

FARMERS' ATTITUDE TOWARDS USE OF PESTICIDES

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FARMERS' ATTITUDE TOWARDS USE OF PESTICIDES

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CERTIFICATE

This is to certify that thesis entitled, “**FARMERS’ ATTITUDE TOWARDS USE OF PESTICIDES**” 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 **DEPARTMENT OF AGRICULTURAL EXTENSION & INFORMATION SYSTEM** embodies the result of a piece of *bona-fide* research work carried out by **Mohammad Abdul Kader Amin** Roll No. 00390 Registration No.25285/00390 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:

.....

Md. Sekender Ali

Thesis Supervisor

DEDICATED TO

MY

BELOVED PARENTS

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FARMERS' ATTITUDE TOWARDS USE OF PESTICIDES

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Mohammad Abdul Kader Amin

ABSTRACT

The main purpose of the study was to assess farmers' attitude towards use of pesticides and also to explore the relationships between nine selected characteristics of the farmers' with their attitude towards use of pesticides. Data were collected from 100 randomly selected farmers out of 500 farmers of Boliardi and Arha village under Bajitpur upazila during March to April 2006, through personal interview. Simple and direct questions with different scales were used to obtain information. Co-efficient of correlation (r) was computed in order to explore the relationships between the attitude towards use of pesticides of farmers and their nine selected characteristics. Seventy seven percent of the respondents had moderately favourable attitude, 10 percent had slightly favourable attitude and 13 percent had high favourable attitude towards use of pesticides. The correlation test showed that farm size and annual income had positive significant relationship; education, extension contact, organizational participation and knowledge on pesticides had negative significant relationship while age, family size, and training experience had no significant relationship with the farmers' attitude towards the use of pesticides.

Chapter 1

Introduction

CHAPTER 1

INTRODUCTION

1.1 General Background

The use of chemical fertilizers and pesticides were started with the necessity of increased agricultural production through increased soil fertility and control of pests and diseases. Of all the chemicals used for the purpose, the pesticides by far constitute the largest group. Although their use was started during the middle of the nineteenth century, until when man was helpless against the mass attack of insect pest. Wide spread application of pesticides was commended only after the second world war.

Insecticides use plummeted sharply to about 1500 tons in 1974-75 and the trend continued upto 1978-79 due to the partial withdrawal of government subsidy from insecticide in 1973-74. (Karim, 1994)

Agriculture and environment interact in such a way that agriculture growth depends on the proper functioning of the environment process and the same way that environment soundness depends upon agriculture (Conway, 1990). Thus agriculture simultaneously becomes a victim and a cause of ecological destruction (Hossain et al, 1994)

Pesticide population and fertilizer wastes also caused microbial degradation in soil (Garg *et al*, 1994).

Excessive use of chemical fertilizer and pesticide also reduce water conservation capacity of soil (Khaleque, 1993 and Rezauddin, 1994)

Most devastating ecological imbalance is caused due to indiscriminate use of pesticides. Pesticides affect fishes, living in the river tank, pond etc. It is proven that dangerous pesticides are present at an unacceptable level in the fishes of the Bay of Bengal which is too much harmful for human health. Fishes alone contributed to an unacceptable level of insecticides among Bangladeshi people which is five times more than their American counterpart (Sarker1993).

There are many other negative consequences of using pesticides such as aquatic lives are being reduced in numbers at alarming rate. On the other hand use of improper doses of pesticides makes the insect pest resistant requiring further stronger doses of chemicals. Consequently, the farmers crops bearing a heavy load of chemicals causing drastic lethal effects on the consumers.

Since the farmers are the ultimate users of pesticides it is necessary to know their awareness about agro environmental pollution in order to reduce the use of agrochemicals. The extent of awareness may vary from one farmer to another farmer due to influence of various factors. Because behavior of an individual is greatly influenced by the totality of ones characteristics. It is very important to know the relative awareness of the farmers about environmental pollution caused by their use of pesticides.

As a result crop production may be damaged wide spread by use of pesticides. But the farmers of Bangladesh do not use of pesticide judiciously, which may pose a serious threat of the environment. Therefore, there is a necessity to conduct a research to determine farmers' attitude towards use of pesticides.

1.2 Statement of the problem

The rapid increase in the use of pesticides in agriculture in recent years has led to concern about its environmental effects. Two dangers are of particular importance in this context. Firstly, pesticides use can have adverse health effects for the farm workers and others exposed to pesticides. Secondly, it might contaminate the ground and surface water, harming downstream users of that water and damaging inland fisheries (Pagiola, 1995). From different viewpoints, it is clear that pesticides have serious effect on ecosystem. Non judicious use of pesticides damage natural resources like land, fishes, beneficial insects, soil, microbes etc. In this regard, sustainable farming system is a prime consideration which encompasses soil and crop productivity, economics and environment. Sustainable agriculture is the integration of agricultural management technology to produce quality food and fiber while maintaining or increasing soil productivity, farm productivity and environmental quality. Goals of achieving success in sustainable agriculture will not be possible if the millions of farmers do not perceive the consequences of the use of pesticides in proper perspectives and behave accordingly.

To find-out farmers' attitude towards use of pesticides. However, in order to make the present study meaningful attempts were made to find-out the answer of the following questions:

1. What are the characteristics of farmers involved in making proper attitude towards use of pesticides?
2. What is the level of farmers' attitude towards use of pesticides?

3. Are there any relationships between the selected characteristics of the farmers with their attitude towards use of pesticides?

1.3 Specific Objectives

The following specific objectives were be formulated to give proper direction to the study:

1. To determine and describe some selected characteristics of the respondents, the characteristics included:
 - a) Age
 - b) Education
 - c) Family size
 - d) Farm size
 - e) Family annual income
 - f) Training exposure
 - g) Extension contact
 - h) Organizational participation
 - i) Knowledge on pesticide
2. To determine the extent of farmers' attitude towards use of pesticides
3. To explore the relationship between the selected characteristics of the farmers' with their attitude towards use of pesticides

1.4 Justification of the study

Bangladesh is an agro-based country. Most of the people live in the villages and they are directly or indirectly involved in agriculture. They are closely related with modern agricultural technologies. In one side use of pesticide controls the pest and thus increases the yield but in other side it affects adversely the whole environment.

In Bangladesh many government and non-government organizations are working in the fields of agriculture and rural development. Sustainable agricultural growth and protection of environment are the issues of high priority to day. The findings of this research will be useful to those who are concerned with planning, implementation and evaluation of agricultural, rural development and environmental protection programmes. The knowledge and skills gained by the researcher in conducting this research will help to conduct similar other studies in the future.

Various agro-chemical companies and farms can also make use of the findings of this research in determining policies and practices for the marketing of their products.

1.5 Assumptions of the study

The following assumptions were in the mind of the researcher while undertaking the study:

1. The respondents involved in the sample were capable of furnishing proper responses to the questions contained in the interview schedule.
2. The data collected by the researcher from the respondents were considered reliable and dependable.

3. Information furnished by the farmers were the representative ones of the whole population of the study area.
4. All the data concerning the dependent and independent variables were normally and independently distributed with their respective means and standard deviation.
5. The findings of the study would have general applications to other parts of the country with similar personal, socio-economic and cultural conditions of the study area.

1.6 Statement of Hypothesis

A null hypothesis states that there is no relationship between the independent variables with dependent variable. The following null hypothesis was formulated to explore the relationships between farmers' attitude towards use of pesticides with each of their nine selected characteristics:

1. There is no relationship between ages of the respondents with their attitude towards use of pesticides.
2. There is no relationship between educations of the respondents with their attitude towards use of pesticides.
3. There is no relationship between family sizes of the respondents with their attitude towards use of pesticides.
4. There is no relationship between farm sizes of the respondents with their attitude towards use of pesticides.

5. There is no relationship between annual of the respondents with their attitude towards use of pesticides.
6. There is no relationship between training experiences of the respondents with their attitude towards use of pesticides.
7. There is no relationship between extension contacts of the respondents with their attitude towards use of pesticides.
8. There is no relationship between organizational participation of the respondents with their attitude towards use of pesticides.
9. There is no relationship between knowledge of the respondents with their attitude towards use of pesticides.

1.7 Scope of the study

attitude towards use of pesticides was determined. This would also enable to identify the selected factors of the farmers' those affect their attitude towards use of pesticides. This important aspect would ultimately help researcher, academician and the extension providers in formulating appropriate technologies of pesticide use and that will be helpful to develop sustainability in agriculture.

By the help of the findings of the research, the concern authority can expect to select appropriate strategies for establishing judicious use of pesticides.

1.8 Limitation of the study

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

1. The study was confined to two villages namely Boliardi and Arha of Bajitpur upazila.
2. The study was restricted within the farmers who had at least some cultivable land under own cultivation.
3. Characteristics of the farmers were many and varied but in the present piece of study only nine characteristics were selected for investigation.
4. For information about the study, the researcher dependent on the data furnished by the selected respondents during their interview with him.
5. In many situations the researcher had to face unexpected interference from the over interested side talkers of the non target respondents.
6. Facts and figures collected by the researcher applied to the situation prevailing during the year 2006.

1.9 Definition of Terms

For clarity of understanding certain terms frequently used throughout the study are defined and interpreted as follows:

Attitude

It means ones feelings, beliefs and tendencies towards an object and concept. This variable was operationalized by developing an attitude scale, following Likert method of summated ratings.

Pesticides

Pesticides refer to those chemical products which used to save the crop plants from the damage of insect and diseases.

Age

Age of a farmer has been defined as the period of time in years from his birth to the time of interview.

Education

It refers to the development of desirable change in human behavior or in the other words it is the development of desirable knowledge, skill and attitude in an individual through reading, writing, observation and other related activities. Participation of an individual in formal educational institutions helps to develop such desirable change in behavior. Hence education has been measured in this study on the basis of years of schooling of an individual.

Family size

Family size refers to the number of member including the respondent himself, his wife, children and other permanent dependents who live and eat together in a family unit.

Farm size

It refers to the total area on which farmers' family carries on farming operations, the area being estimated in term of full benefit to the farmers family.

Annual income

It refers to the total earnings of a farmer from farming and other sources (business, service, daily working etc) during a year. In fact it was gross income and expressed in Taka.

Training exposure

It refers to the total of days that a respondent had received training in his entire life organized by different training providing organization.

Extension contact

It refers to an individual exposure to or contact with different information sources and personalities involved for dissemination of new technologies among the farmer.

Organizational participation

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

Knowledge on pesticides

Knowledge on pesticides means the knowing of various aspects of the use of pesticides by an individual. This variable will sometimes be simply used as knowledge of the farmers in this study.

CHAPTER 2

REVIEW OF LITERATURE

This chapter deals with three sections. The first section deals with concepts of attitude, the second section present the relationships of selected characteristics of farmers with their attitude towards use of pesticides or awareness on related matters and third sections deals with the development of conceptual framework of the study.

2.1 Concept of attitude

Attitude in social psychology is a predisposition to classify objects and events and to react to them with some degree or evaluative consistency. The concept of attitude arises from attempt to observed regularities in the behavior of individual persons. The quality of ones attitude is judged from the observable, evaluative responses he tends to make (Encyclopaedia Britannica, 1968). Attitude has also been defined as a positive or negative feeling associated with a specific psychological object, the object may be any symbol, phrase, slogan, person institution, ideal or idea (Encyclopedia Britannica, 1968). Different persons have defined attitude in many different ways. Some of this are given bellow:

Thurstone (1928) defined an attitude as the effect for or against a psychological object. According to Morgan, et. al. (1929) attitude means ones felling towards person, ideas, institution, practices or facts. Warren (1934) referred to attitude as a specific mental disposition towards an incoming or arising experience, where by that experience is modified, or in other words it is a condition of readiness for a certain type of activity.

Drever (1968) has defined an attitude as a more or less stable set or disposition of opinion, interest or purpose, involving expectancy of certain kind of experience and readiness with appropriate kind of response.

Doob (1966) stated that attitude affects behavior since an implicit, drive producing response considered socially significant in the individual society. If this definition is broken down typographically into phrases and clauses, an attitude implies the following:

- It is an implicit response
- It is both anticipatory and mediating reference to patterns overt responses.
- It is evoked by a variety of stimulus patterns and as a result of previous learning or of gradients of generalization and discrimination.
- It is itself a cue and drive producing.
- It is considered socially significant in the individual's society.

According to Lapiere (1934) a social attitude is a behavior pattern, anticipatory set or tendency, predisposition to specific adjustment of designed social situations or more simply, a conditioned response to social stimuli.

Sherif and Sherif (1956) defined the term attitude as a relatively stable tendency to respond with a positive or negative affect to a specific referent. Attitude was also defined as a predisposition to act in a certain way. It is a state of readiness influence a person to act in given manner (Barnad, 1965).

McGrath (1966) has referred to attitude as the learned orientations towards objects or predisposition to behave in certain ways towards a given object or a class of objects.

Goode (1945), in his dictionary of education, has defined the term as a state of mental and emotional readiness to react to situations, person or things in harmony with a habitual pattern or response previously conditioned to or associated with these stimuli. Attitude is the by product of an individuals experience and have their bases in inner urges, acquired habits and environmental influences by which he is surrounded.

Kendler (1963) regarded the term attitude as applied to an individuals predisposition to respond in characteristic way to some stimuli in his social environment. Basically an attitude, according to him, is a tendency to behave either positively or negatively towards any social care whatever - an institution, a person, a situation, an idea or a concept.

Krech and Crutchfield (1948) have defined attitude as an enduring organization of motivational, emotional, perceptual and cognitive process with respect to some aspect of the individual world.

2.2 Review of studies exploring relationships of the selected characteristics of the farmers and their attitude towards use of pesticides or related matters

2.2.1 Age and attitude towards use of pesticides

Sutradhar (2002) found in his study that there was positive insignificant relationship between age of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Islam et al. (1998) conducted a survey to determine the awareness of farmers on environmental and obtained a negative correlation with the awareness on environmental pollution.

Hamid (1997) made a survey to determine the awareness of farmers on environment. He found that the age of the farmers had negative relationship with the awareness on environmental pollution.

Islam and Kashem (1997) observed that age of the farmers had negative relationship with their attitude towards agrochemicals.

Miah and Rahman (1995) studied to measure the awareness of farmers regarding their environment and to identify the reasons responsible for its degradation. They found insignificant relationship between age of the farmers and awareness regarding farm environment.

2.2.2 Education and attitude towards use of pesticides

Sutradhar (2002) found in his study that there was positive significant relationship between education of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found in his study that there was a positive significant relationship between education of the respondents and their awareness on environmental pollution.

Sarkar (1999) revealed that the level of education of the farmer had significant positive relationship with their perception on environmental degradation.

Hossain (1999) found that education of the farmer had significant positive relationship with the awareness on environmental degradation.

Islam et al. (1998) observed that education of the farmer had significant positive relationship with their perception on environmental degradation.

Miah and Rahman (1995) found that the level of education of the farmers had positive significant relationship with the awareness on farming environment.

2.2.3 Family size and attitude towards use of pesticides

Sutradhar (2002) found that in his study that there was positive significant relationship between family size of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found that in his study that there was a positive insignificant relationship between family size of the respondents and their awareness on environmental pollution.

Habib (2000) observed in his study that there is no significant relationship between family size of the Sub-Assistant Agricultural Officer and attitude towards the use of agrochemicals.

Miah and Rahman (1995) found that family size of the farmers and awareness regarding farming environment were not significant.

2.2.4 Farm size and attitude towards use of pesticides

Sutradhar (2002) found that in his study that there was positive significant relationship between farm size of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found that in his study that there was a negative insignificant relationship between farm size of the respondents and their awareness on environmental pollution.

Hamid (1997) found that area under cultivation of farmers had insignificant relationship with the awareness on environmental pollution.

Miah and Rahman (1995) revealed that farm size of the farmers and awareness regarding farming environment were not significant.

Iqbal (1963) while conducting a study on the farmers attitude towards adoption of modern agricultural practices found that there was a positive relationship between farm size and attitude towards adoption of modern agricultural practices.

2.2.5 Annual income and attitude towards use of pesticides

Sutradhar (2002) found that in his study that there was positive significant relationship between annual income of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found in his study that there was a negative insignificant relationship between annual income of the respondents and their awareness on environmental pollution.

Hamid (1997) found that the annual income of the farmer had significant positive relationship with the awareness on environmental pollution.

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

2.2.6 Training exposure and attitude towards use of pesticides

Habib (2000) observed in his study that training exposure of the Sub-Assistant Agricultural Officer had significant positive relationship with their attitude towards agrochemicals.

Paul (2000) found that there was a positive significant relationship between agricultural training experience of the farmers and their attitude towards the use of urea super granule.

2.2.7 Extension contact and attitude towards use of pesticides

Sutradhar (2002) found in his study that there was positive significant relationship between extension contact of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found in his study that there was a positive significant relationship between extension contact of the respondents and their awareness on environmental pollution.

2.2.8 Organizational participation and attitude towards use of pesticides

Sutradhar (2002) found in his study that there was positive insignificant relationship between organizational participation of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found in his study that there was a insignificant relationship between organizational participation of the respondents and their awareness on environmental pollution.

Hamid (1997) found that the organizational participation of the farmer had positive relationship with the awareness on environmental pollution.

2.2.9 Knowledge on pesticides and attitude towards use of pesticides

Sutradhar (2002) found in his study that there was positive significant relationship between knowledge of the respondents and their awareness on the environmental degradation caused by the use of modern agricultural technologies.

Hanif (2000) found in his study that there was a significant positive relationship between knowledge of the respondents and their awareness on environmental pollution.

Sarker (1999) found that the knowledge on the use of agro-chemicals had a significant positive relationship with their perception on environmental degradation.

2.3 The Conceptual Framework of the Study

According to Rogers and Havens (1960) the conceptual framework is kept in mind while framing the structural arrangement for the dependent and independent variables. This study was concerned with farmers' attitude towards use of pesticides as dependent variable and selected characteristics of farmers as independent variables.

Based on these above discussion and the review of literature, the conceptual framework of this study has been formulated and shown in figure 2.1

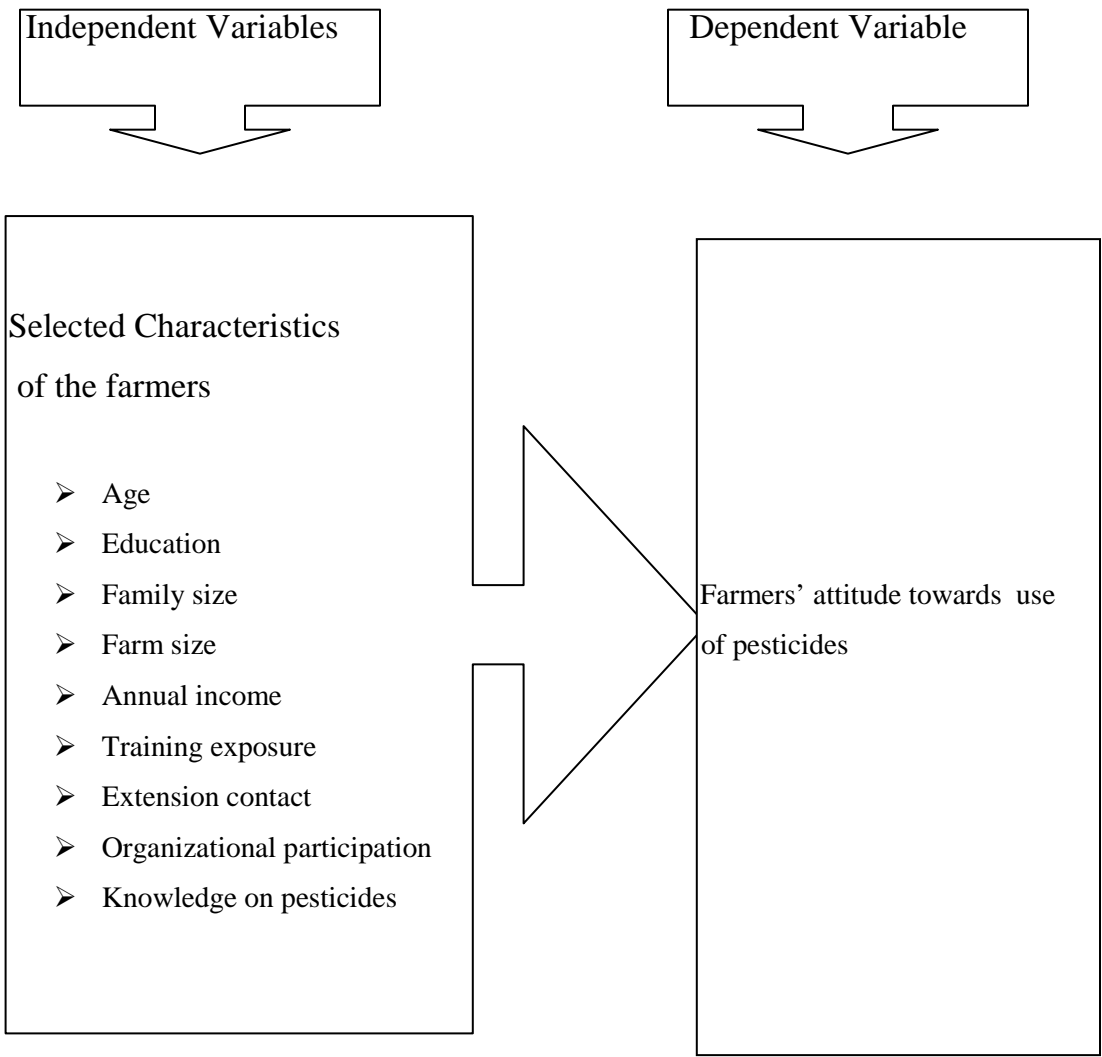


Fig.2.1 Conceptual framework of the study

CHAPTER 3

METHODOLOGY

Methodology is very important in any scientific research. It deserves a very careful consideration for conduction of research. Keeping in view the research had taken intensive care for the use of proper methods in all aspects of the investigation. Methods and procedures followed in this study have been described in this chapter.

3.1 Locale of the study

The locale of the study was two villages of Bajitpur upazila under Kishoregonj district. The names of the villages were Boliardi and Arha. There were two major reasons behind the selection of this area. Firstly, time and resources available to the researcher to carry out the research study in this area and secondly, the communication facilities are well from the district town.

3.2 Population and sampling

The total number of farmers of the two selected villages was the population of the study. A list of population of two villages was collected. Boliardi consisted of 320 households and Arha consisted of 180 households. Out of 320 heads of Boliardi village 64 were selected randomly (20% of the population). Similarly out of 180 heads of Arha village 36 (20% of the population) were selected randomly. Thus a total of 100 farmers constituted the sample for this study.

Simultaneously a reserve list of 10 farmers was prepared keeping view to use the farmers if the farmers included in the sample were not available during collection of data.

Thana	Union	Village	No.of population	Sample size	Reserve list
Bajitpur	Boliardi	Boliardi	320	64	6
Bajitpur	Arha	Arha	180	36	4
Total			500	100	10

3.3 Measurement of variables

This section contains procedures for measurement of both independent as well as dependent variables of the study.

3.3.1 Measurement of independent variables

The independent variables of the study were age, education, family size, farm size, family annual income, training exposure, extension contact, organizational participation, knowledge on pesticide.

Age

Age of the farmer referred to the period of time from his birth to the time of interview. It was measured in terms of actual complete years on the basis of his response to item no.1 of the interview schedule (Appendix-A)

Education

The education was measured on the basis of a respondents year of schooling in the educational institutions which was determined by his response to item No. 2 of the interview schedule. A score of one (1) was given for each year of schooling completed.

For example if a respondent passed class V or equivalent, his education score was given as 5, if he passed the final examination of class IX, his score was 9. If a respondent did not know how to read and write, his education score was zero. A score of 0.5 was given to that respondent who could sign his name only.

Family size

The family size was measured by the total number of members in the family of a respondent. The family members included the respondent himself, his wife, sons and daughter and other dependents. The information was obtained by a respondents response to item No. 3 of the interview schedule (Appendix A). The total number of family members was considered as the family size score of a respondent.

Farm size

Farm size of the farmer was measured by the land area possessed by him.

Data obtained in response to questions under item No 4 of the interview schedule (Appendix A) formed the basis for determining the farm size of the respondent.

Here farm size was computed by using the following formula:

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

Where,

A = Homestead non agricultural land

B = Homestead agricultural land

C = Own land under own cultivation

D = Land taken from others on barga

E = Land given to others on barga

F = Land taken from others as lease

The respondents have given information for their farm size in local unit of measurement. Finally it was converted to hectare and was considered as the farm size score of a respondent.

Family annual income

Annual income of a respondent was measured in taka on the basis of his total yearly earnings from farming and other sources in which the respondent and his family members were involved. The method of ascertaining income from farming involved two phases, in the first phase, the yield of all the crops, in the preceding were noted. Than all the yields were converted into cash income according to the prevailing market price. The price of other enterprises (eg. Milk, fish, egg, cows poultry etc) also included in calculating the income. The earning of each respondent from different sources were also included in calculating the income. Yearly earnings from farming and other sources were added together to obtain total income of a respondent. Data obtained in response to item No.5 of the interview schedule were used to determine the income of the respondents family.

Training exposure

It was measured by the total number of days a respondent receive training on different subject matters in his entire life. The number of days of training was considered as his training exposure score of zero (0) was assigned for receiving no training at all.

Extension contact

It referred to the extent of contact of a respondent with different information sources. The scale used for determining extension contact score of a respondent is given bellow:

SL NO.	Name of the information sources	Extent of use	Score
1	Local leader	Never (Not even once a month) Rarely (1-4 times in a month) Occasionally(5-8 times in a month) Oftenly (9-12 times in a month) Regularly (13 times or more in a month)	0 1 2 3 4
2	NGO worker	Never (Not even once a year) Rarely (1-4 times in a year) Occasionally (5-8 times in a year) Oftenly (9-12 times in a year) Regularly (13 times or more in a year)	0 1 2 3 4
3	Block Supervisor	Never (Not even once a year) Rarely (1-4 times in a year) Occasionally (5-8 times in a year) Oftenly (9-12 times in a year) Regularly (13 times or more in a year)	0 1 2 3 4
4	Thana Agriculture Officer	Never (Not even once a year) Rarely (1-2 times in a year) Occasionally (3-4 times in a year) Oftenly (5-6 times in a year) Regularly (7 times or more in a year)	0 1 2 3 4
5	Agriculture input dealer	Never (Not even once a year) Rarely (1-2 times in a year) Occasionally (3-4 times in a year) Oftenly (5-6 times in a year) Regularly (7 times or more in a year)	0 1 2 3 4
6	Agriculture fair	Never (Not even once a year) Rarely (1 times in 4 year) Occasionally (1 times in 3 year) Oftenly (1 times in 2 year) Regularly (1 times or more in a year)	0 1 2 3 4

7	Farmers training	Never (Not even once a year) Rarely (1 times in 3 or more year) Occasionally (1 times in 2 year) Oftenly (1 times in a year) Regularly (2 times or more in a year)	0 1 2 3 4
8	Radio	Never (Not even once a week) Rarely (1-2 times in a week) Occasionally (3-4 times in a week) Oftenly (5-6 times in a week) Regularly (7 times or more in a week)	0 1 2 3 4
9	Television	Never (Not even once a week) Rarely (1-2 times in a week) Occasionally (3-4 times in a week) Oftenly (5-6 times in a week) Regularly (7 times or more in a week)	0 1 2 3 4
10	Daily newspaper	Never (Not even once a week) Rarely (1-2 times in a week) Occasionally (3-4 times in a week) Oftenly (5-6 times in a week) Regularly (7 times or more in a week)	0 1 2 3 4

Finally total scores of all the extension media were added together to get the extension contact score of the respondents. Thus from ten extension media contact, a respondents could get a score ranged from 0-40, while 0 indicating no extension contact and 40 indicating may high extension contact.

Organizational participation

Organizational participation of a respondent was measured by the nature of his involvement and duration of participation in different organization. The score of a respondent was computed as follows:

Score according to nature of involvement

No participation = 0

Ordinary member = 1

Executive member = 2

Executive officer = 3

The score according to nature of involvement for each organization was multiplied by the duration (years) of his participation in the respective organization. Finally total scores of all organizations were added together to obtain his total score of organizational participation.

Knowledge on pesticide

Knowledge on the use of pesticides was measured using fifteen questions (15) in open form as shown in the item No.9 of the interview schedule. Two score was assigned for each of the questions. The total assigned score of all the questions was 30. If a respondent was able to provide a correct answer to a question, he could receive full score (2) for that particular question. Accordingly, a respondent could receive zero for wrong answer and half or partial score was given for partial correct answer of a question. The total score obtained by a respondent was considered as the knowledge on pesticides of the respondent. Knowledge on pesticide score of a respondent could range from 0 to 30, while 0 indicating very low knowledge and 30 indicating very high knowledge on pesticides.

3.3.2 Measurement of dependent variable

Attitude towards use of pesticides

Attitude of farmers towards use of pesticide was considered as dependent variable of the study. After through consultation with the extension experts and review of literature 12 statements were selected to measure the attitude of the respondents towards use of pesticides. The respondents were asked to give their attitude regarding 12 statements related to use of pesticides. Among the statements 5 were positive and 7 were negative. A five point likert-scale such as strongly agree, agree, no-opinion, disagree, strongly disagree were used to measure the level of agreement of the farmers towards the use of pesticides. In a positive statement a score of 4,3,2,1 and 0 was assigned for responses reflected by the expressions- strongly agree, agree no-opinion, disagree, and strongly disagree, respectively. The scoring order was reverse for the above expression in the negative statements. The attitude score of a respondent was computed by adding his scores for all the 12 statements.

3.4 Data Collection

Data for this study were collected through personal interviews by the researcher himself. Before starting data collection, the researcher meets the members of union council in charge of these villages and explained the purpose of the study. The researcher also meets the Sub-Assistant Agricultural Officer and local elites and requested them to extend cooperation in collecting data. The member of the union council, Sub-Assistant

Agricultural Officer and the local elites extended necessary help and cooperation in collecting data from the respondents. Thus, a congenial atmosphere was created for collecting data from the respondents of both the villages. The entire process of data collection was done during March to April, 2006.

3.5 Data analysis

For this study, the collected data were compiled, tabulated and analyzed in accordance with the objective of the study. All the responses in the interview schedule were given numerical coded values and local units were converted into standard units. The responses to the questions in the interview schedule were then transferred to a master sheet to conduct tabulation. Tabulation and cross tabulations were done on the basis of categories developed by the investigator himself. Pearson product moment correlation co-efficient (r) was used to explore the relationships between the selected characteristics of the respondents with their attitude towards use of pesticide. Five percent level of significance was used as the basis for rejecting or accepting any null hypothesis.

CHAPTER 4

RESULTS AND DISCUSSION

In this chapter, findings are presented in three sections in accordance with the objectives of the study. The first section deals with the selected characteristics of the respondents, while the second section deals with the farmers' attitude towards use of pesticide. Third and final section discusses the relationships between the selected characteristics of the farmers and their attitude towards use of pesticides.

4.1 Selected characteristics of the farmers

Man possesses various interrelated and constitutional characteristics and those form his/her personality. It is expressed behavior or the sum totality of individual characteristics and ways of behaving which determines his unique adjustment to his environment. It includes the individual behavior, appearance, beliefs, attitude, values, motives, emotional reactivity, expressing capacity, experience and individual modes of adjustment. It was therefore, assumed that attitude towards use of pesticide would be influenced by various characteristics of the farmers. Nine characteristics of the respondents were selected to find out their relationship with attitude towards use of pesticide. This has been discussed in the final section of this chapter. The selected characteristics included age, education, family size, farm size, annual income, training exposure, extension contact, organizational participation and knowledge on pesticides. These characteristics of respondents have been presented in table 4.1 and described bellow.

Table 4.1 Farmers characteristics profile

Characteristics with categories	Measurement unit	Possible range	Observed range	Farmers'		Mean	SD
				No	%		
Age							
Young (16-30)	Years	Unknown	16-70	37	37	35.91	12.54
Middle aged (31-50)				50	50		
Old (above 50)				13	13		
Education							
No education (0)	Year of schooling	Unknown	0-12	18	18	3.61	3.22
Primary level (0.5-5)				64	64		
Secondary level (6-10)				15	15		
Upper secondary level (11-12)				3	3		
Family size							
Small (3-4)	No. of members	Unknown	3-12	18	18	5.91	1.64
Medium (5-8)				77	77		
Large (above 8)				5	5		
Farm size							
Small (0.20-0.40)	Hectare	Unknown	0.20-4	11	11	0.886	0.648
Medium (0.41-1.59)				76	76		
Large (1.6-4)				13	13		
Family annual income							
Low (20-30 thousand)	Taka	Unknown	20000-200000	20	20	56360	34161
Medium (31-100 thousand)				69	69		
High (101-200 thousand)				11	11		
Training exposure							
No training (0)	Score	Unknown	0-3	93	93	0.21	0.769
Short training (1-3)				7	7		
Extension contact							
Low (0-3)	Score	0-40	0-12	21	21	5.98	3.25
Medium (4-8)				55	55		
High (9-12)				24	24		
Organizational participation							
No participation (0)	Score	0-18	0-9	41	41	2.06	2.24
Participation (1-9)				59	59		
Knowledge on pesticides							
Low (7-12)	Score	0-30	7-22	15	15	15.39	3.001
Medium (13-19)				78	78		
High (above 19)				7	7		

Age

The age of the respondents ranged from 16-70 years, the average being 35.91 with standard deviation of 12.5. The respondents were categorized into young (16-30), middle aged (31-50) and old (51-70) aged levels. The categories and distribution of respondents are shown in Table 4.1 with their number, percent, mean and standard deviation. Analyzing of data contained in Table 4.1 reveals that the highest proportion of the respondents felt in the younger to middle age categories. By creating proper consciousness about the use of pesticide among the comparatively younger to middle aged group, it may help to use of pesticides judiciously, that will contribute to maintain ecological balance and pollution free environment. In designing extension activities these views and opinions would be helpful to the extension agent.

Education

The education score of the respondents were ranged from 0 to 12, the mean and standard deviation being 3.61 and 3.22 respectively. On the basis of educational scores, the farmers were classified into four categories. Data presented in the Table 4.1 indicated the most of the farmers (64%) felt in the primary level category, 18% of the farmers had no education, 15% of them felt in the secondary level and only 3% of the farmers had higher secondary qualification. Education increases the power of observation, analysis, integration, understanding, decision making and adjustment to new situation of an individual. Educated farmers may get useful information through reading leaflets, booklets, books and other printed materials. Moreover they possess desire for new and

newer information related to their farming operations. Education broadens the power of understanding and develops the abilities of analyzing facts and situation in order to take correct decisions.

Family size

The family size of the farmers ranged from 3 to 12 members with an average of 5.91 and standard deviation of 1.64. On the basis of the family size scores, the farmers were classified into three categories which are presented in the Table 4.1.

Only 18 percent of the respondents belonged to the small family category compared to 77 percent belonged to medium category and only 5 percent to large family category.

Farm size

The farm size scores of the farmers ranged from 0.20 to 4.00 with an average of 0.886 and standard deviation 0.648. Based on farm size scores the respondent were classified into three categories namely, small farm (0.20-0.40) ha, medium farm (0.41-1.59) ha and large farm (1.6-4.0) ha which are presented in Table 4.1.

Table 4.1 reveals that 11 percent of the respondents had small farm holding, 76 percent had medium farm size and 13 percent of them had large farm.

Family annual income

Annual income of the respondents ranged from Tk 20000 to Tk 200000. On the basis of their family annual income the farmers were categorized into three classes namely, low, medium and high income group. The categories and distribution of the farmers are shown in Table 4.1.

The average income of the respondents was Tk 56360 with a standard deviation of Tk 34161. Data were presented in Table 4.1 indicate that 20 percent of the respondents felt into low income group, 69 percent felt into medium income group and only 11 percent felt into high income group. It was observed that greater portion of the farmers felt in medium income group. The respondents of the study area were not engaged only in agriculture. Many of them had other income sources such as service, business, and other farm economic activities.

Training exposure

The training exposure scores of respondents ranged from 0 to 3 with a mean of 0.21 and standard deviation of 0.769. On the basis of their training experience scores, the respondents were classified into two categories as shown in table 4.1. Ninety three percent of the respondents had no training and only seven percent had short training.

Extension contact

Extension contact scores ranged from 0 to 12 with the mean of 5.98 and standard deviation of 3.25. The respondents were classified into three categories which are shown Table 4.1.

Table 4.1 reveals that 55 percent of the respondents had medium extension contact as compared to 21 percent had low and 24 percent had high extension contact category.

Extension contact is important for gathering information from many sources.

Organizational participation

Organizational participation scores ranged from 0 to 9 with the mean of 2.06 and standard deviation of 2.247. The respondents were classified into two categories which is shown in Table 4.1.

Data furnished in Table 4.1 indicate that the highest proportion (59%) of the respondents felt in the “participation’ category and 41% felt in no participation category.

Knowledge on pesticides

Knowledge on pesticides scores of the respondents ranged from 7 to 22 with the mean of 15.39 and standard deviation of 3.001. The distribution of the respondents in different categories on the basis of their knowledge on pesticides scores have been shown in Table 4.1.

Data furnished in Table 4.1 indicate that the highest proportion (78%) of the respondents felt in the medium knowledge category while 15 percent respondents felt in low knowledge category and only 7 percent felt into high knowledge category.

Better knowledge in the use of pesticides is helpful to make the individual aware of their environment.

4.2 Farmers attitude towards use of pesticides

Farmers' attitude towards use of pesticides was the main focus of the study. Attitude scores of the respondents varied from 16 to 33 against the possible of 0 to 48. The mean being 22.87 and standard deviation of 2.501. The distribution of the respondents according to their score on attitude towards use of pesticides is shown in Table 4.2.

Table 4.2 Distribution of the farmers according to their attitude towards use of pesticides

Categories	Farmer		Measurement	Mean	SD
	Number	Percent			
Slightly favourable attitude (16 - 20)	10	10	Score	22.87	2.501
Moderately favourable attitude (21-25)	77	77			
Highly favourable attitude (above 25)	13	13			

It is evident from the table 4.2 that only 13 percent of the respondents possessed highly favourable attitude towards the use of pesticides while an overwhelming majority (77percent) possessed moderately favourable attitude and only 10 percent had slightly favourable attitude towards use of pesticides.

To maintain ecological balance of environment, a favourable attitude on the use of pesticides issue of the farmers is necessary.

4.3 Relationship between the selected characteristics of the respondents and their attitude towards use of pesticides

To examine the relationship of the nine selected characteristics of the respondents with their attitude towards the use of pesticides was the purpose of this section. The nine selected characteristics were: age, education, family size, farm size, annual income, training experience, extension contact, organizational participation and knowledge on pesticides. These nine selected characteristics were the independent variables while farmers' attitude towards use of pesticides was the dependent variable of this study.

Pearsons product moment correlation co-efficient (r) has been used to explore the relationships between the selected characteristics of the respondents with their attitude towards use of pesticides. A null hypothesis was rejected when the observed " r " value was greater than the tabulated value of " r " at 0.05 level of probability. Out of nine variables, the relationships of two (farm size and annual income) variables with farmers attitude towards use of pesticides were positively significant and four (education, extension contact, organizational participation and knowledge on pesticides) variables were negatively significant and only three (age, family size and training exposure) variables were non significant.

A summary of the nine correlations are presented in Table 4.3.

Table 4.3 Correlation between dependent and independent variables

(N= 100)

Dependent variable	Independent variables	computed value of 'r' (N= 100)	Table value of 'r' at 98 degrees of freedom	
			At 0.05	At 0.01
Farmers' attitude towards use of pesticides	Age	0.060 NS	0.196	0.256
	Education	- 0.267 **		
	Family size	0.142 NS		
	Farm size	0.275**		
	Family annual income	0.197*		
	Training exposure	0.077 NS		
	Extension contact	-0.219*		
	Organizational participation	-0.335**		
	Knowledge on pesticides	-0.311**		

NS= Non significant

* Significant at 0.05 level

** Significant at 0.01 level

4.3.1 Age of the respondents with their attitude towards the use of pesticides

The relationship between age of the farmers with their attitude towards use of pesticides was examined by testing the following null hypothesis: "There is no relationship between age of the farmers and their attitude towards the use of pesticides"

The co-efficient of correlation between the concerned variables was 0.060 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a positive trend.
2. The computed value of 'r' (0.060) was found to be less than the table value ('r' = 0.196) with 98 degrees of freedom at 0.05 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore, the null hypothesis was accepted and it may be concluded that there was no relationship between ages of the respondents with their attitude towards use of pesticides. Miah and Rahman (1995) also found that age of the farmers had insignificant relationship with their attitude.

4.3.2 Relationship between education of the respondents with their attitude towards the use of pesticides

The relationship between education of the farmers with their attitude towards use of pesticides was examined by testing the following null hypothesis: "There is no relationship between age of the farmers with their attitude towards use of pesticides"

The co-efficient of correlation between the concerned variables was - 0.267 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a tendency in the negative direction between the concerned values.
2. The computed value of 'r' (-0.267) was found to be larger than the table value ('r' = 0.256) with 98 degrees of freedom at 0.01 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore, the null hypothesis was rejected and it may be concluded that there is a negative significant relationship between education of the respondents with their attitude towards use of pesticide. It means that the higher level of their education the lower was their favourable attitude towards use of pesticide and vice-versa. It is quite logical that educated people are conscious about use of pesticide.

4.3.3 Relationship between family size of the respondents and their attitude towards the use of pesticides

The relationship between family size of the farmers and their attitude towards the use of pesticides was examined by testing the following null hypothesis: "There is no relationship between age of the farmers and their attitude towards the use of pesticides"

The co-efficient of correlation between the concerned variables was 0.142 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a positive trend.
2. The computed value of 'r' (0.142) was found to be less than the table value ('r' = 0.196) with 98 degrees of freedom at 0.05 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore, the null hypothesis was accepted and it may be concluded that there was no relationship between family size of the respondents with their attitude towards use of pesticides. Habib (2000) also found in his study that there was no significant relationship between family size of the Sub-Assistant Agricultural Officer and attitude towards the use of agrochemicals.

4.3.4 Relationship between farm size of the respondents and their attitude towards the use of pesticides

The relationship between farm size of the farmers and their attitude towards the use of pesticides was examined by testing the following null hypothesis: "There is no relationship between age of the farmers and their attitude towards the use of pesticides"

The co-efficient of correlation between the concerned variables was 0.275 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a positive trend.
2. The computed value of 'r'(0.275) was found to be larger than the table value ('r' = 0.256) with 98 degrees of freedom at 0.01 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore the null hypothesis was rejected and it may be concluded that there is a positive significant relationship between the farm size of the respondents with their attitude towards use of pesticide. It means that higher the farm size, the higher was their favourable attitude towards use of pesticides and vice-versa. It is quite logical that high farm size category people are bound to use pesticide as they can not use non-chemical pesticides with their large farm because chemical pest control is easier and less time consuming than non- chemical pesticides.

4.3.5 Relationship between family annual income of the respondents and their attitude towards use of pesticides

The relationship between annual family income of the farmers and their attitude towards the use of pesticides was examined by testing the null hypothesis: "There is no relationship between annual family income of the farmers and their attitude towards use of pesticides"

The co-efficient of correlation between the concerned variables was 0.197 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a positive trend.
2. The computed value of 'r' (0.197) was found to be slight larger than the table value ('r' = 0.196) with 98 degrees of freedom at 0.05 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore the null hypothesis was rejected and it may be concluded that there is a positive significant relationship between the family annual income of the respondents with their attitude towards use of pesticide. It means that higher the family annual income, the higher was their favourable attitude towards use of pesticides and vice-versa. It is quite logical that high annual income category people are bound to use pesticide because chemical pest control is easier and less time consuming than non- chemical pesticides.

4.3.6 Relationship between training exposure of the respondents with their attitude towards use of pesticides

The relationship between training exposure of the farmers with their attitude towards use of pesticides was examined by testing the following null hypothesis: "There is no relationship between training exposure of the farmers with their attitude towards use of pesticides"

The co-efficient of correlation between the concerned variables was 0.077 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a positive trend.
2. The computed value of 'r' (0.077) was found to be less than the table value ('r' = 0.196) with 98 degrees of freedom at 0.05 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore, the null hypothesis was accepted and it may be concluded that there was no relationship between training exposure of the respondents with their attitude towards use of pesticides.

4.3.7 Relationship between extension contact of the respondents and their attitude towards the use of pesticides

The relationship between extension contact of the farmers and their attitude towards the use of pesticides was examined by testing the following null hypothesis: "There is no relationship between extension contact of the farmers with their attitude towards use of pesticides"

The co-efficient of correlation between the concerned variables was - 0.219 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a tendency in the negative direction between the concerned values.
2. The computed value of 'r' (-0.219) was found to be larger than the table value ('r' = 0.196) with 98 degrees of freedom at 0.05 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore the null hypothesis was rejected and it may be concluded that there was negative significant relationship between extension contacts of the respondents with their attitude towards use of pesticide. It means that the higher the extension contact of the respondents the lower was their favourable attitude towards use of pesticide and vice-versa. It is quite logical that extension contact can increase the level of consciousness of the people to use pesticides.

4.3.8 Relationship between organizational participation of the respondents and their attitude towards the use of pesticides

The relationship between organizational participation of the farmers with their attitude towards the use of pesticides was examined by testing the null hypothesis: "There is no relationship between organizational participation of the farmers with their attitude towards use of pesticides"

The co-efficient of correlation between the concerned variables was - 0.335 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a tendency in the negative direction between the concerned values.
2. The computed value of 'r' (-0.335) was found to be larger than the table value ('r'=0.256) with 98 degrees of freedom at 0.01 level of probability.
3. An insignificant relationship was found between the two variables

Therefore the null hypothesis was rejected and it may be concluded that there was negative significant relationship between organizational participation of the respondents with their attitude towards use of pesticide. It means that the higher the organizational participation of the respondents the lower was their favourable attitude towards use of pesticide and vice-versa. It is quite logical that organizational participation can increase the level of consciousness of the people to use of pesticides.

4.3.9 Relationship between knowledge on pesticides of the respondents and their attitude towards the use of pesticides

The relationship between knowledge on pesticides of the farmers with their attitude towards use of pesticides was examined by testing the following null hypothesis: "There is no relationship between knowledge on pesticides of the farmers with their attitude towards use of pesticides"

The co-efficient of correlation between the concerned variables was - 0.311 as shown in Table 4.3. The following observations were made regarding the relationship between these two variables, based on the coefficient values:

1. The relationship showed a tendency in the negative direction between the concerned variables.
2. The computed value of 'r' (-0.311) was found to be larger than the table value ('r' = 0.256) with 98 degrees of freedom at 0.01 level of probability.
3. An insignificant relationship was found between the two variables.

Therefore, the null hypothesis was rejected and it may be concluded that there is a negative significant relationship between knowledge on pesticides of the respondents with their attitude towards use of pesticide. It means that the higher level of their knowledge the lower of their favourable attitude towards use of pesticide and vice-versa. It is quite logical that knowledgeable people are conscious about use of pesticide.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

5.1.1 Introduction

Bangladesh is mainly an agricultural country. All out efforts are being made by the people of our country to increase agricultural production for feeding the rapidly increasing population. One of the efforts is the use of agrochemicals in agriculture. The farmers of this country are increasingly using these agrochemicals in their farming without considering its long run effect, either knowingly or unknowingly.

Soils of Bangladesh are reducing its fertility to a longer extent due to over use of chemicals. Global warming is also contributed to some extent by use of chemicals. Indiscriminate use of insecticides is also polluting environment to a great extent. The farmers are using chemicals in vegetables and consume it before ending its residual effect. Also use of insecticides in water logged rice field pollutes water and ultimately aquatic lives especially fishes are affected. The farmers are using insecticides without considering recommended dose and selectively of insecticides. As a result many unwanted problems arise in the field of agriculture.

But land and water resources are not like the machine that could be placed. So, it is imperative to think agriculture as a perpetual occupation. Hence, it needs consideration of sustainability in agriculture.

To maintain sustainability in agriculture many countries of the world (e.g. Indonesia) have banned use of 50 different kinds of insecticides. In Bangladesh it has also become a burning issue.

Agricultural extension in Bangladesh render their services among the farmers to bring desirable changes in their behavior. Since it is necessary to reduce use of agrochemicals. Therefore, for an effective planning of extension service regarding this matter, to what extent the farmers are aware of use of pesticide. The present study was undertaken, however to determine farmers' attitude use of pesticides.

5.1.2 Specific Objectives

The following specific objectives were formulated to give proper direction to the study:

1. To determine and describe some selected characteristics of the respondents,
2. To determine the extent of farmers' attitude towards use of pesticides and
3. To explore the relationship between the selected characteristics of the farmers' with their attitude towards use of pesticides

5.1.3 Methodology

The two villages namely, Boliardi and Arha of Bajitpur thana were selected purposively as the locale of the study. Data were collected from 64 farmers of Boliardi village and 36 farmers of Arha village selected by random sampling method. Data were collected by the researcher himself by interviewing the farmers according to the interview schedule. Simple direct questions and a few scales were included in the interview schedule. Data obtained from the respondents were coded, compiled, tabulated and analyzed in accordance with the objectives of the study.

Attitude towards use of pesticides was the dependent variable of the study. Nine characteristics of the farmers were selected as independent variables. The characteristics were: age, education, family size, farm size, annual family income, training exposure, extension contact, organizational participation and knowledge on pesticide.

Statistical measures such as: number and percentage distribution, range, average, standard deviation were used in describing the attitude and selected characteristics of the farmers. Tables were used for presentation of data. To explore the relationships between the dependent and independent variables correlation analysis were done. Throughout the study, at least five percent (0.05) level of probability was used as the basis for rejection of any null hypothesis.

5.1.4 Findings

5.1.4.1 Selected characteristics of the farmers

Age

The respondents were 35.91 years old on an average with the standard deviation 12.54. The ranged was 16 -70 years. Fifty percent of the farmers fell in middle aged group while 37 percent and 13 percent were young and old aged groups respectively.

Education

The academic qualification of the respondents ranged from 0-12 with the mean of 3.61 and standard deviation being 3.227. Highest proportion (64 percent) had primary level education while 15 percent and 3 percent had secondary level and upper secondary level education respectively. Eighteen percent of the respondents had no literacy.

Family size

The number of the family members of the respondents ranged from 3-12 with the mean 5.91 and standard deviation being 1.64 .The majority of the respondents had medium family size.

Farm size

It was found that farm size of the respondents ranged from 0.20 to 4 hectares with the mean.8864 and standard deviation being 0.6480. Highest proportion (76 percent) of the respondents had medium farm as compared to11percent had small and 13 percent had large farm size.

Family annual income

The annual income of the respondents ranged from Tk.20000 to Tk.200000 with the mean of Tk.56000 and standard deviation being Tk.34000. Annual income of 69 percent of the respondents ranged from Tk.31000-100000.

Training exposure

The training exposure scores of respondents ranged from 0 to 3 with a mean of 0.21 and standard deviation of 0.769. The majority (93 percent) of the farmers had no training experience in the study area.

Extension contact

Extension contact of the respondents ranged from 0 to 12 with the mean 5.98 and standard deviation being 3.25. The majority (55 percent) of the farmers had medium extension contact, 21 percent had low extension contact and 24 percent had high extension contact.

Organizational participation

Organizational participation of the respondents ranged from 0 to 9. In the study area organizational participation was very poor. Forty one percent of the respondents had no organizational participation.

Knowledge on pesticides

The knowledge on pesticides of the respondents ranged from 7 to 22 with the mean 15.39 and standard deviation being 3.001. The majority (78 percent) of the respondents had medium knowledge while 15 percent and 7 percent had low and high knowledge respectively.

5.1.4.2 Farmers' attitude towards use of pesticides

Attitude scores of the respondents varied from 16 to 33 against the possible of 0 to 48. The mean was 22.87 and standard deviation 2.501. Most of the respondents (77 percent) had medium attitude as compared to similar percent had poor and high attitude towards the use of pesticides.

5.1.4.3 Relationship between the selected characteristics of the farmers with their attitude towards use of pesticides

Farm size and Family annual income of the farmers' had significant positive relationships with their attitude towards use of pesticides.

Education, extension contact, organizational participation and knowledge on pesticides of the farmers had significant negative relationships with their attitude towards use of pesticides.

Age, family size and training exposure of the farmers had no significant relationships with the attitude towards use of pesticides.

5.2 Conclusions

The following conclusions were drawn on the basis of the findings of this study and logical interpretation of their meaning by the researcher.

1. The findings of the study revealed the majority (77%) of the respondents had moderately favorable attitude while 10% had slightly favorable attitude and only 13% had highly favourable attitude towards use of pesticides. This means that 90% of the respondents were lacking of proper attitude by various known and unknown factors.
2. It was found that there was negatively significant relationship between education of the farmers with their attitude towards use of pesticides. Education is generally a contributory factor for gaining knowledge and skill and playing a key role for making proper attitude toward proper things. Hence it may be concluded that non-formal education and massive motivational training on IPM, pesticides etc. especially designed for illiterate and less educated farmers have a conducive effect on judicious use of pesticides.
3. It was observed that farm size of the respondents had significantly and positively relationship with their attitude towards use of pesticides. This leads to the conclusion that the farm size make the owner more aware on the use of pesticides.

4. Annual family income of the respondent in the study area was significantly and positively associated with their attitude towards use of pesticides. Higher annual income predisposes farmers to maintain high economic and social status. They had ability to purchase high cost pesticides. They like to use pesticides because use of pesticides is easier and less time consuming than non-chemical method.
5. Extension contact of the farmers showed a significant negative relationship with their attitude towards use of pesticides. Therefore, it may be concluded that more attention may need to be paid towards farmers having extension contact, so that they become aware about the benefits of IPM for control insect or disease and maximizing crop production.
6. Organizational participation of the farmers showed a significant negative relationship with their attitude towards use of pesticides. Organizational participation helps an individual to work in co-operation with others for solution of various problems.
7. Knowledge on pesticides of the farmers showed significant negative relationship with their attitude towards use of pesticides. It means that the higher the knowledge about pesticides is also a crucial factor influencing farmer's attitude. Above fact leads to the conclusion the necessary steps should be taken to pay more attention to low to medium knowledge category of farmers so that they become more conscious about the use of pesticides.

5.3 Recommendations

5.3.1 Recommendations for policy implication

Based on the findings and conclusions of the study, the following recommendations are presented below:

- It may be recommended that steps are necessary to provide environment related massive training to farmers giving emphasis on the adverse effect of using agro-chemicals for achieving sustainable agricultural development and maximizing crop production. The DAE and NGOs should take special type of extension programmes for providing effective training on use of pesticides to the farmers in the study area.
- Education helps an individual to realize the present and future needs at the personal, social and national levels. Educational facilities especially environmental issues should be provided the farmers.
- Training exposure of the farmers had no relation with their attitude towards use of pesticides. So training is essential component for increasing the knowledge and skills of farmers.
- Extension contact of the farmers had negatively significant relationship with their attitude towards use of pesticides. More extension contact means more collection of information on various matters and more interaction with different sources of information. So effective extension contact is necessary for the change of farmers attitude towards use of pesticides.

- Organizational participation of the farmers had negative significant relationship with their attitude towards use of pesticides. It is therefore, recommended that steps should be taken to encourage participation of the farmers in local organization and they should be encouraged to set up organizations which would be helpful to the farmers to receive new ideas and facts and also necessary action.
- Knowledge on pesticides of the farmers had negative significant relationships with their attitude towards use of pesticides. Therefore steps should be taken to improve the level of knowledge on judicious use of pesticides of the farmers. Farmers need to have adequate knowledge on judicious use of pesticides. DAE and other leading NGOs can play their key role in this regard.

5.3.2 Recommendations for further study

The following suggestions were put for further study in connection with this study-

1. The study was conducted in the two villages of Kishoregonj district. Similar studies should be conducted in other areas of Bangladesh.
2. Attitude towards use of pesticide was investigated. But such study may be conducted by taking into consideration of other factors.
3. Relationships of nine characteristics of the farmers with their attitude were investigated in this study. Further research should be conducted to explore relationships of other characteristics of the farmers with their attitude towards use of pesticides.

4. Further research is necessary to find out effective ways and means of providing education including environmental issues in agriculture to the farmer.
5. This study was conducted at the farmers' level and similar studies may be conducted at the different levels of DAE, especially sub-assistant Agriculture Officers.

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APPENDIX – A

English Version of the Interview Schedule
Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University
Dhaka –1207

An interview schedule on Attitude of farmers towards use of pesticides

Serial no

Name of the respondent:

Address:

(Please answer the following questions)

1. Age

What is your present age?

2. Education

Please mention your educational status from the following

- a. Can not read and write
- b. Can sign only
- c. I have passed class
- d. Did not attend school but know writing and reading which is equivalent to class

3. Family Size

What is the number of your family members?

4. Farm size

Please mention your farm size

SL.NO	Nature of land	Area of the land	
		Local unit	Hectare
1	Homestead non agril.land		
2	Homestead agril. land		
3	Own land under own cultivation		
4	Land taken from others on borga		
5	Land given to others on borga		
6	Land taken from others as lease		
7	Total		

5. Family annual income

Please mention your annual income in taka from the following sources

Serial no	Source of income	Income (taka/year)
1	Agriculture	
2	Rearing of cattle's, goats etc	
3	Poultry	
4	Fish culture	
5	Business	
6	Service	
7	Day labour	
8	Others	
9	Total	

6. Training exposure

Please mention the following information

SL.No	Name of the training course	Concerned organization	Duration training
1			
2			
3			

7. Extension contact

Please mention the extent of your contact with the following source

SL.No	Sources	Extent of contact				
		Regularly	Often	Occasionally	Rarely	Never
1	Local leader/Ideal farmer					
2	NGO worker					
3	Block Supervisor					
4	Thana Agril Officer					
5	Agril input dealer					
6	Agril.fair					
7	Farmers training					
8	Radio					
9	Television					
10	Daily Newspaper					

8. Organizational Participation

Please mention the nature and duration of your participation with the following organization

SL.No	Name of Organization	Not Participated	Duration of participation (Year)		
			Ordinary member	Executive member	Executive Officer
1	Farmers cooperative society				
2	School Committee				
3	Madrassa Committee				
4	Mosque Committee				
5	NGO				
6	Market Committee				
7	Others				

9. Please answer the following question

SL.No	Question	Full marks	Marks obtained
1	In what direction of wind, pesticide should be sprayed?		
2	What time do you like best for using pesticide?		
3	Where do you wash your hands and machineries after spraying pesticide?		
4	What is the negative effect of using excess pesticide?		
5	Where do you keep your machineries after spraying pesticide?		
6	Please mention two pesticides found in local market.		
7	Please mention two methods of pest control in our country.		
8	What caution should be taken using of pesticide?		
9	Mention two negative effects of using pesticide		

10	Mention two positive effects of using pesticide.		
11	Why fish species decrease in our country?		
12	Why we don't see bird in the field now?		
13	Mention two pesticides which make by plant product.		
14	What can be used without pesticide for control bean aphid?		
15	What will you do when plant or plant parts affect by virus?		

10. Attitude of farmers towards use of pesticide

SL No	Statements	Extent of agreement				
		Strongly agree	Agree	No opinion	Disagree	Strongly disagree
-1	The use of pesticides are harmful than useful.					
+2	Pesticide should apply immediately just after the infection of pest.					
-3	Pesticide is the cause of death of aquatic living beings.					
+4	Pesticide do not reduce the soil fertility.					
-5	Pesticide is the cause of death of poultry.					
+6	The use of pesticide increase crop yield.					
-7	Pesticide increase of human disease.					
+8	There is no way use of pesticide					

	when pest attack injuriously.					
-9	Pesticide is the cause of death of useful insect.					
-10	Pesticide decrease food test and quality.					
+11	Regular use of pesticide does not any insect in crop that sell high rate.					
-12	Pesticide pollutes air& water.					

Thanks for your co-operation

Signature of the interviewer

Date:

APPENDIX – B

Correlation matrix of the dependent and independent variables (N= 100)

Variables	A	B	C	D	E	F	G	H	I	J
A	1.000									
B	-0.029	1.000								
C	0.484**	-0.108	1.000							
D	0.105	0.248*	0.116*	1.000						
E	0.260**	0.295**	0.204	0.642**	1.000					
F	0.168	0.088	0.063	0.121	0.160	1.000				
G	-.379**	0.392**	-0.222*	0.074	-0.127	0.002	1.000			
H	-0.117	0.411**	-0.056	0.226*	0.91	-0.025	0.392**	1.000		
I	-0.041	0.637**	-0.079	0.187	0.267**	0.174	0.134	0.335**	1.000	
J	0.060	-.267**	0.142	0.275**	0.197*	0.077	-0.219*	-.335**	-0.311**	1.000

*Correlation is significant at the 0.05 level (2 tailed)

** Correlation is significant at the 0.01 level (2 tailed)

- A = Age
- B = Education
- C = Family size
- D = Farm size
- E = Annual income
- F = Training exposure
- G = Extension contact
- H = Organizational participation
- I = Knowledge on pesticides
- J = Farmers' attitude towards use of pesticides