).



Chapter IV
Results & Discussion

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this chapter is to describe the findings of the present study. The data collected from 100 respondents of selected two villages were carefully edited, coded, computed tabulated and analyzed in accordance with the objectives of the study. The findings of the study are presented in three sections. In the first section, the profile characteristics of the respondent have been discussed. The second section dealt with the extent of use of integrated pest management (IPM) practices as well as adoption of integrated pest management (IPM) practices by the respondents in the selected villages. In the third section, relationships between selected characteristics of the respondents and their adoption in integrated pest management (IPM) practices have been described.

4.1 Selected characteristics of the Respondents

There are many interrelated and constituent attributes that characterize an individual and form an integral part in the development of his behaviour and personality. Hence, it was hypothesized that adoption of integrated pest management (IPM) practices by the respondents would be different according to their various characteristics.

The purpose of this section is to have an understanding on 10 selected characteristics of the respondent farmer.

The salient features of the selected characteristics of the respondent farmer have been presented in the Table 4.1.

Table 4.1 Salient features of the selected characteristics of the Respondents

Sl. No.	Characteristics	Measuring unit	Ranges		Mean	Standard Deviation
			Possible scores	Observed scores		
1.	Age	Number of years	Unknown	27-70	52.35	9.69
2.	Level of education	Schooling (years)	Unknown	0-15	6.38	4.41
3.	Family size	Number of person	Unknown	3-12	6.37	2.17
4.	Farm size	in hectares	Unknown	0.30-2.72	0.94	0.45
5.	Annual family income	in '000' Taka	Unknown	60-580	235.75	125.35
6.	Organizational participation	Scale score	Unknown	0-14	5.14	3.57
7.	Extension media contact	Scale score	0-42	2-25	7.58	4.28
8.	Cosmopolitaness	Scale score	0-21	6-19	10.73	2.85
9.	Innovativeness	Scale score	0-40	6-24	14.41	3.46
10.	Knowledge on IPM practices	Scale score	0-25	7-22	12.69	3.16



4.1.1 Age

The age of the respondents ranged from 27 to 70 years with an average being 52.35 years and standard deviation of 9.69. This indicates that the study group was moderately heterogenous in terms of age level. On the basis of their age, the respondents were classified into three categories as shown in the Table 4.2

Table 4.2 Distribution of the respondents according to their level of age

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Young aged (up to 35 years)	6	6	52.35	9.69
Middle aged (36-49 years)	28	28		
Old aged (50 years and above)	66	66		
Total	100	100		

Data presented in the Table 4.2 show that highest proportion (66 percent) of the respondents belonged to the old-aged category whereas 28 percent of the respondents fell into the middle-aged category and only 6 percent belonged to the young aged category.

The findings indicated that the overwhelming majority (94 percent) of the respondents fell in middle aged to old aged category. The fact is that most of the farmers' young sons have been working in foreign countries such as Middle East, Malaysia, Singapore, European countries and other countries of the world. As the maximum farm holders become middle aged to old aged category, they work as well as engaged labour in their field during cultivation.

4.1.2 Level of education

The level of education of the respondents ranged from 0 to 15 years of schooling, the average being 6.38 years and a standard deviation of 4.41. On the basis of their level of education scores, the respondents were classified into five categories as shown in the Table 4.3.

Table 4.3 Distribution of the respondents according to their level of education

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
No education (0.0)	11	11	6.38	4.41
Can sign only (0.5)	12	12		
Primary education (1-5)	24	24		
Secondary education (6-10)	40	40		
Above secondary education (11 or above)	13	13		
Total	100	100		

Data presented in the Table 4.3 indicate that the highest proportion (40 percent) of the respondents had secondary education whereas second highest proportion (24 percent) of the respondents had primary level of education. Above secondary level education of the respondents were 13 percent and 12 percent of the respondents could able to sign their name only. About 11 percent of the respondents had no education.

The findings revealed that 77 percent of the respondents were literate ranged from primary level to above secondary level of education. Therefore, the literacy rate is greater than the national average. It is perhaps due to their consciousness of the benefit of taking education. After passing SSC and HSC examination, male respondents are not interested to continue their education. They try to move in foreign countries of the world. But the brilliant students are tried to continue their education up to graduate and post graduate level.

4.1.3 Family size

The family size of the respondents ranged from 3 to 12. The average family size being 6.37 and standard deviation of 2.17. On the basis of their family size scores, the respondents were classified into three categories as shown in the Table 4.4.

Table 4.4 Distribution of the respondents according to their family size

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Small family (up to 4)	14	14	6.37	2.17
Medium family (5-8)	62	62		
Large family (above 8)	24	24		
Total	100	100		

Data presented in the table 4.4 show that 14 percent of the respondents had small family. Majority of them (62 percent) had medium size family and 24 percent of the respondents belonged to large size family category. The findings indicated that average family size of the study area was greater than the national average of 4.85 (BBS, 2005). The fact is that joint family mostly characterized the large families.

4.1.4 Farm size

The farm size of the respondents of the study area ranged from 0.30 to 2.72 hectares with an average of 0.94 ha and a standard deviation was 0.45. Depending on the farm size, the respondents were classified into following categories as shown in the Table 4.5.

Table 4.5 Distribution of the respondents according to their farm size

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Landless (below 0.02 ha)	0	0	0.94	0.45
Marginal farm (0.02-0.19 ha)	0	0		
Small farm (0.20-0.99 ha)	59	59		
Medium farm (1.00-2.99 ha)	41	41		
Total	100	100		

Data presented in the Table 4.5 shows that the highest proportion (59 percent) of the respondents had small size farm while 41 percent of them had medium size farm. There were no marginal and landless farmers in the study area.

4.1.5 Annual family income

The observed annual family income score of the respondents ranged from 60.00 to 580.00 (Tk.1000 = 1) with an average 235.75 and standard deviation 125.35. According to annual income, the respondents were classified into three categories as shown in the Table 4.6.

Table 4.6 Distribution of the respondents according to their annual family income

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low income (up to 180.00)	35	35	235.75	125.35
Medium income (180.01-360.00)	48	48		
High income (above360.00)	17	17		
Total	100	100		

Data presented in the Table 4.6 revealed that the highest proportion (48 percent) of the respondents had medium income as compared to 35 percent and 17 percent have low income and high income respectively.

The researcher found that the main source of income of the respondents' farmers were remittances from their sons and relatives who have been working in abroad still now. Besides, they involve in business such as timber, wood etc business activities. Although, they are involved to cultivate their land optionally as a source of income but they continued it regularly. The study area is a hoar area where the cultivable low land was under water for three months in a year during rainy season.

4.1.6 Organizational participation

The organizational participation score of the respondents ranged from 0 to 14 with an average of 5.14 and standard deviation of 3.57. On the basis of organizational participation score, the respondents were classified into four categories as shown in the Table 4.7.

Table 4.7 Distribution of the respondents according to their Organizational participation

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
No participation (0.0)	12	12	5.14	3.57
Low participation (1-5)	42	42		
Medium participation (6-10)	28	28		
High participation (above 10)	8	8		
Total	100	100		

Data presented in the Table 4.7 reveal that highest proportion (42 percent) of the respondents had low organizational participation whereas 28 percent of them had medium participation and only 8 percent of them had high organizational participation. Besides this, 12 percent of the respondents had no organizational participation.

The farmers of the study area are involved in mainly bazaar committee, Madrasa committee and cultural organization. Besides, some of the respondents were the customer member of different NGOs such as ASA, Proshika, Grameen Bank etc. The farmers in the study willingly participated in any social cultural festival.

4.1.7 Extension media contact

The extension media contact score of the respondents ranged from 2 to 25 with an average of 7.58 and standard deviation 4.28. On the basis of extension media contact

score of the respondents'; they were classified into three categories as shown in the Table 4.8.

Table 4.8 Distribution of the respondents according to their extension media contact

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 4)	21	21	7.58	4.28
Medium (5-12)	69	69		
High (13 and above)	10	10		
Total	100	100		

Data furnished in the Table 4.8 indicate that about 69 percent of the respondents had medium extension contact, while 21 percent of them had low extension contact and 10 percent of them high extension media contact.

They are more interest in business rather than agricultural, therefore they keep contact with other neighbour, friends, stake holder etc. Besides, as majority of the farmers were middle to old aged, so they could not able to keep contact with all media frequently.

4.1.8 Cosmopolitaness

Cosmopolitaness score of the respondents ranged from 6 to 19. The average score of cosmopolitaness being 10.73 and standard deviation 2.85. On the basis of their cosmopolitaness score, they were classified into three categories as shown in the Table 4.9 .

Table 4.9 Distribution of the respondents according to their cosmopolitaness

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 8)	20	20	10.73	2.85
Medium (9-13)	67	67		
High (14 and above)	13	13		
Total	100	100		

Data furnished in the Table 4.9 indicate that majority of the respondents (67 percent) were in the medium cosmopolitaness category. About one-fifth i.e. 20 percent of them were belonged to low cosmopolitaness category and 13 percent of them were in high cosmopolitaness category.

The road transport facilities of the study area were moderately fine. They also have the electric facility. They communicate to another place by bicycle, motor cycle, rickshaw, van etc. They also used boat in the rainy season.

4.1.9 Innovativeness

The innovativeness score of the respondents ranged from 6 to 24 with an average 14.41 and standard deviation 3.46. Based on their innovativeness score, the respondents were classified into three categories as shown in the Table 4.10.

Table 4.10 Distribution of the respondents according to their innovativeness

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 12)	30	30	14.41	3.46
Medium (13-18)	61	61		
High (19 and above)	9	9		
Total	100	100		

Data furnished in the Table 4.10 reveal that majority of the respondents (61 percent) were medium innovativeness, whereas 30 percent of the respondents were low innovativeness and 9 percent of them were belonged to high innovativeness category. The farmers in the study area are interested in business rather than cultivation of crop. Therefore, they took in any new idea with a less extent.

4.1.10 Knowledge on IPM

The knowledge on IPM score of the respondents ranged from 7 to 22 with an average being 12.69 and standard deviation 3.16. The respondents were classified into three categories as shown in the Table 4.11 based on their score obtained from knowledge on IPM.

Table 4.11 Distribution of the respondents according to their knowledge on IPM practices

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 10)	30	30	12.69	3.16
Medium (11-16)	57	57		
High (>16)	13	13		
Total	100	100		

Data presented in the Table 4.11 indicated that majority (57 percent) of the respondents had medium knowledge about IPM practices; while 30 percent of them had low knowledge and 13 percent of them were in high knowledge about IPM category. Comparatively medium to old aged farmers have more knowledge about IPM practices.

4.2 Extent of use and adoption of integrated pest management (IPM) practices by the respondents

This section deals with the extent of use of integrated pest management practices (IPM) and adoption of integrated pest management practices (IPM) by the respondents. According to the objectives of the study, extent of use of integrated pest management practices (IPM) has described first and then adoption of integrated pest management practices (IPM) by the respondents were described.

4.2.1 Extent of use of integrated pest management (IPM) practices by the respondents

The findings of this section have been described considering the following aspects:

- (i) Comparative use of integrated pest management practices (IPM) by the respondents.
- (ii) Overall use of integrated pest management practices (IPM) by the respondents.

4.2.1.1 Comparative use of integrated pest management practices (IPM) by the respondents

According to 12 IPM practices, an IPM Practice Use Index (IPUI) was computed in order to compare among the selected IPM practices. Comparison of identified IPM practices has been presented in the Table 4.12 along with IPM Practice Use Index (IPUI) in rank order. Observed IPUI ranged from 12 to 286 with an average 167.67 and standard deviation 85.95. IPUI reveals that out of 12 IPM practices, top three practices adopted by the respondents were – (i) water management (IPUI=286), (ii) weed management (IPUI=269) and (iii) use of healthy and disease free seed (IPUI=226). Use of light trap for insect control had the lowest rank as 12 (IPUI=12).

Table 4.12 Comparison among the identified IPM practices used by the respondents

Sl. No.	IPM practices	Extent of Use				IPUI	Rank Order
		Frequently (%)	Occasionally (%)	Partially (%)	Not at All (%)		
1.	Water management	90	6	4	-	286	1
2.	Weed management	82	8	7	3	269	2
3.	Use of healthy and disease free seed	34	58	8	-	226	3
4.	Cultivation of resistant variety	42	46	5	7	223	4
5.	Use of pesticides	32	53	10	5	212	5
6.	Destroy the crop residues	40	30	24	6	204	6
7.	Use of Power Tiller/ Tractor	37	27	24	12	189	7
8.	Preparation of compost/ green manure	14	32	46	8	152	8
9.	Collection and destroy of eggs and larvae	12	16	62	10	130	9
10.	Practice of crop rotation	6	23	27	44	91	10
11.	Use of sweeping net	-	-	18	82	18	11
12.	Use of light trap for insect control	-	-	12	88	12	12

Some of them used IPM practices frequently, occasionally and partially. Besides some practices they never used at all. In the study area, the farmers cultivate mainly rice in Robi and Kharif-I season. They cultivate BRR1 Dhan-28 and BRR1 Dhan-29 which are popular in the study area. In the rainy season, they cultivate a crop named Jainta for fuel wood which is grown in low land. It was found that they used to water their crop field in time which ranked first followed by weed management ranked second. BRR1 Dhan-28 and BRR1 Dhan-29 are very popular in the study area. They irrigated their field by deep tube well, Power tiller pump etc.

They use pesticides and fertilizers as their requirement which ranked fifth. They cultivate pulse crop such as Mung bean, Black gram, Lentil etc. They also cultivate vegetables such as potato, sweet potato to some extent. Although some of them opined that they used sweeping net and light trap for insect control but it was found partially and very little use.

4.2.1.2 Overall use of integrated pest management practices (IPM) by the respondents

Overall use of integrated pest management practices (IPM) by the respondents ranged from 14 to 26 with an average 19.38 and standard deviation 2.34. According to their score, the respondents were classified into three categories as shown in the Table 4.13.

Table 4.13 Distribution of the respondents according to their overall use of integrated pest management practices (IPM)

Categories	Respondents		Mean	Standard Deviation
	Number	Percent		
Low (up to 17)	22	22	19.38	2.34
Medium (18-21)	57	57		
High (22 and above)	21	21		
Total	100	100		

Data presented in the Table 4.13 indicate that majority (53 percent) of the respondents had medium use of IPM practices and 21 percent of them had high use of IPM practices whereas 22 percent of them had low use of IPM practices. The overwhelming proportion (74 percent) had medium to high use of IPM practices. However, whether it is low, medium or high, every respondent used different level of IPM practices.

The Overall use of integrated pest management practices (IPM) by the respondents has been diagrammatically shown in Figure 4.1.

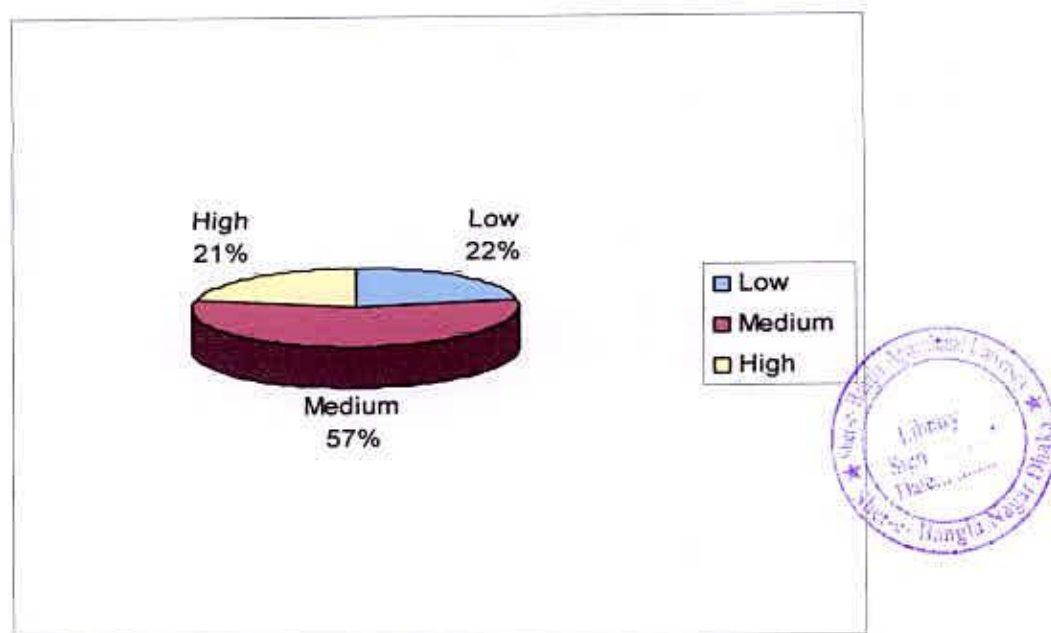


Fig. 4.1 Pie-graph showing the overall use of integrated pest management (IPM) practices by the respondents

4.2.2 Adoption of IPM practices by the respondents

On the basis of adoption quotient formula forwarded by Bose (1965), a modified formula was developed by M.H. Bhuiyan, **Professor**, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka-1207 (Mia, 2005). Adoption of IPM practices by the respondent farmers was measured by using the following formula:

$$\text{Adoption Quotient} = \frac{\text{Mean score of IPM adoption} / \text{Mean adoption period}}{\text{Number of practices}} \times 100$$

Here,

Mean score of IPM adoption = 21.56

Mean adoption period = 2.29

Number of practices = 12

Adoption Quotient = A.Q. = ?

$$\text{A.Q.} = \frac{21.56 / 2.29}{12} \times 100$$

$$= 78.45$$

The adoption quotient could be range from 0 to 100, where 0 indicate no adoption and 100 indicate highest adoption. More the adoption quotient more the use of IPM practices.

4.3 Relationships between selected characteristics of the respondents and their use of IPM practices

The purpose of this section is to explore the relationships between selected characteristics of the respondents with their extent of use in integrated pest management practices (IPM). Pearson's product moment correlation coefficient (r) was used to test the null hypotheses in exploring the relationships between only two concerned variables. Five percent (0.05) level of probability was used as the basis for rejection of a null hypothesis. The summary of correlation coefficients of the study has been presented in the Table 4.14.

Table 4.14 Coefficient of correlation ('r') showing the relationships between selected characteristics of the respondents and their use of integrated pest management (IPM) practices

Selected characteristics of the respondents	Correlation coefficient (r) with use of IPM practices
1. Age	0.350**
2. Level of education	0.475**
3. Family size	0.066 ^{NS}
4. Farm size	0.213*
5. Annual family income	0.141 ^{NS}
6. Organizational participation	0.252*
7. Extension media contact	0.152 ^{NS}
8. Cosmopolitaness	0.250*
9. Innovativeness	-0.063 ^{NS}
10. Knowledge on IPM	0.223*

N=100, Degrees of freedom = 98

Table value at 5 percent level = ± 0.196

Table value at 1 percent level = ± 0.253

^{NS} = Non-significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

This subsection outlines the relationships of 10 selected characteristics of the respondents with their adoption of IPM practices. Out of 10 correlations, the relationships of six were found positively significant (age, education, farm size, organizational participation, cosmopolitaness and knowledge on IPM practices) and other relationships were found statistically non-significant.



4.3.1 Relationship between age of the respondents and their use of IPM practices

Relationship between age of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis “There is no relationship between age of the respondents and their use of IPM practices”. The correlation coefficient (r) between the concerned variables was computed and found to be 0.350^{**} , which led to the following observation.

- a) The computed value of ' r ' (0.350^{**}) was found to be greater than the tabulated value of ' r ' (± 0.253) with 98 degrees of freedom at 0.01 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was significant.

Hence, the concerned null hypothesis was rejected. Therefore, the researcher concluded that age of the respondents had positively significant relationship with their use of IPM practices. The older farmers have more experienced about cultivation. They knew the positive effect of using IPM practices. Therefore, they used IPM practices at different level in crop cultivation.

4.3.2 Relationship between level of education of the respondents and their use of IPM practices

Relationship between level of education of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis “There is no relationship between level of education of the respondents and their use of IPM practices”. The correlation coefficient (r) between the concerned variables was computed and found to be 0.475^{**} which led to the following observation.

- a) The computed value of ' r ' (0.475^{**}) was found to be greater than the tabulated value of ' r ' (± 0.253) with 98 degrees of freedom at 0.01 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was significant.

Hence, the concerned null hypothesis was rejected. Therefore, the researcher concluded that level of education of the respondents had positively significant relationship with their use of IPM practices.

Roy (1997), Mia (2005), Kausar (2006), and Hossain (2006) found the similar findings between level of education and use of IPM practices.

Education helps an individual to gain knowledge and skill in different subject matters and change their attitude to a positive trend which ultimately increases their use of IPM practices in crop cultivation. Educated farmers know the value of using IPM practices. Therefore, they also practiced the IPM technologies in their cultivable land.

4.3.3 Relationship between family size of the respondents and their use of IPM practices

Relationship between family size of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis “There is no relationship between family size of the respondents and their use of IPM practices”. The correlation coefficient (r) between the concerned variables was computed and found to be 0.066, which led to the following observation.

- a) The computed value of ' r ' (0.066) was found to be smaller than the tabulated value of ' r ' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was not significant.

Hence, the concerned null hypothesis could not be rejected. Therefore, the researcher concluded that family size of the respondents had no significant relationship with their use of IPM practices.

Hossain (2006), Kausar (2006), Rabbany (2003) and Roy (1997) found the similar findings between family size and use of IPM practices.

The numbers of young farmers in the study area are comparatively poor. Young farmers are more energetic than old farmers. Most of the farmers are middle to old aged in the study area. Although their family members assist them, but they engaged labour in cultivation and cultivate their land together.

4.3.4 Relationship between farm size of the respondents and their use of IPM practices

Relationship between farm size of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis “There is no relationship between farm size of the respondents and their use of IPM practices”. The correlation coefficient (r) between the concerned variables was computed and found to be 0.213* which led to the following observation.

- a) The computed value of ' r ' (0.213*) was found to be greater than the tabulated value of ' r ' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was significant.

Hence, the concerned null hypothesis was rejected. Therefore, the researcher concluded that farm size of the respondents had positively significant relationship with their use of IPM practices activities.

Kausar (2006), Mia (2005) and Sardar (2002) found the similar findings between farm size and their use of IPM practices.

In the study area, the farmers have small and medium size of farm. Hence, they have more opportunities to use different IPM technologies and it was found that they used different level of IPM practices in their cultivable land.

4.3.5 Relationship between annual family income of the respondents and their use of IPM practices

Relationship between annual family income of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis “There is no relationship between annual family income of the respondents and their use of IPM practices”. The correlation coefficient (r) between the concerned variables was computed and found to be 0.141 which led to the following observation.

- a) The computed value of ‘ r ’ (0.141) was found to be smaller than the tabulated value of ‘ r ’ (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was not significant.

Hence, the concerned null hypothesis could not be rejected. Therefore, the researcher concluded that annual family income of the respondents had no significant relationship with their use of IPM practices.

Sardar (2002) and Roy (1997) found the similar findings between annual family income and their use of IPM practices.

Use of IPM practices has positive effect on yield and it increases the yield and production of a crop. But farmers’ annual family income and use of IPM practices showed a non-significant relationship. The fact is that maximum farmers’ annual income depends on remittances, timber business, fuel wood business etc. non-agricultural sources. Some of them cultivate crop optionally as their income source.

4.3.6 Relationship between organizational participation of the respondents and their use of IPM practices

Relationship between organizational participation of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis “There is no relationship between organizational participation of the respondents and their use of IPM practices”. The correlation coefficient (r) between the concerned

variables was computed and found to be 0.252* which led to the following observation.

- a) The computed value of 'r' (0.252*) was found to be greater than the tabulated value of 'r' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was significant.

Hence, the concerned null hypothesis was rejected. Therefore, the researcher concluded that organizational participation of the respondents had positively significant relationship with their use of IPM practices.

Hossain (2006), Mia (2005), Rabbany (2003) and Hoque (1993) also found the similar findings between organizational participation of the respondents and their use of IPM practices. Middle aged farmers participate different organization than old aged farmers.

4.3.7 Relationship between extension media contact of the respondents and their use of IPM practices

Relationship between extension media contact of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis "There is no relationship between extension media contact of the respondents and their use of IPM practices". The correlation coefficient (r) between the concerned variables was computed and found to be 0.152 which led to the following observation.

- a) The computed value of 'r' (0.152) was found to be smaller than the tabulated value of 'r' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was not significant.

Hence, the concerned null hypothesis could not be rejected. Therefore, the researcher concluded that extension media contact of the respondents had no significant relationship with their use of IPM practices. The farmers are more interest in business

than cultivation of crop. Besides, majority of them did not keep contact with all the media frequently.

4.3.8 Relationship between cosmopolitanism of the respondents and their use of IPM practices

Relationship between cosmopolitanism of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis "There is no relationship between cosmopolitanism of the respondents and their use of IPM practices". The correlation coefficient (r) between the concerned variables was computed and found to be 0.250* which led to the following observation.

- a) The computed value of ' r ' (0.250*) was found to be greater than the tabulated value of ' r ' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was significant.

Hence, the concerned null hypothesis was rejected. Therefore, the researcher concluded that cosmopolitanism of the respondents had positively significant relationship with their use of IPM practices.

Hossain (2006), Kausar (2006), Mia (2005), Rabbany (2003) and Roy (1997) also found the similar findings between cosmopolitanism of the respondents and their use of IPM practices.

4.3.9 Relationship between innovativeness of the respondents and their use of IPM practices

Relationship between innovativeness of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis "There is no relationship between innovativeness of the respondents and their use of IPM practices". The correlation coefficient (r) between the concerned variables was computed and found to be -0.063 which led to the following observation.

- a) The computed value of 'r' (-0.063) was found to be smaller than the tabulated value of 'r' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a negative direction between the concerned variables.
- c) The relationship between two concerned variables was not significant.

Hence, the concerned null hypothesis could not be rejected. Therefore, the researcher concluded that innovativeness of the respondents had no significant relationship with their use of IPM practices. The farmers who spend more time in business are not like to take innovation in cultivation. Besides, they did not use some of the innovation such as practice of ail-cropping, use of granular urea, practice of crop rotation etc.

Rabbany (2003) and Hossain (1999) found the similar findings between innovativeness of the respondents with their use of IPM practices and adoption of pesticides respectively.

4.3.10 Relationship between knowledge on IPM of the respondents and their use of IPM practices

Relationship between knowledge on IPM of the respondents and their adoption of IPM practices was examined by testing the following null hypothesis "There is no relationship between knowledge on IPM of the respondents and their use of IPM practices". The correlation coefficient (r) between the concerned variables was computed and found to be 0.223*, which led to the following observation.

- a) The computed value of 'r' (0.223*) was found to be greater than the tabulated value of 'r' (± 0.196) with 98 degrees of freedom at 0.05 level of probability.
- b) The relationship showed a positive direction between the concerned variables.
- c) The relationship between two concerned variables was significant.

Hence, the concerned null hypothesis was rejected. Therefore, the researcher concluded that knowledge on IPM practices of the respondents had positively significant relationship with their use of IPM practices. Majority of the respondents

had medium to high knowledge on IPM practices. Farmers, who have more knowledge on IPM practices, used more IPM technologies.

Hossain (2006), Kausar (2006), Mia (2005), Rabbany (2003) and Sardar (2002) also found the similar findings between knowledge on IPM practices of the respondents and their use of IPM practices.



Chapter V

Summary, Conclusions & Recommendations

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the findings, conclusions and recommendations of the study.

5.1 Summary of the Findings

The major findings of the study are summarized below:

5.1.1 Selected characteristics of the farmers

Ten characteristics of the farmers were selected for investigation. Findings in respect of these characteristics are furnished below:

5.1.1.1 Age

The age of the respondents ranged from 27 to 70 years with an average being 52.35 years and standard deviation of 9.69. Highest proportion (66 percent) of the respondents belonged to the old-aged category whereas 28 percent of the respondents fell into the middle-aged category and only 6 percent belonged to the young aged category.

5.1.1.2 Level of education

The level of education of the respondents ranged from 0 to 15 years of schooling, the average being 6.38 years and a standard deviation of 4.41. Highest proportion (40 percent) of the respondents had secondary education whereas second highest proportion (24 percent) of the respondents had primary level of education. Above secondary level education of the respondents were 13 percent and 12 percent of the respondents could able to sign their name only. About 11 percent of the respondents had no education.

5.1.1.3 Family size

The family size of the respondents ranged from 3 to 12. The average family size being 6.37 and standard deviation of 2.17. Majority of them (62 percent) had medium family and 24 percent of the respondents belonged to large size family category. Near about 14 percent of the respondents had small size family. Joint family mostly characterized the large size families.

5.1.1.4 Farm size

The farm size of the respondents of the study area ranged from 0.30 to 2.72 hectares with an average of 0.94 ha and a standard deviation was 0.45. Highest proportion (59 percent) of the respondents had small size farm while 41 percent had medium farm size. Marginal and landless farmer was not found in the study area.

5.1.1.5 Annual family income

The observed annual family income of the respondents ranged from Tk 60.00 to Tk 580.00 (in thousands) with an average 235.75 and standard deviation 125.35. The highest proportion (48 percent) of the respondents had medium income as compared to 35 percent and 17 percent have low income and high income respectively.

5.1.1.6 Organizational participation

The organizational participation score of the respondents ranged from 0 to 14 with an average of 5.14 and standard deviation of 3.57. Highest proportion (42 percent) of the respondents had low organizational participation whereas 28 percent of them had medium participation and only 8 percent of them had high organizational participation. Besides this, 12 percent of the respondents had no organizational participation.

5.1.1.7 Extension media contact

The extension media contact score of the respondents ranged from 2 to 25 with an average of 7.58 and standard deviation 4.28. About 69 percent of the respondents had medium extension contact, while 21 percent of them had low extension contact and 10 percent of them high extension media contact.

5.1.1.8 Cosmopolitaness

Cosmopolitaness score of the respondents ranged from 6 to 19. The average score of cosmopolitaness being 10.73 and standard deviation 2.85. Majority of the respondents (67 percent) were in the medium cosmopolitaness category. About one-fifth i.e. 20 percent of them were belonged to low cosmopolitaness category and 13 percent of them were in high cosmopolitaness category.

5.1.1.9 Innovativeness

The innovativeness score of the respondents ranged from 6 to 24 with an average 14.41 and standard deviation 3.46. Majority of the respondents (61 percent) were medium innovativeness, whereas 30 percent of the respondents were low innovativeness and 9 percent of them were belonged to high innovativeness category.

5.1.1.10 Knowledge on IPM

The knowledge on IPM score of the respondents ranged from 7 to 22 with an average being 12.69 and standard deviation 3.16. Majority (57 percent) of the respondents had medium knowledge about IPM practices; while 30 percent of them had low knowledge and 13 percent of them were in high knowledge about IPM category.

5.1.2 Extent of use of integrated pest management practices (IPM) and adoption of integrated pest management practices (IPM) by the farmers

This section deals with the extent of use of integrated pest management practices (IPM) and adoption of integrated pest management practices (IPM) by the

respondents. The findings of this section have been described considering the following aspects:

5.1.2.1 Comparative use of integrated pest management practices (IPM) by the farmers

An IPM Practice Use Index (IPUI) was computed in order to compare among the 12 selected IPM practices. Observed IPUI ranged from 12 to 286 with an average 167.67 and standard deviation 85.95. IPUI reveals that out of 12 IPM practices, top three practices adopted by the respondents were – (i) water management (IPUI=286), (ii) weed management (IPUI=269) and (iii) use of healthy and disease free seed (IPUI=226). Use of light trap for insect control had the lowest rank as 12 (IPUI=12).

Overall use of integrated pest management practices (IPM) by the respondents ranged from 14 to 26 with an average 19.38 and standard deviation 2.34. Majority (57 percent) of the respondents had medium use of IPM practices and 21 percent of them had high use of IPM practices whereas 22 percent of them had low use of IPM practices. The overwhelming proportion (74 percent) had medium to high use of IPM practices.

5.1.2.2 Adoption of IPM practices by the respondents

The adoption quotient could be range from 0 to 100, where 0 indicate no adoption and 100 indicate highest adoption. However, the adoption quotient was determined as 78.45.

5.1.3 Relationships between selected characteristics of the respondents and their extent of use of IPM practices

According to objectives of the study, the relationships between selected characteristics of the respondents and their extent of use of IPM practices has described in this section. Out of 10 correlations, the relationships of six were found positively significant (age, education, farm size, organizational participation, cosmopolitaness

and knowledge on IPM practices) and other relationships were found statistically non-significant.

The results of the hypothesis testing between each of the selected characteristics of the respondents and their extent of use of IPM practices are placed below:

Age:

Age of the respondents had positively significant relationship with their extent of use of IPM practices. The relationship was significant at 0.01 level of probability.

Level of education:

Level of education of the respondents had positively significant relationship with their extent of use of IPM practices. The relationship was significant at 0.01 level of probability.

Family size:

Family size of the respondents had no significant relationship with their use of IPM practices.

Farm size:

Farm size of the respondents had positively significant relationship with their extent of use of IPM practices. The relationship was significant at 0.05 level of probability.

Annual family income:

Annual family income of the respondents had no significant relationship with their extent of use of IPM practices.

Organizational participation:

Organizational participation of the respondents had positively significant relationship with their extent of use of IPM practices. The relationship was significant at 0.05 level of probability.

Extension media contact:

Extension media contact of the respondents had no significant relationship with their extent of use of IPM practices.

Cosmopolitaness:

Cosmopolitaness of the respondents had positively significant relationship with their extent of use of IPM practices. The relationship was significant at 0.05 level of probability.

Innovativeness:

Innovativeness of the respondents had no significant relationship with their extent of use of IPM practices.

Knowledge on IPM:

Knowledge on IPM practices of the respondents had positively significant relationship with their extent of use of IPM practices. The relationship was significant at 0.05 level of probability.

5.2 Conclusions

Conclusions drawn on the basis of the findings of the study, the logical interpretation of this meaning and other relevant facts are presented below:

1. Majority of the respondents were middle to old aged. Their literacy rate was high and they also had medium to high knowledge on IPM practices. They became more cautious in using IPM practices in cultivation. Educated farmers had been using different IPM technologies and also guide their labour for using IPM practices.

On the other hand, the researcher found that people in the study area, has taken education up to SSC or HSC level. But after passing SSC and HSC examinations, they would try to move to foreign countries to be an immigrant in USA, Australia, Middle East, Malaysia and Singapore etc. where currency

value is greater than that of Bangladesh. Some of them had opined that they want to send their child abroad to earn money and after passing eight to ten years in abroad, their child would come back home and start business. Besides, brilliant students tried to continue their education up to graduate and post graduate levels. In case children reluctant to pay any heed to acquire education then their parents and relatives would support them to start business or get them involve in cultivation.

2. Although respondent farmers and their sons were involved in cultivation but they also engaged day labourer in cultivation and work together. Findings of the study showed that family size of the respondents had no significant relationship with their use of IPM practices. Hence, it may not be important to put more attention to the family size of the farmers for using IPM practices.
3. In the study area, farmers had small to medium size of farm and they also involved in other income generation activities. Therefore, a farmer of medium farm size took the risk of using a new technology rather than a farmer having small sized farm. So, there is a scope to conduct motivational programs in their field through setting method demonstration, result demonstration etc. by the extension workers of DAE so that farmers are encouraged to take more risk to using a new technology particularly those related to IPM.
4. Annual family income of the respondents and their use of IPM practices showed positively non-significant relationship. The researcher found that the main source of income of the respondent farmers were remittances from their sons and relatives who have been working in abroad. Besides, they involved in business such as timber, fuel wood etc business activities.
5. Organizational participation of the farmers had positively significant relationship with their use of IPM practices. They willingly participated in various cultural functions. They were involved in bazaar committee, madrasa

committee and school committee etc. Organization participation of the farmers should be more oriented for participation in different organization to develop their attitude and perceived benefits expected from organization.

6. Cosmopolitaness of the farmers had positively significant relationship with their use of IPM practices. Respondents may adopt or use any innovation by witnessing its positive effect. Therefore, the farmers who are more cosmopolite are able to change their outlook and take decision to use of different IPM practices.
7. Knowledge on IPM practices of the farmers had positively significant relationship with their use of IPM practices. Majority of them had medium to high knowledge on IPM practices and the farmers who have more knowledge on IPM practices were found to be willingly using IPM practices in crop cultivation.
8. Extension media contact and innovativeness of the farmers had non-significant relationship with their use of IPM practices. The farmers opined that crop cultivation is less profitable than their other income generating activities. Therefore, they have less interest to contact with extension personnel and they are not interested to adopt a new idea in cultivation such as use of granular urea, use of leaf colour chart, use of crop rotation practices etc. The DAE or other extension agencies may intensify their effects to increase communication between their extension personnel and farmer to popularize IPM practices.
9. They cultivate crop mainly in Robi and Kharif-I seasons. Near about 85% of them cultivate rice such as BRRI Dhan-28 and BRRI Dhan-29 frequently. Besides, 10-15% of them cultivate pulse crop partially such as Mung bean, Black gram, Lentil etc. in Robi season.

10. The researcher found that the farmers cultivated a crop in low land during rainy season which is locally known as Jainta crop. It is mainly cultivated for fuel wood purpose. Its cultivation technique is easy. Its height ranged from 8 to 10 feet long. Farmers in the study area cultivated this plant moderately to frequently. Because this plant meet up their fuel for cooking purpose in lieu of jute.
11. Use of IPM practices of the farmers was moderate, as nearly 78 percent of farmers had medium to high use of IPM practices. Besides, their adoption quotient was as high as 78.45. Through the attempt of different government and non-government organizations, the farmers had been using some of the IPM practices at different level for several years. It is therefore concluded that both the Government and Non-Government organization workers should provide appropriate technical and IPM related information to the farmers through continued extension and other support services.
12. The researcher found that there is a scarcity of labour in the study area. The fact is that majority of the respondents were middle to old aged. Young respondents were few in number. Hence, labour cost is very high which ranged two to three hundred taka per day. But in harvesting period, the labour will get three hundred and fifty taka only per day. Maximum labour in the study area came from northern part of Bangladesh such as Kurigram, Nilphamari and greater Mymensingh district. They work in the study area mainly seasonal basis.

5.3 Recommendations

5.3.1 Recommendations for policy implication

1. Age of the farmers had positively significant relationship with their use of IPM practices and majority of them were middle to old aged. It is therefore recommended that the extension workers should concentrate their works with

all age categories of farmers with priority given to middle to old aged categories of farmers in order to accelerate their extent of use of IPM practices.

2. Education of the farmers showed positively significant relationship with their use of IPM practices. As near about 80 percent of the farmers were literate, so more use of IPM practices by the respondents in cultivation could be possible if their skill be enhanced through training on IPM practices.
3. Although, family size of the respondents had no significant relationship with their use of IPM practices, but the extension workers should concentrate their efforts to all small, medium and large sized family for other aspect.
4. Extension media contact pertains to one's contact with multifarious sources of knowledge and information. It changes an individual's behaviour and makes him more conscious about his needs and more efficient about his activities. Therefore, it may, recommended that special importance should be given to increase the extension media contact of the farmers, so that they can understand easily the perceived benefits of using IPM practices. Hence, DAE needs to pay more attention to the extension activities of SAAO/AEO/UAO so that they can keep sufficient confidence among the farmers.
5. Result demonstration method should be strengthened in disseminating innovative information as it creates more confidence among the farmers through practical observation. Hence, DAE should take necessary steps to organize result demonstration, method demonstration in order to popularize all good IPM practices and other innovation on cultivation among the farmers.
6. High price of agricultural inputs (such as fertilizer, insecticides, etc.) made them disinterested to cultivate their land frequently. Hence, quality seeds, fertilizers, insecticides etc. agricultural inputs should be made available at right time and at fair prices.

7. Government should ensure proper prices for agricultural products (i.e. harvested crops) as well as proper marketing support or facilities should be ensured. DAE, BADC and other organization may take necessary steps to minimize these problems.

8. The study revealed that the farmers are like to send their child in abroad to earn money. But now a day, many of the innocent countrymen are being cheated by the frauds for immigration purpose. As a result, they lose their money and come back home with empty. There are many organizations, consultancy firms in Bangladesh advertised their accuracy to assist the countrymen for getting visa. Hence, Government needs to pay careful attention to export manpower in different countries of the world so that the countrymen would not be cheated by other organizations and frauds.

5.3.2 Recommendations for future study

A small piece of study having conducted in some specific location cannot provide all information for proper understanding about different development activities and related matters. Future studies should be undertaken covering more dimensions in the related matters. The following recommendations are suggested in this connection.

1. The study examined the effects of 10 selected characteristics of the farmers and their extent of use of IPM practices. Therefore, it is recommended that further research may be undertaken involving other characteristics in this regard.

2. Extent of use of IPM practices may be determined by using other methods. Future study may be conducted in this connection.

3. Relationships of 10 selected characteristics of the respondents with their extent of use of IPM practices have been investigated in this study. Further research should be conducted to explore the relationships of other characteristics of the farmers.
4. Coefficient of correlation (r) was computed to find out the relationships between the selected characteristics of the respondents with their extent of use of IPM practices. Path analysis or Regression may be computed in this connection for future study.
5. The present study was conducted in Kuti union of Kasba upazila under Brahmanbaria district. Findings of the study should be verified by similar research in other parts of the country.



BIBLIOGRAPHY

- Anonymous, 2002. *National Integrated Pest Management Policy*. Ministry of Agriculture, Government of the People's Republic of Bangladesh.
- Aurangozeb, M.K. 2002. Adoption of Integrated Homestead Farming Technologies by the Rural Women in RDRS. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Banglapedia. 2006. *The National Encyclopedia of Bangladesh*. Asiatic Society of Bangladesh.
- BBS, 2005. *Household Income and Expenditure Survey, 2005*. Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.
- BER, 2008. *Bangladesh Economic Review*. Economic Advisor's Wing, Finance Division, Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka.
- Bose, S.P.1965. Socio-cultural Factors in Farm Efficiency. *Indian Journal of Extension Education*. Vol.1(3).
- Chowdhury, M.S.A. 1997. Adoption of Selected BINA Technologies by the Farmers of Boyra Union in Mymensingh District. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Goode, W.J. and P.K. Hatt. 1952. *Method of Social Research*. New York: McGraw Hill Book Company, Ins.
- Hossain, M.A. 1999. Adoption Behaviour of Contract Wheat Growers in Sadar Upazila of Jamalpur District. *M.S. Thesis*, Department of Agricultural Extension & Information System. Bangladesh Agricultural University, Mymensingh.
- Hossain, M.M. 2006. Use of Integrated Pest Management Practices in Rice Field by the Farmers in Tapodhan Union under Rangpur District. *M.S. Thesis*, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka.
- Hoque, M.M. 1993. Adoption of Improved Practices in Sugarcane Cultivation by the Sugarcane Growers of Sreepur Upazila under Gazipur District. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

- Juliana, C.S., R. Annamalai and S. Somasundram. 1991. Adoption of Integrated Pest Management Practices. *Indian journal of Extension Education*, XXVII (3&4): 23-27.
- Kausar, A.S.M.N.U. 2006. Use of Integrated Pest Management Practices by the Farmers in Crop Cultivation. *M.S. Thesis*, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka.
- Khan, M.H. 1993. Adoption of Insecticides and Related Issues in Villages of Pachon Union, Madaripur District. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Mia, M.A.T. 2005. Adoption of Integrated Pest Management (IPM) Practices by the Vegetable Growers of Magura District. *M.S. Thesis*, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, Dhaka.
- Muttaleb, A. 1995. Relationships of Selected Characteristics of Potato Growers with Their Adoption of Improved Potato Technologies. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Nurruzaman, M. 2000. Knowledge, Attitude and Practice of FFS and non-FFS Farmers in Respect of IPM. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Rabbany, G. 2003. Use of IPM Practices by the Farmers in Rice Cultivation. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Rahman, M.H. 2001. *The Influence of Extension on the Introduction of Organic Farming in Bangladesh*. Lit Verlag, London and Frankfurt.
- Rahman, M.M. 1986. Correlates of Adoption of Improved Practices in Transplanted Aman Rice. *Bangladesh Journal of Extension Education*. 1(2): 75.
- Ramaswamy, S. 1997. A Summary of Integrated Pest Management Activities and Their Impacts in Bangladesh DAE, Dhaka. P. 8-13.
- Ray, G.L. (1991). *Extension Communication and Management*. Calcutta: Naya Prokash.
- Rogers, E.M. (1995). *Diffusion of Innovation*, 4th Edition. New York: The Free Press.
- Roy, S.K. 1997. Factors Associated with the Extent of Adoption of IPM Practices in Boro Rice in Sadar Thana of Magura District. *M.S. Thesis*, Department of Agricultural Extension Education, BSMRAU, Gazipur.

- Sardar, M.H.U. 2002. Adoption of IPM Practices by the Farmers under PETRRA Project of RDRS. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Singh, P.K. 1991. Extent of Adoption of Selected Recommended Practices by Kinnow growers of Ferozepur and Faridkot District of Panjab. *Thesis Abstract*. 17(3): 209-210. Directorate of Publication, Haryana Agricultural University, Hissar, India.
- Stuart, L.H. 1991. Constraints in Technology Transfer: A User's Perspective with a Focus in IPM. Philippines, Los Banos. PP. 473-485.
- Townsend, J.C. 1953. *Introduction to Experimental Method*. New York: Mc Grow Hill Book Company, Ins.
- Uddin, M.J. 2008. Professor's Current Affairs Saltamamy. 37/1 Dotala, Banglabazar, Dhaka-1100. Professor's Prokasan.

APPENDIX – A

ENGLISH VERSION OF THE INTERVIEW SCHEDULE

DEPARTMENT OF AGRICULTURAL EXTENSION & INFORMATION SYSTEM
SHER-E-BANGLA AGRICULTURAL UNIVERSITY, DHAKA-1207

An Interview Schedule on

“Adoption of Integrated Pest Management (IPM) Practices by the farmers of Kasba Upazila of Brahmanbaria District”

Serial No.

Date

Address of the Respondent:

- a) Name.....
- b) Father's / Husband's Name.....
- c) Village.....
- d) Union.....
- e) Upazila.....
- f) District.....

Please answer the following questions:

1. Age:

Please mention your age.

.....Years



2. Level of education :

Please mention your level of education giving tick (✓) mark where necessary.

a) Cannot read and write

b) Can sign only

c) Studied up toclass

3. Family size:

Please mention the total numbers of your family members (including yourself)

No. of Male	No. of Female	Total

4. Farm size:

Please describe your farm size according to tannery system.

Sl. No.	Type of Land Use	Area of Land	
		Local unit	Hectare(ha)
1.	Homestead area		
2.	Own pond		
3.	Own land under own cultivation		
4.	Own land given to other on barga system		
5.	Land taken from others on barga system		
6.	Land taken from others on lease		
7.	Others (specify)		
Total			

5. Annual family income:

Please mention your annual family income in Taka from each of the following sources earned during last year.

a) Agriculture:

i. Crops:

Sl. No.	Name of the product	Total production (Local Unit)	Price / unit (Tk.)	Total price (Tk.)
1.	Rice			
2.	Wheat			
3.	Jute			
4.	Mung bean			
5.	Maize			
6.	Potato			
7.	Mustard			
8.	Vegetables			
9.	Fruits			
10.	Others (specify)			
Total				

ii. Livestocks:

Sl. No.	Name of the product	Total production (No. / Local unit)	Price / unit (Tk.)	Total price (Tk.)
1.	Beef fattening			
2.	Milk / Milk product			
3.	Cow dung			
4.	Goat rearing			
5.	Poultry rearing (chick + duck)			
6.	Eggs			
7.	Others (specify)			
Total				

b) Non-agriculture:

Sl. No.	Name of the Sources	Taka / month	Taka / year
1.	Labour		
2.	Van / rickshaw pulling		
3.	Small business		
4.	Service		
5.	Others (specify)		
Total			

Total annual family income = $a(i + ii) + b = \dots\dots\dots$ Taka

6. Organizational participation:

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

Sl. No.	Name of the Organizations	Nature of Participation				Duration (year)
		Executive Officer	Executive Member	Ordinary Member	Not Involved	
1.	Masjid committee					
2.	Madrassa committee					
3.	Temple committee					
4.	School committee					
5.	Bazar committee					
6.	Co-operative society					
7.	Rural arbitration committee					
8.	Youth club					
9.	Cultural organization					
10.	Others (specify)					

7. Extension media contact:

Please mention the frequency of communication of the following persons and agriculture related media.

Sl. No.	Name of Communication Media	Extent of Contact			
		Frequently	Occasionally	Partially	Not at all
Individual contact					
1.	Friend / Neighbour	≥ 7 times / month	3-6 times / month	1-2 times / month	No visit
2.	Sub-Assistant Agril. Officer	≥ 5 times / month	3-4 times / month	1-2 times / month	No visit
3.	Upazila Agril. Officer / Additional Agril. Officer / Agril. Extension Officer	≥ 3 times / year	2 times / year	1 time/ year	No visit

4.	Agricultural input dealer	≥ 4 times / year	2-3 times / year	1-2 times / year	No visit
5.	Local Leader	≥ 5 times / year	3-4 times / year	1-2 times / year	No visit
6.	NGO field worker	≥ 4 times / year	2-3 times / year	1 time / year	No visit
7.	Others extension worker (e.g. Health worker etc.)	≥ 3 times / year	2 times / year	1 time / year	No visit
Group contact					
1.	Participation in group discussion	≥ 4 times /year	2-3 times /year	1 time/year	Never
2.	Participation in demonstration meeting	≥ 4 times /month	1-3 times /month	3 times / year	Never
3.	Participation in training activities	≥ 3 times /year	2 times /year	1 time /year	Never
Mass contact					
1.	Listening agricultural programme on radio	4 times /month	2-3 times /month	1 time /month	Never
2.	Watching agricultural programme on television	4 times /month	2-3 times /month	1 time /month	Never
3.	Reading agricultural magazine	≥ 5 times /year	3-4 times /year	1-2 times /year	Never
4.	Visiting agricultural fair	≥ 3 times /year	2 times /year	1 time /year	Never

8. Cosmopolitaness:

Please indicate how do you travel out side your village? Give tick (√) mark in the appropriate places.

Sl. No.	Place of Visit	Frequency of Visit			
		Regularly	Occasionally	Rarely	Not at all
1.	Visit of market / relatives / friends / familiar home outside of your own village	≥ 7 times / month	3-6 times / month	1-2 times / month	No visit
2.	Visit to own upazila sadar	≥ 5 times / month	3-4 times / month	1-2 times / month	No visit
3.	Visit to other upazila outside own upazila sadar	≥ 3 times / year	2 times / year	1 time/ year	No visit
4.	Visit to Upazila agricultural office	≥ 4 times / year	2-3 times / year	1-2 times / year	No visit
5.	Visit to own district sadar	≥ 5 times / year	3-4 times / year	1-2 times / year	No visit
6.	Visit to other district sadar	≥ 4 times / year	2-3 times / year	1 time / year	No visit
7.	Visit to capital city or other metropolitan city	≥ 3 times / year	2 times / year	1 time / year	No visit

9. Innovativeness:

Please mention the extent of use of the following practices?

Sl. No.	Name of Innovations	Period of Adoption (Years)	Do not Adopt
1.	Use of green manure		
2.	Use of granular urea		
3.	Use of Power Tiller		
4.	Use of HYV seed		
5.	Use of leaf colour chart (LCC)		
6.	Use of seed treating chemicals		
7.	Use of herbicide		
8.	Use of poultry- fish culture		
9.	Practice of ail cropping		
10.	Practice of crop rotation		

10. Knowledge on IPM:

Please answer the following question.

Sl. No.	Questions	Full Marks	Marks Obtained
1.	What do you mean by IPM?		
2.	Mention the methods of IPM?		
3.	Mention two examples of cultural method?		
4.	Mention two examples of mechanical method?		
5.	Name two major pests of rice?		
6.	Name two major pests of vegetables?		
7.	Name two major pests of pulse?		
8.	Name two beneficial insects of crop?		
9.	Mention two disadvantages of chemical fertilizer?		
10.	What is light trap?		
11.	Name two pesticides of crops?		
12.	Mention two disadvantages of pesticide?		
13.	Name two green manure crops?		
14.	What are the advantages of weed management?		
15.	What are the characteristics of quality seed?		
16.	Name four rice weeds?		
17.	What are the merits of crop rotation?		

18.	Name two trap crops?		
19.	What do you mean by resistant variety?		
20.	Mention two HYV of rice seed?		
	Total	20	

11. Use of IPM Practices:

Please indicate the extent of your practices in the following IPM technologies in your crop field.

Sl. No.	IPM Technologies	Extent of Use				Years of Adoption
		Frequently	Occasionally	Partially	Not at all	
1.	Cultivation of Resistant variety					
2.	Use of healthy and disease free seeds					
3.	Practice of crop rotation					
4.	Destroy the crop residues					
5.	Use of sweeping net for insect control					
6.	Collection and destroy eggs and larvae of insects					
7.	Water management					
8.	Weed management					
9.	Use of pesticide					
10.	Preparation of compost / green manure					
11.	Use of Power tiller, Tractor etc.					
12.	Use of light trap					

Thank you for your kind co-operation



Signature of the Respondent

Date:

Signature of the Interviewer

Date:

APPENDIX – B

Correlation matrix showing inter-correlations among all the variables

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	Y
X ₁	1										
X ₂	0.053	1									
X ₃	0.436**	0.068	1								
X ₄	0.086	0.241*	-0.032	1							
X ₅	0.105	0.172	-0.004	0.674**	1						
X ₆	0.330**	0.401**	0.195	0.268**	0.225**	1					
X ₇	0.104	0.175	-0.065	-0.008	0.057	0.546**	1				
X ₈	0.129	0.119	-0.028	-0.060	0.184	0.350**	0.509**	1			
X ₉	0.111	0.184	0.062	0.231*	0.046	0.379**	0.205*	-0.148	1		
X ₁₀	0.122	0.405**	0.052	0.090	0.118	0.643**	0.605**	0.396**	0.251*	1	
Y	0.350**	0.475**	0.066 ^{NS}	0.213*	0.141 ^{NS}	0.252*	0.152 ^{NS}	0.250*	-0.063 ^{NS}	0.223*	1

N = 100, Degrees of freedom = 98

Table value at 5 percent level = ±0.196

Table value at 1 percent level = ±0.253

* Correlation is significant at 0.05 level of probability

** Correlation is significant at 0.01 level of probability

LEGENDS:

Independent variables (X)

- X₁= Age
- X₂= Level of education
- X₃= Family size
- X₄= Farm size
- X₅= Annual family income

- X₆= Organizational participation
- X₇= Extension media contact
- X₈= Cosmopolitaness
- X₉= Innovativeness
- X₁₀= Knowledge on IPM

Dependent variable (Y)

Y= Extent of use of IPM practices

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