PROMOTIONAL STRATEGY FOR THE UTILIZATION OF PLANT BASED PESTICIDES IN VEGETABLE CULTIVATION IN THRISSUR DISTRICT - AN EXPERIMENTAL STUDY

By

RASHMI ANNIE JOSE

THESIS

Submitted in partial fulfilment of the requirement for the degree of

Master of Science in Agriculture

(AGRICULTURAL EXTENSION)

Faculty of Agriculture

Kerala Agricultural University

Department of Agricultural Extension

COLLEGE OF HORTICULTURE

VELLANIKKARA, THRISSUR - 680654

KERALA

1998

DECLARATION

I hereby declare that the thesis entitled '**Promotional strategy for the utilisation of plant based pesticides in vegetable cultivation in Thrissur district - An experimental study**' is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

Vellanikkara

24 -2 -1998

Rashmi

RASHMI ANNIE JOSE

CERTIFICATE

Certified that the thesis entitled **`Promotional strategy for the utilisation of plant based pesticides in vegetable cultivation in Thrissur district - An experimental study'** is a record of research work done independently by **Miss.Rashmi Annie Jose**, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him.

Dr.N.P.Kumari Sushama
Chairperson, Advisory Committee
College of Horticulture
Vellanikkara

Vellanikkara
24-2-1988

CERTIFICATE

We, the undersigned members of the Advisory Committee of **Mis.Rashmi Annie Jose**, a candidate for the degree of **Master of Science in Agriculture** with major in **Agricultural Extension**, agree that the thesis entitled '**Promotional strategy for the utilisation of plant based pesticides in vegetable cultivation in Thrissur district - An experimental study**' may be submitted by Mis.Rashmi Annie Jose, in partial fulfilment of the requirement for the degree.

Dr.N.P.Kumari Sushama
(Chairperson, Advisory Committee)
Associate Professor
Department of Agricultural Extension
College of Agriculture, Vellayani

Dr.O.Abdul Rahiman Kunju
Professor (Retd.)
Department of Agricultural Extension
College of Agriculture
Vellayani

Dr.Joy Mathew
Professor i/c
Central Training Institute
Mannuthy

Dr.T.N.Vilasini
Associate Professor
Department of Plant Pathology
College of Horticulture
Vellanikkara

EXTERNAL EXAMINER

ACKNOWLEDGEMENT

I sincerely acknowledge my deep sense of gratitude and indebtedness to ***Dr.N.P.Kumari Sushama,*** *Associate Professor, Department of Agricultural Extension, College of Agriculture, Vellayani and Chairperson of my Advisory Committee for her expert guidance and enduring patience throughout the course of my study and preparation of the thesis.*

I am very much obliged to ***Dr.Abdul Rahiman Kunju,*** *Professor (Retd.), Department of Agricultural Extension, College of Agriculture, Vellayani,* ***Dr.Joy Mathew,*** *Professor i.c, Central Training Institute, Mannuthy and* ***Dr.T.N.Vilasini,*** *Associate Professor, Department of Plant Pathology, College of Horticulture, Vellanikkara for their valuable suggestions and advice during the entire period of my research study.*

I profusely thank Dr.C.Bhaskaran, Associate Professor, Department of Agricultural Extension, College of Agricultural, Vellayani for his valuable suggestions and advice throughout the course of my study.

I express my sincere gratitude to Dr.Ranjan S. Karippai, Dr.P.S.Geethakutty, Dr.Alexander George and Dr.F.M.H.Khaleel, Associate Professors of Department of Agricultural Extension for their co-operation and guidance during the entire period of my study.

I am also thankful to Smt.Gracemma Kurian, Department of Agricultural Statistics for the timely help in the analysis and interpretation of the data.

I thank profusely my friends Mercy, Meera, Anitha, Fathima, Indu, Deepa, Sona, Liji, Duethi, Preeti, Lincy and Manojkumar for their help at different stages of my research work.

I thankfully acknowledge all the farmer respondents of my study for their whole-hearted co-operation with the investigation.

I further express my thanks to Mr.Joy for his neat typing of the manuscript.

It is with deepfelt gratitude, I remember the warm blessings, moral support and inspiring encouragement of my parents and my sister.

I am extremely grateful to my husband Bino for his whole-hearted support.

The award of fellowship by KAU is gratefully acknowledged.

Above all, I thank ALMIGHTY GOD whose blessings has helped me to complete this endeavour successfully.

Rashmi Annie Jose

CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

Introduction

INTRODUCTION

Mounting pressure of teeming population and shrinking land resources have necessitated increased production of food per unit area. Insect pests, diseases and weeds are important biotic constraints inflicting 20-25 per cent loss in agricultural production. Synthetic pesticides have of course played a very significant role in restricting many pest problems (NAS, 1969).

Despite these credentials, the use of synthetic pesticides has been ecologically unsound, associated with disadvantages like pest resistance, outbreak of secondary pests, adverse effect on non target organisms, objectionable pest residues and direct hazards to the user. Chemical pesticides which are easily accessible to the farmers giving quick results were often used indiscriminately and unnecessarily leading to several hazards to man and created lot of environmental problems (Regupathy, 1988).

The studies on contamination of the Indian environment by pesticides revealed that pesticides were the major contaminants in all food commodities and also the human system, blood, fat and milk. The monitoring reports on vegetables revealed high level of contamination by pesticides in vegetables consumed by people in Kerala (Mathew *et al.*, 1990). Many of the vegetables are consumed raw and so use of chemical pesticides which have residual toxicity needs to be curtailed.

It is high time to think about an environment based pest control strategy. Botanicals are plant derived substances which are chemically active against pests. Botanical pesticides have many active chemicals each of which may simultaneously affect more than one physiological system of an insect. Bioactive products of plant origin being less persistent in environment and safe to mammals and other non

toxic organisms have become the focus of attention today. Keeping in view the above facts an attempt has been made here to study about the commonly used and important plant based pesticides, viz., neem kernel suspension and tobacco decoction.

Neem based products are the best known of botanical pesticides today. Neem does not pollute, it is harmless to farmers and to those who consume the crop on which it is used, as well as to birds, mammals etc. Azadirachtin, the most potent chemical identified in neem, causes no serious harm to beneficial species such as pollinating bees and earth worms.

Tobacco decoction is also a very effective botanical. This is very cheap and their crude extracts can be easily prepared by farmers. There is no need to purify the chemicals, since crude extracts are highly effective.

Effective communication of farm information to the farmers is the key to socio-economic transformation of a nation. A successful extension worker needs to choose effective extension methods to communicate ideas and practices to the farmers. The effectiveness of an extension method is judged in terms of its capability to transfer the instructional content to its fullest measure to the recipient. Different methods were used and UNESCO (1958) proved that people retained 20 per cent of what they had heard, 30 per cent of what they had seen, 50 per cent of what they had heard and seen

The study proposed is an attempt to conduct different experiments for popularising two plant based pesticides viz., neem kernel suspension and tobacco decoction which are recommended by Kerala Agricultural University (KAU) in vegetable cultivation. Two popular vegetables grown in homesteads i.e. cowpea and

amaranthus need to be selected for the study. Different extension methods and their combination like lecture, lecture + group discussion and lecture + group discussion + method demonstration have to be used. Impact of these treatments on farmers knowledge, attitude and symbolic adoption require to be ascertained.

With these in view, this research study was conducted with the following specific objectives.

1. To develop a strategy for the promotion of the utilisation of plant based pesticides.
2. To assess the level of knowledge of farmers about plant based pesticides in vegetable cultivation.
3. To find out the attitude of farmers towards plant based pesticides in vegetable cultivation.
4. To know the symbolic adoption of plant based pesticides in vegetable cultivation.
5. To study the impact of extension methods on the knowledge, attitude and symbolic adoption of plant based pesticides in vegetable cultivation.
6. To study the constraints in the use of plant based pesticides in vegetable cultivation.

Scope of the study

The study proposed is an attempt to conduct experiments for popularising plant based pesticides in vegetable cultivation. They are less costly, available locally and are eco-friendly. So the findings of this study will be of paramount practical significance in sustaining vegetable production on profitable lines and at the same time in reducing health hazards.

The realization by consumers that synthetic pesticides are harmful in forcing the pesticide industry to look for safer alternatives. Botanicals are less likely or slower to result in the development of resistance or resurgence in pests. So now-a-days they are gaining more and more popularity.

Impact of extension methods which are effective in improving the knowledge, attitude and symbolic adoption of farmers about plant based pesticides in vegetable cutlivation will be useful in formulating promotional strategies for the utilisation of plant based pesticides.

Limitations of the study

The present research work formed a part of post graduate programme which was a single student investigation and hence it has all the limitations of time, finance, mobility and other resources. The study was restricted to one panchayat and only two major vegetables - amaranthus and cowpea were taken for this study. So it may not be possible to generalise the findings of the study for the entire state. Inspite of these limitations every effort was made by the researcher to carry out the study as systematic and objective as possible.

Presentation of the thesis

The thesis is divided into five chapters including the present one. The present chapter already covered the scope, objective and limitations of the study.

The second chapter deals with review of literature relevant to the study.

The details of the study area, selection of respondents, procedures adopted for development of the indices, selection, operationalization and measurement of variables, tools of data collection and statistical techniques used are covered in the third chapter 'Methodology'.

The fourth chapter deals with the results of the study obtained and also discussion on the results in detail.

The fifth and final chapter presents the summary and implications of the study. The references, appendices and abstract of the thesis are given at the end.

Theoretical Orientation

CHAPTER-II

THEORETICAL ORIENTATION

The purpose of this chapter is to review briefly the findings of the research studies carried out on various topics that are related to this problem under study.

Review of related literature is an essential step in educational research. It should be considered as a necessary step that would enable the researcher to base this rational argument for the justification of this study.

The collected reviews are presented under the following heads.

2.1 Concept of plant based pesticides

2.2 Studies on plant based pesticides

2.3 Level of knowledge of farmers about plant based pesticides and its relationship with selected characteristics of respondents

2.4 Attitude of farmers towards plant based pesticides and its relationship with selected characteristics of the respondents

2.5 Symbolic adoption of plant based pesticides and its relationship with selected characteristics of respondents

2.6 Effectiveness of different extension teaching methods

2.7 Constraints in the adoption of recommended technology

2.8 Conceptual frame work of the study

2.1 Concept of plant based pesticides

KAU (1993) while formulating package of practices recommendations pointed out that plant derived substances are chemically active and are harmful against insect pests.

Periera's (1993) study revealed that many of the plant extracts are known to be powerful pesticides and neem is the best known of the botanicals today.

Chander and Munshi (1995) stated that bioactive products of plant origin being less persistent in environment and safe to mammals are used for pest control.

The study of Meera (1995) revealed that plant extracts are useful in controlling common insect pests in vegetable cultivation.

Preetha (1997) revealed that tobacco decoction is used for control of sucking insects in vegetables. This will supplement the farmers with sustainable and non polluting alternatives to the use of chemical pesticides.

2.2 Studies on plant based pesticides

Kanagasabapathi (1990) reported the scientific rationale of using tobacco leaf extract and neem cake dissolved in cows urine for controlling cotton boll worm among farmers practicing dryland agriculture

Nagarajah and Rao (1990) reported that 'azadirachtin', a substance isolated from neem has been found to have insecticidal and insect repellent properties.

Pereira (1993) stated that plant derived substances have been traditionally used for pest control for centuries in India. More than 500 species of plants have been used for field storage as well as for domestic pests.

Vijayalakshmi (1993) reported that knowing about and using traditional plant protection measures will help in a way of continuing with high yield farming without poisoning the soil, water and air with chemical fertilizers and pesticides.

Vivekanandan (1994) reported that neem cake contains alkaloid and this will repel the rice pests like green leaf hopper.

Meera (1995) revealed that only very few farmers were using plant based pesticides in vegetable cultivation. She also reported that most of the farmers had not taken seriously the effectiveness of plant based pesticides in controlling the common insect pests in vegetable crops.

Preetha (1997) reported that tobacco decoction with soap is a recommended practice for the control of sucking insects in vegetable.

2.3 Level of knowledgse of farmers about plant based pesticides and its relationship with selected characteristics of the respondents

In the absence of direct studies on plant based pesticides in this context, research works done on related fields are reviewed and presented in this section.

Bloom *et al.* (1956) defined knowledge as those behaviours and situations which emphasised the remembering either by recognition or recall of ideas, material or phenomenon.

Bhaskaram and Mahajan (1968) reported that young farmers and middle aged farmers retained slightly more knowledge as compared to the old group.

Gopal (1974) reported that the level of knowledge of farmers in cotton cultivation was very low. Out of 120 farmers covered in this study about 60 per cent obtained a knowledge score less than the mean score.

Khaleel (1978) noted a positive and significant influence of education on knowledge of paddy growers.

Somasundaram and Singh (1978) established knowledge as the crucial factor for extent of adoption by small farmers and as such knowledge of small farmers was found to be related with the extension agency contact.

Manivannan (1980) revealed that a significant association exists between knowledge level of sunflower growers and their farm size.

Selvanayagam (1980) inferred that young farmers gained more knowledge than the mid adult and late adult hood groups. He also stated that farmers studied upto secondary education gained more information than those having primary education.

Shukla (1980) reported that cropping intensity and knowledge had significant relationship with each other.

Kamarudeen (1981) found positive correlation between risk orientation and knowledge. He also observed positive correlation between knowledge and scientific orientation.

Jeyakrishnan (1984) stated that a positive relationship existed between economic motivation and knowledge about agricultural practices. He also reported that there was positive and significant relation between risk orientation and knowledge of farmers.

Godhandapani (1985) found that there existed no significant relationship between area of the farm and knowledge of farmers in agricultural practices.

Badagaonkar (1987) observed a significant relationship between annual income and knowledge. He also revealed that extension orientation had no significant relation with the level of knowledge of groundnut cultivators.

Pitchai (1987) reported that there was no significant relationship between farming experience and knowledge level of small and big farmers on messages formulated by T & V system.

Ramdass (1987) indicated that social participation was positively and significantly related with knowledge level of rural and urban farmers. He also stated that innovativeness had shown positive significant relationship with the knowledge level of rural and urban farmers.

Kanagasabapathi (1988) reported that majority of tribal farmers had only low level of knowledge on ragi cultivation

Krishnamoorthy (1988) reported that significant relationship existed between age and knowledge of seed treatment of irrigated cotton.

Dharmalingam (1990) found that scientific orientation established a significant positive relationship with the knowledge level of paddy farmers in weedicide technology.

Ratnabai (1990) reported that the risk orientation had no significant relationship with the knowledge level of farmers

Satheesh (1990) reported positive and significant relationship between knowledge and area under cultivation.

Selvaraj (1990) concluded that size of farm contributed favourably and directly to knowledge gain. He also reported that annual income contributed indirectly towards knowledge gain.

Bonny (1991) found that majority of vegetable growers had medium level of knowledge on improved vegetable cultivation.

Gopala (1991) stated that relationship between economic motivation and knowledge level was nonsignificant.

Chaudhari and Makode (1992) reported that there was positive relationship between economic motivation and knowledge level.

Ahiah (1993) reported that there was no significant relationship between farming experience and knowledge level of farmers.

Nirmala (1993) found that innovativeness was positively significant with the knowledge level of farmers on biofertilizers.

Sumathi and Annamalai (1993) found a significant influence of education on knowledge level of paddy farmers.

Suresh (1993) observed that risk orientation was positively significant with the knowledge level of farmers.

Babu (1995) stated that education was significantly correlated with the level of knowledge of farmers.

Philip (1995) stated that farming experience had no association with knowledge gain. He also concluded that farm size had maximum direct favourable effect towards knowledge gain.

Jeyasubramanian (1996) observed that the age of participants had shown slightly negative relationship with knowledge gain. He observed that educational qualification had exhibited a positive and highly significant association with knowledge gain and annual income had exhibited a non significant relationship with that of knowledge. He observed that farming experience had shown positive relationship and farm size had exhibited a non significant negative correlation.

Manju (1997) reported that education was significantly and negatively correlated with knowledge and stated that farming experience was positively and significantly related with indigenous knowledge.

She reported that area under cultivation and cropping intensity had significant negative relationship with the knowledge level of farmers. She also pointed out that economic motivation, innovativeness and scientific orientation had

significant negative relation with knowledge. Manju also reported that extension orientation had significant relationship with the level of knowledge.

2.4 Attitude of farmers towards plant based pesticides and its relationship with selected characteristics of the respondents

Allport (1935) defined attitude as a mental and neural state of readiness organised through experience, exerting a directive or dynamic influence upon the individuals response to all objects and situations with which it is related.

Carter (1953) pointed out that attitude as important determinant of achievement has won wide acceptance.

Sharma (1972) defined attitude as personal disposition which impels an individual to react to some object or situations.

Vasudeva (1976) defined attitude as an enduring organisation of evaluative belief and a learned technology to react positively or negatively varying in degrees to certain class of objects which determine the actual and potential responses of the individual.

Mani (1980) observed positive and significant association between farm size and attitude of turmeric growers towards regulated markets.

Prakash (1980) reported that there was no significant relationship of farm size with farmers' attitude towards settled agriculture.

Ravichandran (1980) revealed that farming experience had significant and positive relationship with attitude of registered sugarcane growers towards sugar factory.

Kamarudeen (1981) stated cosmopoliteness was non significantly related to attitude in the case of neighbouring farmers. He also revealed that degree of contact with extension agency had positive and significant relationship with attitude of farmers.

Naik (1981) reported significant association between risk preference and attitude of farmers.

Vijayakumar (1983) reported significant relationship between cosmopoliteness and attitude.

Cherian (1984) reported significant association between risk preference and attitude of farmers.

Krishnakumar (1987) reported that no significant relationship existed between farmers attitude and farming experience

Prabhu (1988) reported that no significant relation existed between farmers attitude and farming experience.

Chandra and Singh (1992) reported that attitude and adoption had significant positive relationship.

Fathimabai (1993) reported that contact with extension agency and economic motivation had a non significant relationship with attitude.

Jnanadevan (1993) reported the existence of positive and significant relationship between farming experience and attitude of farmers. He also reported positive and significant relationship of economic motivation with attitude of farmers.

Sulaiman and Prasad (1993) reported that attitude and adoption had significant positive relationship.

Mercykutty (1997) reported that 76.67 per cent and 71.33 per cent respondents were in the low category with respect to their attitude towards use of biofertilizers and knowledge on biofertilizers respectively.

2.5 Symbolic adoption of plant based pesticides and its relationship with selected characteristics of respondents

Chandrakandan (1982) revealed that education had high significant positive correlation towards symbolic adoption.

He also observed that age had negative correlation towards the variable symbolic adoption. He revealed that farm size had high significant positive correlation towards symbolic adoption.

Ambastha (1986) defined symbolic adoption as the decisions made by the farmer to adopt innovations with respect to summer paddy and dwarf wheat.

Ramkumar (1987) referred symbolic adoption as the mental decision of the respondent to make full use of an innovation.

Selvaraj (1990) revealed that farming experience had indirectly and positively contributed to symbolic adoption. A negative association between annual income and symbolic adoption was also reported by him.

Singh and Singh (1990) revealed that education explained variation in symbolic adoption to the extent of 50 per cent.

They also reported that risk preference and contact with extension agency were found to contribute most to symbolic adoption

Chiprikar and Khupse (1992) identified significant positive correlation between area under grapes and adoption behaviour of grape growers.

Jeyasubramanian (1996) stated that education had shown non significant negative relationship with the symbolic adoption behaviour of the participants. He also inferred that farming experience of the participants and their symbolic adoption had no association with each other. It was also stated that no association existed between annual income of the participants and their symbolic adoption.

Selvaraj (1997) stated that symbolic adoption of any technology is an important stage in adoption process It is nothing but the decision stage to adopt a technology.

2.6 Effectiveness of different extension teaching methods

Marks (1955) reported that most people retained 10-15 per cent of what they had read, 20-25 per cent of what they had heard and 30-35 per cent of what

they had seen and 50 per cent or more of what they had seen and heard at the same time.

Rao (1965) revealed that 49 per cent of agricultural extension officers were using method and result demonstrations. The most frequent use of result demonstration and method demonstration by agricultural extension officers was because they were very effective in improving the knowledge level.

Khara (1967) stated that lecture meetings were significantly better among group contact methods in the first information stage in the adoption of hybrid seeds.

Bhaskaram and Mahajan (1968) revealed that method demonstration was found to be the most effective extension method compared to lecture and flash card and lecture alone in respect of retention of knowledge about the practice as well as adoption.

Bharadwaj and Hansra (1983) reported that printed material followed by group discussion was found to be the most effective mode for communicating knowledge to the members of charchamandals.

Manchanda and Hansra (1983) revealed that there was significant gain and retention of knowledge through selected extension teaching methods namely lecture method, printed material followed by group discussion when compared with the control group.

Singh and Babu (1984) revealed that there was significant increase in adoption of agricultural practices with the use of extension teaching methods.

Mangal and Hansra (1986) revealed the use of extension teaching methods was found to be very effective for gaining knowledge.

2.7 Constraints in the adoption of recommended technology

Sinha and Bhasin (1968) stated that difficulty and untimely availability of inputs might result in low adoption and at times even rejection of an agricultural innovation.

Nair (1969) in his investigation observed that lack of knowledge, non availability of inputs, high cost of fertilizers, insufficient labour supply and erratic rainfall were the important reasons for non adoption and partial adoption of the practices of paddy cultivation.

Waghmare and Pandit (1982) identified lack of knowledge, lack of technical guidance, high cost of inputs and non availability of credit as major constraints.

Sekar (1985) identified that the reasons for non adoption of biofertilizer technology were lack of awareness, lack of conviction about merits of practices, lack of technical skill etc

Vasanthakumar (1987) identified the constraints to agricultural development by the small and marginal farmers and classified them into five categories as general constraints, technological constraints, input oriented, credit oriented and infrastructural constraints. He concluded that there were more of input oriented constraints followed by general, credit oriented, infrastructural and technological constraints in that order.

Pandya and Trivedi (1988) defined constraints as those items or difficulties or problems faced by individual in the adoption of a technology

Bonny (1991) revealed that high cost of plant protection chemicals, inadequate markets, storage and post harvest facilities as the important constraints experienced by the commercial vegetable growers.

Geethakutty (1993) while analysing the fertilizer use behaviour of rice farmers in Kerala revealed lack of knowledge, about fertilizer use, lack of assured irrigation facilities, high cost of fertilizers, high rate of labour wages and increased incidence of pests and diseases as the major constraints.

Gopala and Krishna (1993) reported that lack of knowledge, lack of irrigation facility, lack of capital and lack of land as constraints in adoption of recommended sericultural practices.

Bhaskaran and Sushama (1994) cited lack of infrastructural facilities, absence of technological options and inadequate training for farmers as constraints in transfer of technology.

Jabbar (1996) revealed that the most important constraints in using improved vegetable production technologies were uneconomic holding size, inadequacy of capital and increased cost of plant protection chemicals.

Manju (1997) reported that emergence of new pests and diseases, increased pests and diseases and low productivity were the most important constraints perceived by the farmers in the case of indigenous technology adoption.

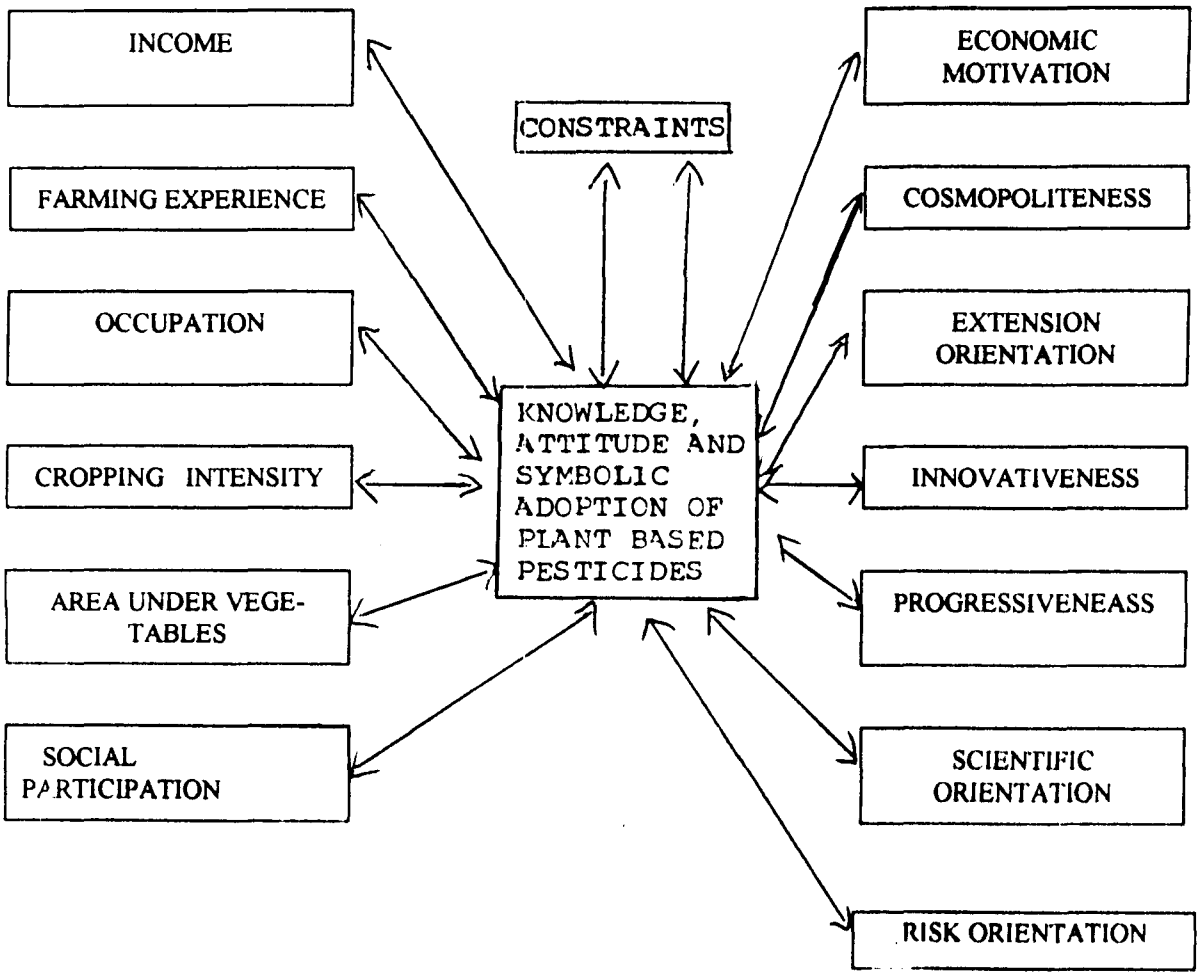
Mercykutty (1997) reported that lack of technical knowledge and inadequate awareness about biofertilizers were the most important client system constraints in the adoption of biofertilizer technology.

2.8 Conceptual framework of the study

The main objective of the conceptual frame work being developed in this study is to provide an abstract view of the knowledge, attitude and symbolic adoption of the respondents on plant based pesticides and their interaction with personal, socio-economic and psychological characteristics. The frame work is expected to facilitate theoretical and empirical analysis of the knowledge, attitude and symbolic adoption of the respondents (Fig. 1).

It is an accepted fact that knowledge, attitude and extent of symbolic adoption are influenced by personal, socio-economic and psychological characteristics of the respondents. These factors are intricately associated with each other and hence, a wholistic view of all these factors would give a clear picture of the dependent variables viz. knowledge, attitude and symbolic adoption.

Fig. 1. CONCEPTUAL MODEL OF THE STUDY



Methodology

CHAPTER-III

METHODOLOGY

The methodology followed in the study is presented under the following heads:

3.1 Locale of the study

3.2 Selection of the sample

3.3 Operationalization and measurement of variables

3.4 Methods used for data collection

3.5 Statistical tools used for the study

3.1 Locale of the study

The study was conducted in Thrissur district since the district accounted for considerable area under vegetable cultivation.

Puthur panchayat in Thrissur district was selected as this is one of the prime vegetable growing areas in the district and has the maximum area under vegetable cultivation. Map showing the area of the study is presented as Fig.2.

For the purpose of this study, two most important vegetables, popular in homestead vegetable gardens in the district namely amaranthus and cowpea were included. Two plant based pesticides recommended by the Kerala Agricultural University in the Package of Practices viz., tobacco decoction and neem kernal suspension were considered for the study.

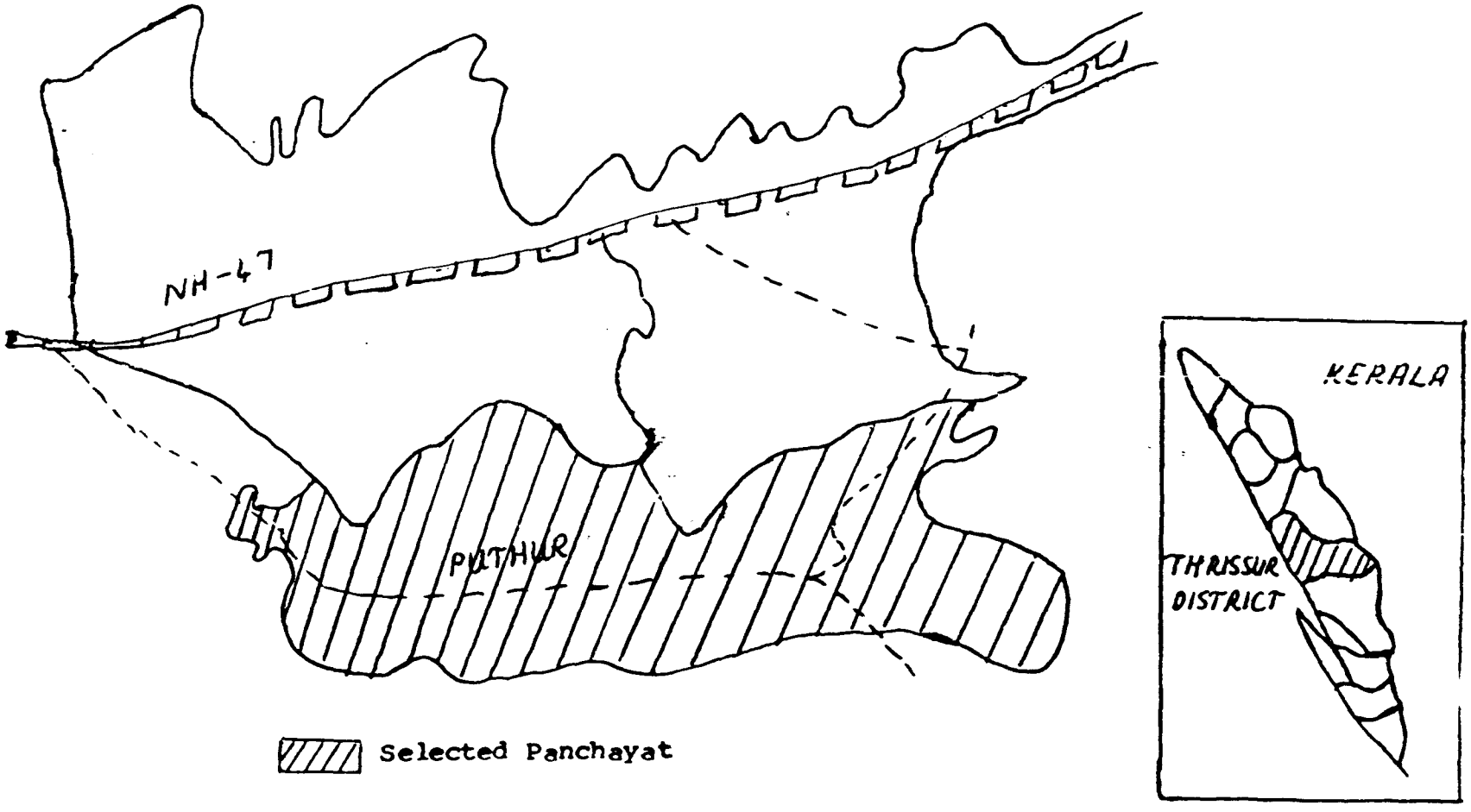


FIG.2 MAP SHOWING THE LOCATION OF SELECTED PANCYAYAT

3.2 Selection of the sample

The list of vegetable growers engaged in the cultivation of amaranthus and cowpea was prepared with the help of the staff of Krishibhavan.

A sample of 120 homestead vegetable growing farmers were selected in such a way that each respondent has some area under these two vegetables viz., cowpea and amaranthus. A pilot study was conducted among vegetable growers in Puthur panchayat for grouping the 120 respondents into four non-overlapping clusters. The 120 respondents were classified into non-overlapping clusters of four groups having 30 respondents in each group. Grouping was done based on their age and education and sum of these scores were taken and the respondents grouped into four categories.

Respondents coming under 30-40 age group were assigned a score of 1, 41-50 age group a score of 2 and those who are above 50 were given a score of 3. Farmers having collegiate education were given a score of 3, secondary education a score of 2 and primary education a score of 1. Based on the scores of age and education, a composite score was developed. The composite scores obtained were 6, 5, 4, 3 and 2. Grouping of respondents into four non-overlapping clusters of 30 each was done considering these composite scores. Then the respondents were exposed to different experimental treatments involving different extension teaching methods.

Lecture alone was given to the respondents having a composite score of 6. Lecture + group discussion were given to those having a composite score of 5. Individuals with composite score of 4 were given lecture + group discussion + method demonstration. Farmers having composite scores of 3 and 2 were clubbed

together and they formed the control group. The distribution of the respondents into four non-overlapping clusters and details regarding experimental treatments given to them are furnished in Table 1.

Table 1. Distribution of respondents into non-overlapping clusters based on composite scores

n = 120

Treatment	Total composite score	Audiovisual packages
T_1	6	Lecture alone
T_2	5	Lecture + group discussion
T_3	4	Lecture + group discussion + method demonstration
T_4	3 and 2 clubbed together	Control group

The subject of how to prepare neem kernel suspension and tobacco decoction was exposed to the selected 30 respondents in treatment No.1 through a lecture by the researcher.

In treatment No.2 the same subject was exposed to the selected 30 respondents through a lecture by the researcher followed by group discussion among the respondents

In treatment No.3, in addition to exposing the respondents to lecture and group discussion, the skill component of how to prepare neem kernel suspension and tobacco decoction were demonstrated to the selected 30 respondents by the researcher. The farmers were given opportunity to repeat the practice of how to prepare the above two plant based pesticides taking into consideration "learning by

doing" principle of method demonstration. In conducting these treatments, the actual involvement of the members of the advisory committee of the researcher was also ensured. Control group T_4 was not exposed to any of these treatments.

3.3 Operationalisation and measurement of variables included in the study

3.3.1 Operationalisation and measurement of independent variables

1. Annual income

This indicates the total annual income expressed in rupees earned by the respondent in an year.

2. Farming experience

Farming experience was operationalized as the experience of the farmer in vegetable cutlivation which is expressed in terms of number of years. The variable is quantified by asking the respondent to indicate the number of years he has been practicing vegetable cultivation

3. Occupation

The professional status of agriculture for a farmer respondent was measured by this variable. It refers to wheather agriculture was the respondents chief occupation or not.

Scoring procedure is as follows:

Farming as primary occupation	2
Farming as secondary occupation	1

4. Cropping intensity

It is defined as the number of crops raised in an year in a unit area by the farmer expressed in percentage.

The procedure followed by Prasad (1978) and as described by Balan (1987) was used for the measurement of cropping intensity. The farmer was asked to indicate single cropped land cultivated by him and was asked to provide the above data for both garden and wetland. The total cropped area per year was obtained by summation of single cropped area, twice the double cropped area and thrice the triple cropped area. The cropping intensity was calculated as below.

$$\text{Cropping intensity} = \frac{\text{Gross cropped area}}{\text{Net cropped area}} \times 100$$

5. Area under vegetables

It is operationalised as the area under vegetable farming measured in cents.

6. Social participation

Social participation is operationally defined as the degree of involvement of the respondents in formal and non formal social organisations either as member or as office bearer which also include their degree of participation in organisation activities.

The procedure followed by Vipinkumar (1994) was adopted for the measurement of social participation as indicated below.

Category	Score
1. Membership in organisation	
No membership in each organisation	0
Membership in each organisation	1
Office bearer in each organisation	2
2. Frequency of attending meeting	
Never attending any meetings/activities	0
Occassionally attending meetings/activities	1
Regularly attending meetings/activities	2

To obtain the final score of the respondent, the scores given as member or office bearer were multiplied with scores given for attendance in the activities and added up for all organizations. Based on the mean scores obtained, the respondents were then classified into low/high groups.

7. Economic motivation

Economic motivation refers to the extent to which as individual is oriented towards achieving maximum economic ends such as maximisation of the product.

The scale developed by Supe (1969) was used to measure economic motivation.

The scale consists of four statements of which three are positive and one is negative. The statements were suggested to the respondents in the following three point continuum.

Category	Score
Agree	3
Undecided	2
Disagree	1

The scoring pattern was reversed in case of negative statements.

8. Cosmopoliteness

Cosmopoliteness was operationally defined as the tendency of the farmer to be in contact with the outside world based on the belief that all the needs of an individual cannot be met within his own community.

The extent of cosmopoliteness was measured following Desai (1961) method. Accordingly the two dimensions of the variable measured were

1) Frequency of visiting the nearest town
2) Purpose of visit

The total score of cosmopoliteness for each respondent was calculated by adding the score of the two dimensions of cosmopoliteness.

1) Frequency of visiting the nearest town

Frequency of visit	Score
Twice/more times a week	5
Once in a week	4
Once in a fortnight	3
Once in a month	2
Very rarely	1
Never	0

2) Frequency of visiting the nearest town

Purpose of visit	score
All visits relating to agriculture	4
Some relating to agriculture	3
Personal/domestic matters	2
Entertainment	1
No purpose	0

9. Extension orientation

Extension orientation was operationally defined as the extent of contact of the vegetable farmer with extension agencies and their extent of participation in extension activities.

The method used by Bonny (1991) was used here for quantifying this variable. Extension orientation was measured on two dimensions viz., extension contact and extension participation.

a) Extension contact

The degree of extension contact by the respondent was computed by giving scores to the items as below.

Sl.No.	Frequency of meeting ADA/AO/AA	Scores
1	Regularly	2
2	Occassionally	1
3	Never	0

b) Extension participation

Extension participation was defined as the frequency of participation of the individual respondent in different extension activities. Activities conducted to evaluate the extension participation of the respondents were study tours, seminars, farm fair, demonstrations and others.

The respondents participation in each of the above extension activities for the past one year was noted to get the extension participation score as below.

Sl.No.	Category of response	Scores
1	Attended whenever conducted	2
2	Attended occassionally	1
3	Never attended	0

The scores obtained for both the sub items by each respondent were calculated and the total score for extension orientation was obtained by summation of the scores of extension contact and extension participation.

10. Innovativeness

This is operationally defined as the degree to which a farmer is relatively earlier in adopting new ideas.

The procedure developed by Singh (1977) was used to measure the innovativeness of a farmer The question asked was "When would you prefer to adopt an improved practice in farming?"

Three responses were given with scoring procedure as follows.

1. As soon as it is brought to my knowledge	- 3
2. After I have seen some farmers using it successfully	- 2
3. Prefer to wait and take my own time	- 1

Total score was obtained by summing up scores for each statement.

11. Progressiveness

Progressiveness refers to the relative receptivity of a farmer towards modern values and practices.

The scale used by Balasubramaniam (1992) was adopted here to measure progressiveness. The scale consisted of three statements and the respondents were asked to state their agreement on a three point continuum. The scores for the responses of each statement in terms of agree, undecided and disagree were 3, 2 and 1 respectively.

12. Scientific orientation

Scientific orientation is operationalized as the degree to which a farmer is oriented to the use of scientific method in decision making in farming.

For the measurement of this variable, the scale developed by Supe (1969) was followed with slight modification to suit the purpose of the present study. The scale consisted of six statements in which five statements were positive and one was negative. The statements suggested to respondents were scored as follows.

Category	Score
Agree	3
Undecided	2
Disagree	1

13. Risk orientation

Risk orientation is operationally defined as the degree to which a farmer is oriented towards risk and uncertainity and portrayed the courage to face problems in farming.

To measure the variable, the scale adopted by Selvanayagam (1986) was used for the present study. The scale consisted of five statements of which four statements were positive and one statement was negative. These statements were suggested to the respondents in the following scoring continuum.

Category	Score
Agree	3
Undecided	2
Disagree	1

The scoring pattern was reversed in case of negative statements.

3.3.2 Operationalisation and measurement of dependent variables

1. Level of knowledge of farmers about plant based pesticides.

Knowledge about plant based pesticides was operationalised as the extent of information possessed by a farmer regarding the use of plant based pesticides.

In the present study, a knowledge test was developed for measuring the knowledge of the farmers about plant based pesticides. To measure this variable, the procedure followed by Sureshkumar (1994) was adopted with suitable modifications.

For this an item pool of questions was prepared based on the review of relevant literature and discussion with the experts. Care was taken to avoid 'too easy' or 'too difficult' items to make them discriminable. These questions were administered to non sample respondent in a pilot study prior to the preparation of final interview schedule. Scores of one and zero were given to the correct and incorrect answers respectively. The scores obtained for all questions were found out separately and these questions were arranged in the descending order of the total

scores obtained by them. For effective discrimination fourteen questions were retained after eliminating terminal questions with low and high scores. These fourteen questions were included in the final interview schedule. To measure the level of knowledge of farmers about plant based pesticides before and after the experiment, the same fourteen questions were used. The total number of correct answers were summed up to get the knowledge score of the respondents.

2. Attitude towards plant based pesticides

For this study attitude is operationally defined as the degree of positive or negative disposition associated with the use of plant based pesticides.

Sharma (1965) defined attitude as a personal disposition which impels an individual to react to some object or situations. A number of attitude scales have been developed in the past for measuring the attitude of respondents towards a technology or practice. An attitude scale is one that assess the degree of effect that individuals may associate with some psychological object. Tripathi *et al.* (1982) used Likert's (1932) technique of five point rating scale for measuring the attitude of gram sevaks towards community Development programme. Mercykutty (1997), while studying transfer of technology of biofertilizers, developed an attitude scale following the method of summated ratings in the present study also attitude of farmer respondents was measured using an attitude scale developed for this purpose utilizing Likert's summated rating technique.

The first step was collection of statements regarding different aspects of plant based pesticides on the basis of review of literature and discussion with experts of Kerala Agricultural University. Care was taken to develop a universe of content including all possible statements that would reflect the attitude of the

respondents towards the stimulus under study The collected statements were then edited by comparing against the criteria described by Edwards (1957). Out of the 30 statements, fourteen statements were selected after editing. Care was taken to include both positive and negative statements on plant based pesticide use.

These edited statements were administered to 20 non sample respondents. They were asked to respond to each statement in terms of their own agreement or disagreement with the statements on a five point continuum as follows.

SA - Strongly agree

A - Agree

UD - Undecided

DA - Disagree

SDA - Strongly disagree

After collecting the responses from the farmers, these statements were subjected to item analysis. The purpose of item analysis is to examine how well each statement discriminates between respondents with different attitudes.

The procedure involved in item analysis as suggested by Edwards (1957) was followed first of all, the total score was found out for each respondent by summing up the scores obtained for all the statements in the list. The various responses were assigned numerical weights such as 'strongly agree' response was given score of 4, agree-3, undecided-2, disagree-1 and strongly disagree-0 for positive statements. The order was reversed for negative statements. Thus the total score of an individual was the summation of numerical weights assigned to the responses. The responses were arranged in the descending order of the total scores. From these 25 per cent of the subjects with the highest total score were taken up for

item analysis. It was assumed that these two groups would provide the criterion groups in terms of which one can evaluate the individual statement. The following formula was used for evaluating the responses of high and low group of each statement.

$$t = \frac{X_H - X_L}{\sqrt{\frac{S_H^2}{n_H} + \frac{S_L^2}{n_L}}}$$

where

X_H - the mean score as a given statement for the high group

X_L - the mean score as a given statement for the low group

S_H^2 - the variance of distribution of responses of the high group to the statement

S_L^2 - the variance of the distribution of responses of the low group to the statement

n_H - the number of subjects in the high group

n_L - the number of subjects in the low group

The value of 't' is a measure of the extent to which a given statement differentiates between the high and low groups.

As an appropriate rule of thumb, any value of 't' equal to or greater than 1.75 was only considered. Statements with their 't' values were arranged in ascending order of magnitude and eight statements having the maximum 't' values were selected for the final scale which consisted of four positive and four negative statements. The statements with their 't' values are furnished in Appendix I.

To measure the attitude towards the use of plant based pesticides, the respondents were asked to express their opinion on these statements.

The responses to these statements were collected on a three point continuum.

Category	Score
Agree	3
Undecided	2
Disagree	1

For negative statements the scoring pattern was reversed. The total score obtained by summing up the score for each statement yielded the attitude towards plant based pesticides.

3. Symbolic Adoption of plant based pesticides

Symbolic adoption is operationally defined as the mental decision to use an innovation.

Ambastha (1986) defined symbolic adoption as the decisions made by the farmer to adopt innovations with respect to summer paddy or dwarf wheat.

In the present study Symbolic adoption was measured using the scale developed by Ramkumar (1987).

Extent of symbolic adoption was measured by symbolic adoption index. For each practice a score of one for symbolic adoption and zero for non adoption was given.

Symbolic adoption index was calculated by the following formula.

$$\text{Symbolic adoption index} = \frac{\text{Respondent's score}}{\text{Total score}} \times 100$$

3.3.3 Measurement of Intervening variable

1. Constraints in the adoption of plant based pesticides

Based on discussion with farmers and also through review of relevant literature some of the constraints faced by the farmers were recorded.

The list containing these constraints were presented to the respondents. They were also asked to add any constraints which they thought appropriate to be included.

The response to each constraint was obtained in a three point continuum namely 'agree', 'undecided' and 'disagree' with weights 3, 2 and 1 respectively. Cumulative value for each constraint was worked out and based on this value, constraints were ranked.

3.4 Methods used for data collection

The data pertaining to the present study was collected as follows.

A pretested structured schedule was prepared for farmers for collecting data in the pilot study. The data were collected through personal interview by the researcher using the final interview schedule.

Then these respondents were classified into four groups of thirty each. The respondents were exposed to different experimental treatments of extension and audio-visual packages. Impact of these treatments on farmers knowledge, attitude and symbolic adoption was ascertained using the pre-tested interview schedule.

3.5 Statistical tools used for the study

The following statistical techniques were used in the analysis of the data.

1. Percentage analysis

Percentage were calculated for making simple comparisons among the different groups.

2. Correlation analysis

Correlation coefficient is a measure of the association between two variables. The correlation coefficient was worked out to measure the relationship between the dependent variable and each of the personal socio-economic and situational variables.

Inorder to test the significance of the observed correlation coefficient the students t test at (n-2) degrees of freedom was used.

To test the significance of correlation coefficient, the table for the values of correlation coefficient for different levels of significance was used.

3. Multiple regression analysis

Multiple regression analysis was done to determine the net contribution of each of the selected personal, socio-economic and situational variables to the dependent variable and to know the percentage of variation that a set of personal, socio-economic and situational variables jointly explain in the dependent variable

A significant R^2 suggest the desirability of regression analysis in predicting the dependent variable. The test of significance of regression coefficients (b's) was carried out with the help of 't' values computed.

4. 't' test

The 't' test was used to test the significance of difference between means of knowledge, attitude and symbolic adoption before and after exposure to various treatments.

Results and Discussion

CHAPTER-IV

RESULTS AND DISCUSSION

The findings of the present study and discussion of the salient results are presented in this chapter under the following heads

4.1 Distribution of the respondents based on their personal, socio-economic and situational characteristics

4.2 Distribution of respondents based on knowledge, attitude and symbolic adoption of plant based pesticides

4.3 Influence of personal, socio-economic and situational variables on the knowledge of farmers about plant based pesticides

4.4 Influence of personal, socio-economic and situational variables on the attitude of farmers towards plant based pesticides

4.5 Influence of personal, socio-economic and situational variables on the symbolic adoption of plant based pesticides in vegetable cultivation

4.6 Impact of extension methods and audio-visual aids on the knowledge, attitude and symbolic adoption of plant based pesticides in vegetable cultivation

4.7 Constraints in the use of plant based pesticides

4.8 Empirical models of the study

4.1 Distribution of the respondents based on the selected personal, socio-economic and situational variables

A persual of Table 2 revealed that majority of respondents were in high category in the case of variables like income (58.00%), farming experience

Table 2. Distribution of the respondents based on their personal, socio-economic and situational characteristics

(n = 120)

Sl. No.	Characteristic	Category	Score	f	%
1	Income	Low	Below 26,725	58	48.33
		High	26,725 and above	62	51.67
2	Farming experience	Low	Below 22.42	55	45.83
		High	22.42 and above	65	54.17
3	Occupation	Low	Below 1.73	33	27.50
		High	1.73 and above	87	72.50
4	Cropping intensity	Low	Below 142.92	54	45.00
		High	142.92 and above	66	55.00
5	Area under vegetable (cents)	Low	Below 37.97	62	51.70
		High	37.97 and above	58	48.30
6	Social participation	Low	Below 6.88	65	54.17
		High	6.88 and above	55	45.83
7	Economic motivation	Low	Below 8.24	72	60.00
		High	8.24 and above	48	40.00
8	Cosmopoliteness	Low	Below 6.18	72	60.00
		High	6.18 and above	48	40.00
9	Extension orientation	Low	Below 6.31	60	50.00
		High	6.31 and above	60	50.00
10	Innovativeness	Low	Below 1.93	41	34.17
		High	1.93 and above	79	65.83
11	Progressiveness	Low	Below 4.93	47	39.17
		High	4.93 and above	73	60.83
12	Scientific orientation	Low	Below 11.52	56	46.67
		High	11.52 and above	64	53.33
13	Risk orientation	Low	Below 10.18	66	55.00
		High	10.18 and above	54	45.00

(54.17%), occupation (72.5%), cropping intensity (55.00%), innovativeness (65.83%), progressiveness (60.83%) and scientific orientation (53.33%).

The respondents were in the low category with respect to area under vegetables (51.7%), social participation (54.17%), economic motivation (60.00%), cosmopoliteness (60.00%) and risk orientation (55.00%).

4.2 Distribution of respondents based on knowledge, attitude and symbolic adoption of plant based pesticides

The distribution of respondents based on knowledge, attitude and symbolic adoption of plant based pesticides is shown in Table 3.

The table revealed that 54.17 per cent of the respondents belonged to the low knowledge category and 53.33 per cent possess low attitude towards plant based pesticides.

It is interesting to note that 55.83 per cent of the respondents are in the high category with respect to symbolic adoption.

Table 3. Distribution of respondents based on knowledge, attitude and symbolic adoption of plant based pesticides

(n = 120)

Sl.No.	Characteristics	Category	Score	f	%
1	Knowledge about plant based pesticides	Low	Below 6.48	65	54.17
		High	6.48 and above	55	45.83
2	Attitude towards plant based pesticides	Low	Below 15.09	64	53.33
		High	15.09 and above	56	46.67
3	Symbolic adoption of plant based pesticides	Low	Below 42.51	53	44.17
		High	42.51 and above	67	55.83

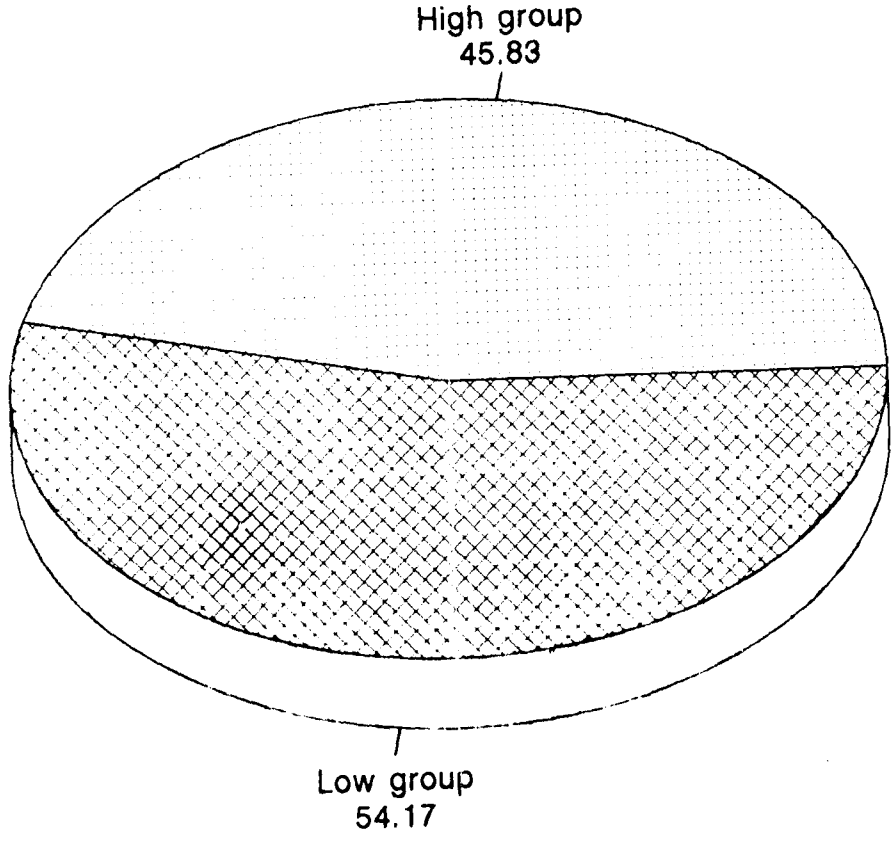


Fig.3. Distribution of respondents based on their knowledge

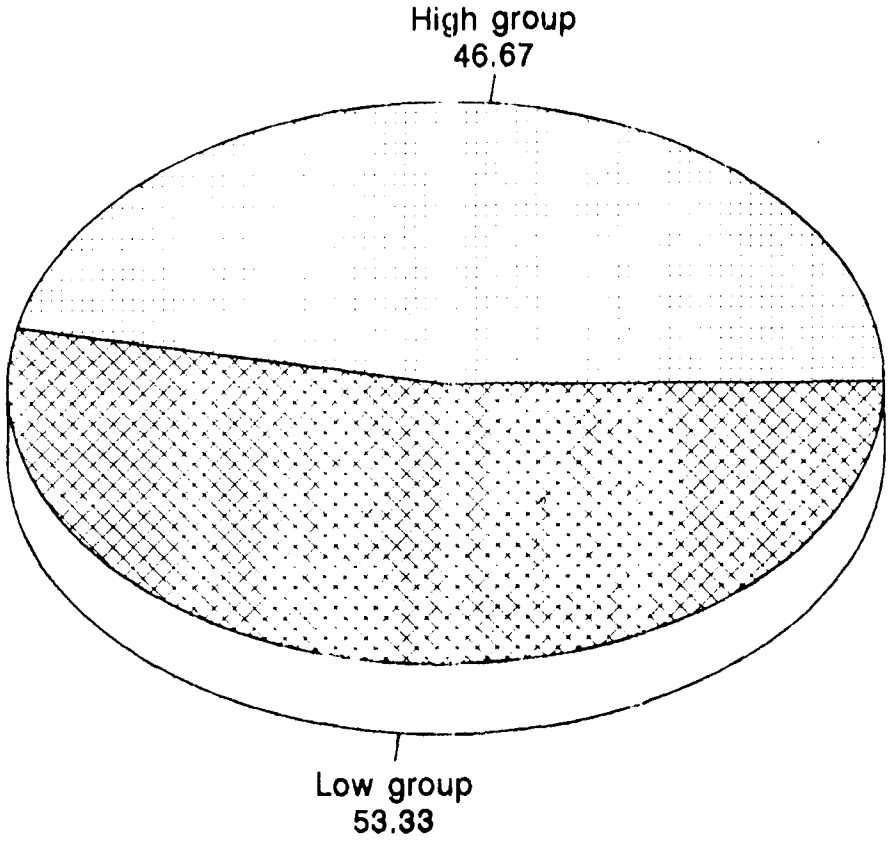


Fig.4. Distribution of respondents based on their attitude

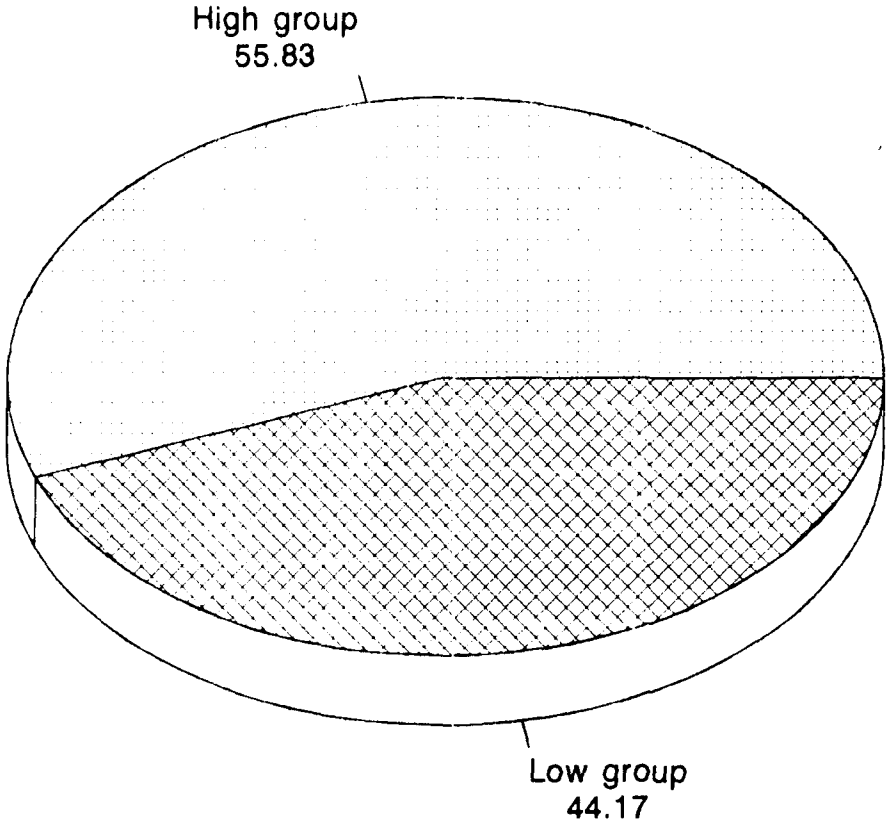


Fig.5. Distribution of respondents based on symbolic adoption

4.3 Influence of personal, socio-economic and situational variables on the knowledge of farmers about plant based pesticides

Respondents were classified into four homogenous group of 30 each based on their age and education for the study. So these two variables are uniform and are not considered for the correlation and multiple regression analysis.

The relationship of the remaining 13 personal, socioeconomic and situational variables on the knowledge of farmers about plant based pesticides was established in this study by correlation and findings are presented in Table 4.

4.3.1 Simple correlation analysis of knowledge about plant based pesticides

It can be seen that out of 13 independent variables social participation, economic motivation, cosmopoliteness, innovativeness, progressiveness, scientific orientation and risk orientation were positively and significantly related with the dependent variable.

The variable farming experience had negative and significant relationship with the dependent variable. Other independent variables did not show any significant correlation with the dependent variable.

Social participation showed a significant positive effect on the knowledge about plant based pesticides. Social participation might have enabled the farmers to perceive the role and importance of plant based pesticides in farming especially in the present situation where many of the advanced technologies are unsuitable in the long run.

Table 4. Correlation between knowledge about plant based pesticides and selected personal, socio-economical and situational variables

(n = 120)

Sl.No.	Independent variables	Correlation coefficient (r)
1	Income	-0.162 NS
2	Farming experience	-0.644**
3	Occupation	-0.056 NS
4	Cropping intensity	0.005 NS
5	Area	-0.030 NS
6	Social participation	0.226*
7	Economic motivation	0.369**
8	Cosmopoliteness	0.313**
9	Extention orientation	-0.089 NS
10	Innovativeness	0.199 *
11	Progressiveness	0.353**
12	Scientific orientation	0.365**
13	Risk orientation	0.424**

* Significant at 5% level

** Significant at 1% level

NS - Not significant

This finding is in agreement with the findings of Suresh (1993) who observed that social participation was positively and significantly related with knowledge.

The present study established a positive significant relationship between economic motivation and knowledge about plant based pesticides. This finding is in conformity with the results of Chaudhari and Makode (1992).

A farmer who has high economic motivation would naturally concentrate himself in boosting his knowledge with the use of locally available cheap inputs.

It can be observed from the table that positive and significant relationship exists between cosmopoliteness and knowledge. Farmers who are more cosmopolite in nature will be more aware of the present day trends. Nowadays people are trying to go back to nature and botanical pesticides are getting more and more popular. So the positive and significant relationship between cosmopoliteness and knowledge is justifiable.

This finding is in agreement with the findings of Manju (1996) which showed a significant positive relation of cosmopoliteness with knowledge.

It was found that innovativeness was positively and significantly related to the knowledge about plant based pesticides. Innovative farmers will be aware of the fact that plant based pesticides have become the focus of attention today. They will be more willing to try out this practice. So this positive correlation is justifiable.

This study established a significant and positive correlation between progressiveness and knowledge about plant based pesticides. Progressive farmers

are aware of the fact that people are getting health conscious and so the popularity of botanicals is increasing.

Hence it is logical that positive relationship exists between knowledge and progressiveness.

Scientific orientation is found to have a significant and positive relationship with knowledge. Farmers having high scientific orientation will be very much aware of the merits of plant based pesticides and the ill effects of chemical pest control. So the positive relationship can be explained.

The observation made by Dharmalingam (1990) and Suresh (1993) agrees with this finding.

In conformation with the results of Suresh (1993), the present study established a significant and positive relationship between risk orientation and knowledge about plant based pesticides. Farmers who are willing to take risks will be ready to follow a practice which is not followed by all.

A negative significant relationship was observed between farming experience and knowledge. Farmers who have more experience in farming will come under the high age group. They may not be aware of the latest scientific developments and so will be lagging behind in adopting that practice.

This finding is in agreement with the findings of Godhandapani (1985) who found that farming experience had negative significant relationship with knowledge.

Table 5. Results of multiple regression analysis of knowledge of plant based pesticides with the selected personal, socio-economic and situational variables

(n = 120)

Sl. No.	Independent variable	Partial regression coefficient	Standard error	't' value
1	Income	-0.000016534	0.0000345	-0.479 NS
2	Farming experience	-0.13014	0.026460	-4.918**
3	Occupation	0.050953	0.33617	0.152 NS
4	Cropping intensity	0.00078919	0.0032084	0.246 NS
5	Area	-0.013049	0.015750	-0.828 NS
6	Social participation	0.0062261	0.041543	0.150 NS
7	Economic motivation	0.31865	0.10590	3.009**
8	Cosmopoliteness	0.18321	0.12360	1.482 NS
9	Extension orientation	0.00014763	0.064449	0.002 NS
10	Innovativeness	-0.14449	0.21668	-0.667 NS
11	Progressiveness	0.19278	0.13303	1.449 NS
12	Scientific orientation	0.14985	0.075360	1.988*
13	Risk orientation	0.20528	0.083800	2.450*

* Significant at 5% level

** Significant at 1% level

NS - Not significant

$R^2 = 0.552$

Intercept = 1.8460

F values = 10.05

4.3.2 Multiple Regression Analysis

The results of multiple regression analysis between knowledge about plant based pesticides by the respondents and the selected personal, socio-economic and situational variables are presented in Table 5.

The R^2 value of 0.552 indicates that 55 per cent of variation could be explained by personal, socio-economic and situational variables selected.

From Table 5 it is evident that out of 13 variables, three variables were positively and significantly related with knowledge. They are economic motivation (3.009), scientific orientation (1.988) and risk orientation (2.450).

4.4 Influence of personal, socio-economic and situational variables on the attitude of farmers towards plant based pesticides

The relationship of personal, socioeconomic and situational variables on the attitude of farmers towards plant based pesticides was established in this study by correlation and findings are presented in Table 6.

4.4.1 Simple correlation analysis of attitude of farmers towards plant based pesticides

It was found that out of 13 independent variables economic motivation, progressiveness, scientific orientation and risk orientation were positively and significantly related with the attitude towards plant based pesticides. The variable farming experience had negative and significant relationship with the dependent

Table 6. Correlation between attitude on plant based pesticides and selected personal, socio-economic and situational variables

(n = 120)

Sl.No.	Independent variables	Correlation coefficient (r)
1	Income	-0.018 NS
2	Farming experience	-0.548**
3	Occupation	0.059 NS
4	Cropping intensity	0.104 NS
5	Area	0.083 NS
6	Social participation	0.125NS
7	Economic motivation	0.281**
8	Cosmopoliteness	0.193 NS
9	Extention orientation	-0.102 NS
10	Innovativeness	0.137 NS
11	Progressiveness	0.375**
12	Scientific orientation	0.372**
13	Risk orientation	0.244**

* Significant at 5% level

** Significant at 1% level

NS - Not significant

variable. Other independent variables did not show any significant correlation with the dependent variable.

Economic motivation showed a positive and significant relationship. Farmers who have high economic motivation will prefer to use locally available cheap inputs. Such farmers will also have a favourable attitude towards plant based pesticides which are less costly. So the positive correlation between economic motivation and attitude is justifiable.

The present study established a significant positive relationship between progressiveness and attitude towards plant based pesticides. Progressive farmers are health conscious and prefer to have vegetables grown in eco-friendly conditions. This explains the observed positive relation between these two variables.

Scientific orientation had positive and significant relationship with attitude. Scientifically oriented farmers will be very much aware of the negative effects of chemical pesticides in the long run. So it could be explained as the possible reason for the observed positive relationship.

The study established a significant and positive relationship between risk orientation and attitude. It can be seen from Table 6 that positive and significant relationship was established between knowledge about plant based pesticides and risk orientation. So a positive relationship between attitude and risk orientation is also justifiable.

The findings of Naik (1981) agrees with the trend observed in this study where in a positive relationship was reported between risk preference and attitude of farmers.

Negative and significant correlation was observed between farming experience and attitude. Respondents having more farming experience will belong to the high age group. So it will be difficult to bring changes in their attitude. So a negative relationship between these two is understandable.

Multiple Regression Analysis

The results of multiple regression analysis between attitude towards plant based pesticides and selected personal, socio-economic and situational variables are presented in Table 7.

The R^2 value of 0.427 indicated that 43 per cent of variation in the attitude towards plant based pesticides could be explained by the personal, socioeconomic and situational variables selected for the study.

From Table 7 it is evident that out of 13 variables only three variables were significantly and positively related with attitude. They were economic motivation (2.188), progressiveness (2.261) and scientific orientation (2.340).

4.5 Influence of personal, socio-economic and situational variables on the symbolic adoption of plant based pesticides

The relationship of personal, socioeconomic and situational variables with the symbolic adoption of plant based pesticides was established in this study by correlation analysis and the findings are presented in Table 8.

Table 7. Results of multiple regression analysis of attitude towards plant based pesticides with the selected personal, socio-economic and situational variables

(n = 120)

Sl. No.	Independent variable	Partial regression coefficient	Standard error	't' value
1	Income	0.000024776	0.000046055	0.538 NS
2	Farming experience	-0.15035	0.035304	-4.259**
3	Occupation	0.47284	0.44852	0.054 NS
4	Cropping intensity	0.0038388	0.0042807	0.897 NS
5	Area	0.0062467	0.021014	0.297 NS
6	Social participation	-0.028921	0.05428	0.522 NS
7	Economic motivation	0.30915	0.14129	2.188*
8	Cosmopoliteness	0.019978	0.16492	-0.121 NS
9	Extension orientation	0.0032527	0.085990	0.038 NS
10	Innovativeness	-0.14670	0.28910	-0.507 NS
11	Progressiveness	0.40140	0.17749	2.261*
12	Scientific orientation	0.23526	0.10055	2.340*
13	Risk orientation	0.023316	0.11181	0.209 NS

* Significant at 5% level

** Significant at 1% level

NS - Not significant

$R^2 = 0.427$

Intercept = 9.313339

F values = 6.07

Table 8. Correlation between symbolic adoption of plant based pesticides and selected personal, socio-economic and situational variables

(n = 120)

Sl.No.	Independent variables	Correlation coefficient (r)
1	Income	-0.205*
2	Farming experience	-0.405**
3	Occupation	0.094 NS
4	Cropping intensity	0.042 NS
5	Area	-0.010 NS
6	Social participation	0.227*
7	Economic motivation	0.150 NS
8	Cosmopoliteness	0.120 NS
9	Extention orientation	0.165 NS
10	Innovativeness	0.234*
11	Progressiveness	0.132 NS
12	Scientific orientation	0.156 NS
13	Risk orientation	0.245*

* Significant at 5% level

** Significant at 1% level

NS - Not significant

4.5.1 Simple correlation analysis of symbolic adoption of plant based pesticides and selected personal, socio-economic and situational variables

The results indicated that out of the 13 independent variables, only three variables ie. social participation, innovativeness and risk orientation showed significant and positive correlation with symbolic adoption. A negative correlation was observed between income and farming experience and the dependent variable. The other independent variables did not show any significant correlation with the dependent variable.

Significant positive correlation was observed between social participation and symbolic adoption. Social participation resulted in an easy access to farm information and enhanced confidence among farmers. They get a chance to discuss about the ill effects of chemical pest control. Greater awareness will be created among the members about the merits of plant based pesticides as their social participation improved. These could justify the above finding.

The study revealed a significant positive relationship of the dependent variable with the independent variable innovativeness. As the term itself envisages, the innovative farmers will be ready to follow practices which are not very widely used.

In conformation with the results of Singh and Singh (1990) the present study also established a positive significant relationship between risk orientation and extent of symbolic adoption.

Results of plant based pesticide use is uncertain. Only a farmer with high risk orientation will use plant based pesticide whose effect is gradual.

Negative and significant relationship was observed between income and symbolic adoption. Farmers belonging to high income group usually will have a tendency to follow costly chemical pest control methods.

So the significant negative relationship ,between these two could be justified.

The study revealed a negative and significant relationship between farming experience and symbolic adoption. The respondents having more farming experience will be reluctant to bring about any change in the farming technology. So the significant negative relationship is quite logical.

The observation made by Selvaraj (1990) agrees with this finding.

Multiple Regression Analysis

Using 13 independent variables, multiple regression analysis was carried out in order to know the relative contribution of each of the independent variables to the dependent variables. The findings are presented in Table 9.

R^2 value of 0.257 indicated that 26 per cent of variation in symbolic adoption could be explained by the personal, socioeconomic and situational variables selected.

From Table 9 it is evident that none of the variables was positively and significantly related with symbolic adoption of plant based pesticides.

Table 9. Results of multiple regression analysis of extent of symbolic adoption of plant based pesticides with the selected personal, socio-economic and situational variables

(n = 120)

Sl. No.	Independent variable	Partial regression coefficient	Standard error	't' value
1	Income	-0.0011512	0.00052177	-2.206*
2	Farming experience	-1.0156	0.035304	-4.259**
3	Occupation	-5.3279	5.0815	-0.048 NS
4	Cropping intensity	0.046440	0.048497	0.958 NS
5	Area	0.23642	0.23808	0.993 NS
6	Social participation	0.96023	0.62797	1.529 NS
7	Economic motivation	-0.17082	1.6008	-0.107 NS
8	Cosmopoliteness	-0.57987	1.8684	-0.310 NS
9	Extension orientation	-0.7377	0.97421	-1.784 NS
10	Innovativeness	2.1608	3.2754	0.660 NS
11	Progressiveness	-0.3020	2.0109	-0.164 NS
12	Scientific orientation	-0.0004847	1.1391	-0.000 NS
13	Risk orientation	1.2000	1.2667	0.947 NS

* Significant at 5% level
** Significant at 1% level
NS - Not significant
$R^2 = 0.427$
Intercept = 9.313339
F values = 6.07

4.6 Impact of extension methods and audio-visual aids on the knowledge, attitude and symbolic adoption of plant based pesticides in vegetable cultivation

Respondents were classified into four groups of 30 each based on their age and education. Income was ignored as there was not much variation in their income.

The four groups were subjected to different experimental treatments of extension methods and audiovisual aids and the impact of the treatments T_1, T_2 and T_3 on farmers knowledge, attitude and symbolic adoption in relation to plant based pesticides were ascertained and the results are as follows.

4.6.1 Comparison of knowledge level of farmers about plant based pesticides before and after exposing them to treatment (T_1) ie. lecture method

It can be observed from Table 10 that the mean value in this regard before the treatment was 4.2 and after the treatment it was 6. The 't' value of 9.0 was significant at one per cent level.

The results indicate that there was significant change in knowledge after exposing the respondents to the treatment.

Table 10. Comparison of knowledge of farmers before and after exposing the respondents to lecture (T_1)

Mean value before treatment	Mean value after treatment	t value
4.2	6.0	9.0**

** Significant at 1% level

4.6.2 Comparison of attitude of farmers towards plant based pesticides before and after exposing them to treatment 1 (T_1) ie. lecture method

Table 11 revealed that mean value before treatment was 12.2 and after treatment it was 13.77. The 't' value of 7.1802 was significant at one per cent level.

Significant change in attitude was observed after exposing the respondents to the treatments.

Table 11. Comparison of attitude of farmers before and after exposing the respondents to lecture (T_1)

Mean value before treatment	Mean value after treatment	t value
12.2	13.77	7.1802**

** Significant at 1% level

4.6.3 Comparison of symbolic adoption of plant based pesticides before and after exposing them to treatment 1 (T_1) ie. lecture method

A perusal of Table 12 reveals that mean value before treatment was 25.8 and after treatment it was 45.8. The 't' value is 5.1739 and is significant at 1 per cent level.

From the above results we can conclude that there was significant change in the symbolic adoption of plant based pesticides after exposing them to lecture method.

Table 12. Comparison of symbolic adoption plant based pesticides before and after exposing the respondents to lecture (T_1)

Mean value before treatment	Mean value after treatment	t value
25.8	45.8	5.1739**

** Significant at 1% level

4.6.4 Comparison of knowledge level of farmers on plant based pesticides before and after exposing them to treatment 2 (T_2) ie. lecture + group discussion

It can be observed from Table 13 that the mean value before the treatment was 5.6 and after the treatment it was 8.4. The 't' value of 18.6097 is significant at one per cent level.

The results indicate that there was significant change in the knowledge of the farmers after exposing them to the treatment.

Table 13. Comparison of knowledge of farmers before and after exposing the respondents to lecture + group discussion (T_2)

Mean value before treatment	Mean value after treatment	t value
5.6	8.4	18.6097**

** Significant at 1% level

4.6.5 Comparison of attitude of farmers towards plant based pesticides before and after exposing them to treatment 2 (T_2) lecture + group discussion

Table 14 indicated that the mean value before treatmentwas 15.2 and after treatment it was 17.9. The 't' value is 14.69 and is significant at one per cent level.

Significant change in attitude of respondents was observed after the treatment.

Table 14. Comparison of attitude of farmers before and after exposing the respondents to lecture + group discussion (T_2)

Mean value before treatment	Mean value after treatment	t value
15.2	17.9	14.69**

** Significant at 1% level

4.6.6 Comparison of symbolic adoption of plant based pesticides before and after exposing them to treatment 2 (T_2) ie. lecture + group discussion

Table 15 indicated that the mean value before treatment was 39.2 and mean value after treatment it was 69.2. The 't' value is 10.77 and is significant at one per cent level.

This result also revealed a significant change in the symbolic adoption after the treatment.

Table 15. Comparison of symbolic adoption of plant based pesticides before and after exposing the respondents to lecture + group discussion (T_2)

Mean value before treatment	Mean value after treatment	t value
39.2	69.2	10.77**

** Significant at 1% level

4.6.7 Comparison of knowledge level of farmers on plant based pesticides before and after exposing them to treatment 3 (T_3) ie. lecture + group discussion + method demonstration

It can be observed from Table 16 that the mean value in this regard before treatment was 7.0 and mean value after the treatment was 11.0. The 't' value is 22.90 and is significant at 1 per cent level.

Significant change in knowledge was observed after the treatment.

Table 16. Comparison of knowledge of farmers before and after exposing the respondents to lecture + group discussion + method demonstration (T_3)

Mean value before treatment	Mean value after treatment	t value
7.0	11.0	22.90**

** Significant at 1% level

4.6.8 Comparison of attitude of farmers towards plant based pesticides before and after exposing them to treatment 3 (T_3) lecture + group discussion + method demonstration

Table 17 shows that the mean value before treatment was 16.0 and mean value after treatment it was 19.5. The 't' value is 15.3046 and is significant at one per cent level.

The results indicate a significant change in attitude.

Table 17. Comparison of attitude of farmers before and after exposing the respondents to lecture + group discussion + method demonstration (T_3)

Mean value before treatment	Mean value after treatment	t value
16.0	19.5	15.30**

** Significant at 1% level

4.6.9 Comparison of symbolic adoption of plant based pesticides before and after exposing them to lecture + group discussion + method demonstration (T_3)

Table 18 revealed that the mean value before treatment was 42.5 and mean value after treatment it was 75.0. The 't' value is 6.19 and is significant at 5% level.

Significant change was observed after the treatment.

Table 18. Comparison of symbolic adoption of plant based pesticides before and after exposing the respondents to lecture + group discussion + method demonstration (T_3)

Mean value before treatment	Mean value after treatment	t value
42.5	75.0	6.19**

** Significant at 1% level

4.6.10 Pooled analysis of the impact of treatments T_1, T_2, T_3 and T_4 on farmers knowledge, attitude and symbolic adoption of plant based pesticides

From Table 19 it is evident that there was significant change in knowledge, attitude and symbolic adoption after exposing the respondents to the different experimental treatments.

From this it may be concluded that extension teaching methods were very effective in bringing about changes in the knowledge, attitude and symbolic adoption of farmers.

This finding is in agreement with the findings of Manchanda and Hansra (1983) who stated that there was significant gain in knowledge through selected extension teaching methods.

It can also be observed from the study that maximum change was observed while using more of combination of extension methods.

This is an agreement with the findings of Singh and Babu (1984) who revealed that there was significant increase in knowledge and adoption with the use of increased number of teaching aids.

Table 19. Pooled analysis of the impact of treatments T_1, T_2 and T_3 on farmers knowledge, attitude and symbolic adoption of plant based pesticides

(n = 30) each

Treatment No.	Extension method and audio visual packages	Knowledge		Attitude		Symbolic adoption	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
1	Lecture to 30 farmers	4.2	6.0	12.2	13.77	25.8	45.8
2	Lecture + group discussion to 30 farmers	5.6	8.4	15.2	17.9	39.2	69.2
3	Lecture + group discussion + method demonstration	7.0	11.0	16.0	19.5	42.5	75.0

4.7 Constraints in the adoption of plant based pesticides

An effort was made to identify the constraints perceived as important by the farmers in adopting plant based pesticides.

The major constraints experienced by the farmers are presented in Table 20. These constraints were ranked based on the importance with which they were felt by the farmers.

The major constraint experienced by the farmer was the absence of immediate results.

Other constraints were high labour cost, inadequate knowledge among farmers, occurrence of too many pests at a time, time consuming method, need of application immediately after preparation, lack of availability of local inputs, lack of proper publicity and environmental instability, respectively.

Table 20. Constraints in the adoption of plant based pesticides

(n = 120)

Sl.No.	Constraints	Score	Rank
1	Absence of immediate results	256	I
2	High labour cost	246	II
3	Inadequate knowledge among farmers	243	III
4	Occurence of too many pests at a time	235	IV
5	Time consuming method	203	V
6	Need of application immediately after preparation	202	VI
7	Lack of availability of local inputs	201	VII
8	Lack of proper publicity	200	VIII
9	Environmental instability	196	IX

Fig.6. Empirical model of the study showing the relationship between selected personal socio-economic and psychological characteristics and the knowledge about plant based pesticides

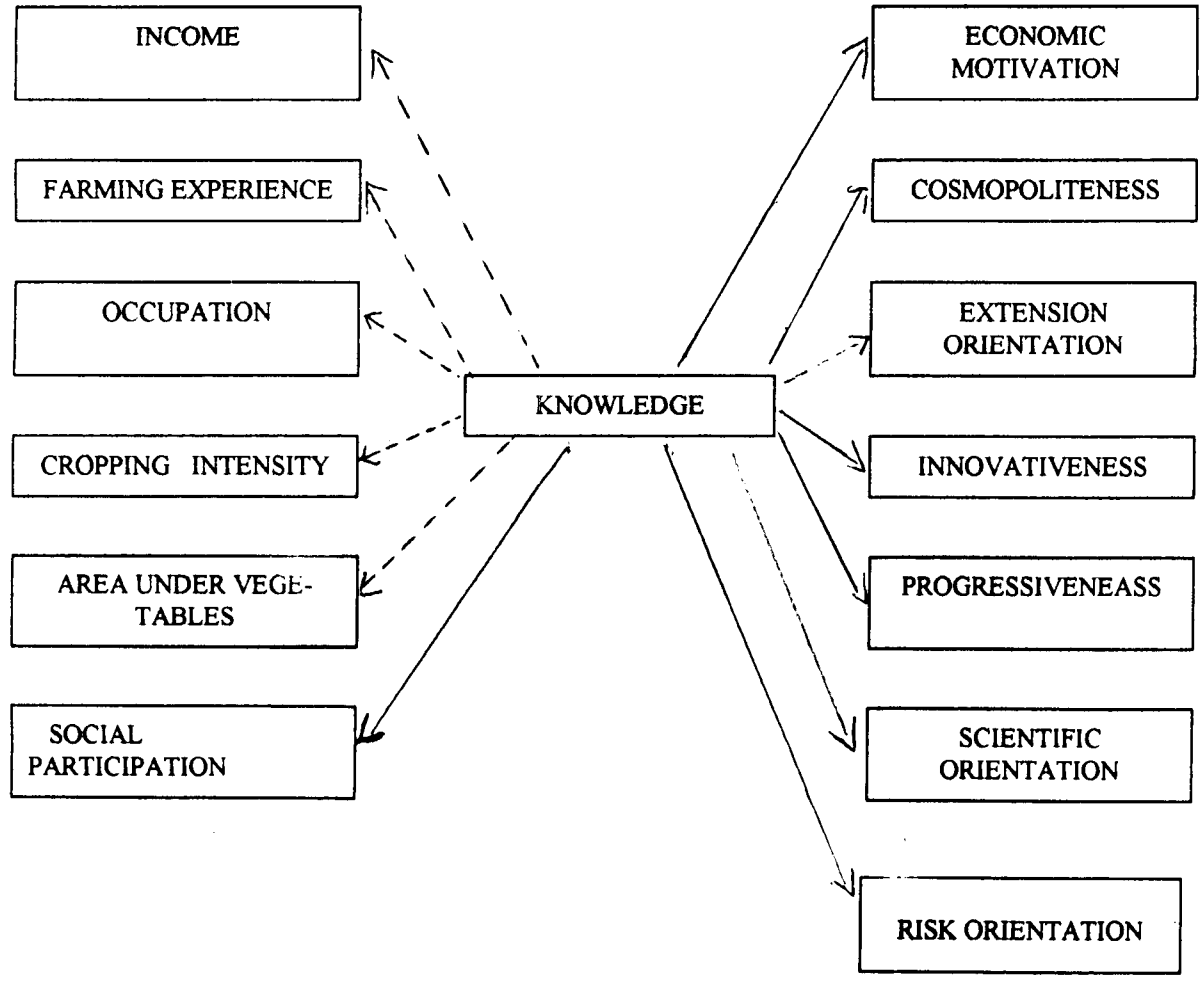
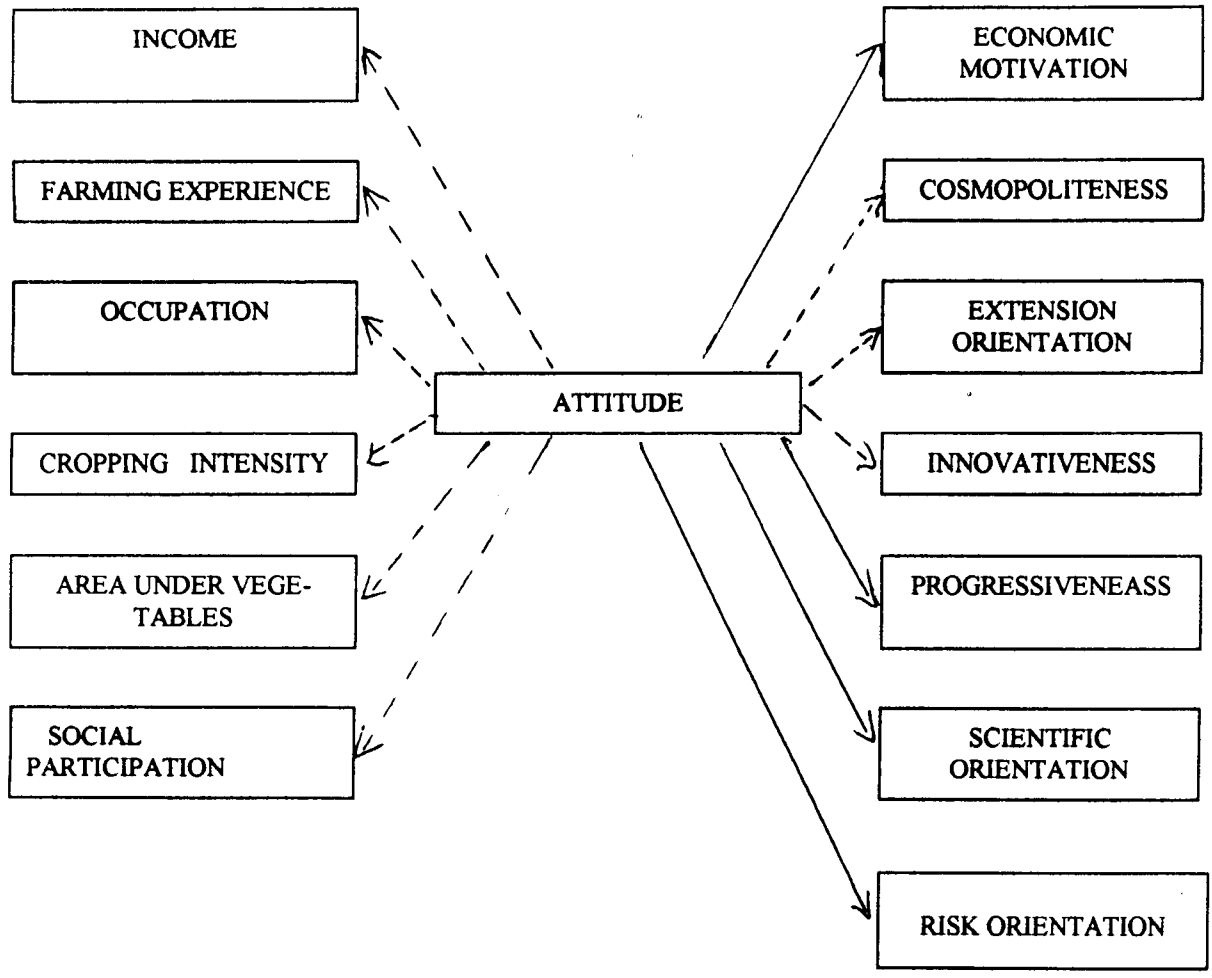


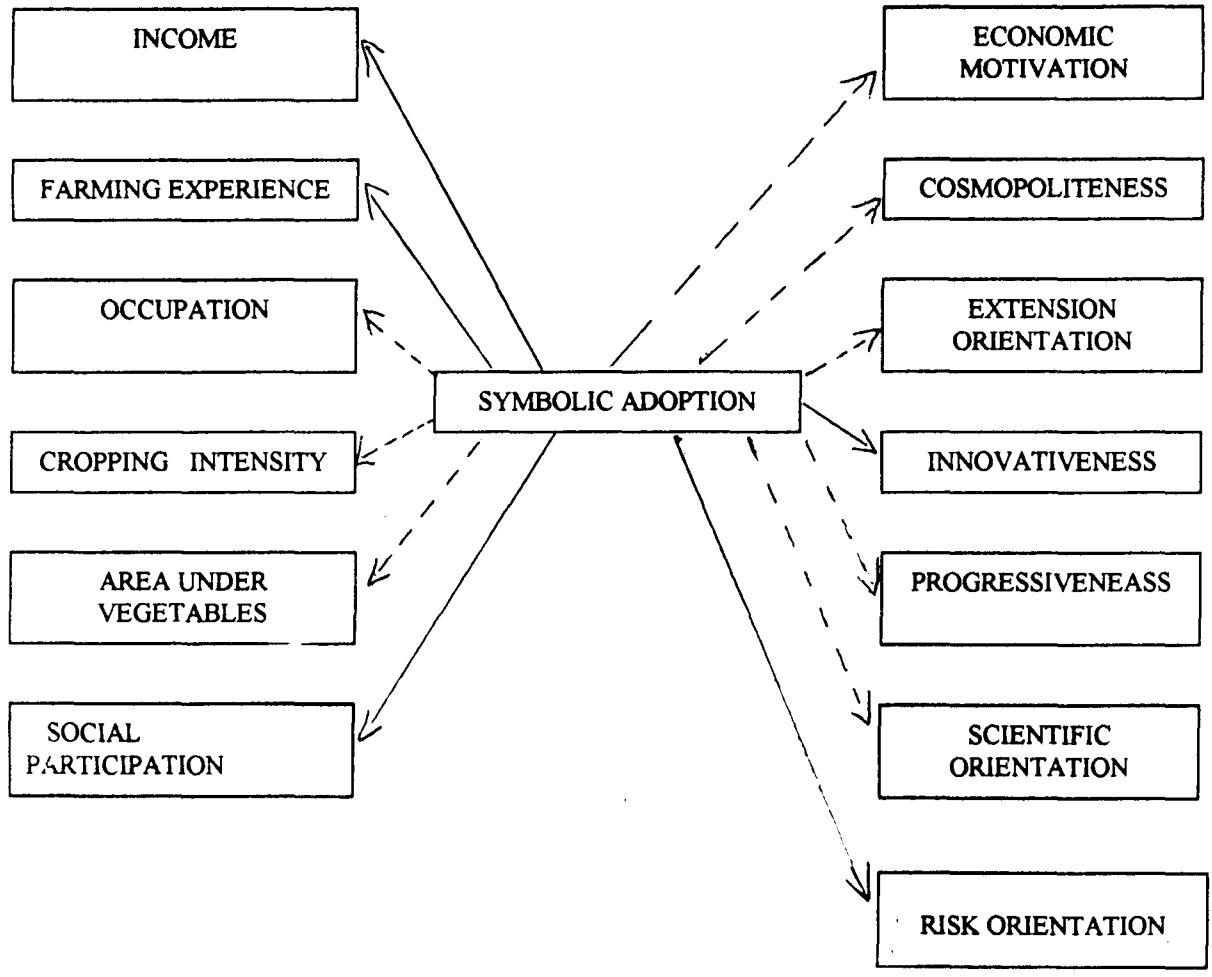
Fig.7. Empirical model of the study showing the relationship between selected personal, socio-economic and psychological characteristics and the attitude towards plant based pesticides



——————→ Significanct of relationship

– – – – – → Non significant relationship

Fig. 8. Empirical model of the study showing the relationship between selected personal, socio-economic and psychological characteristics and the symbolic adoption of plant based pesticides



Summary

CHAPTER-V

SUMMARY

In agriculture the future of plant protection belongs to plant based pesticides. Indiscriminate use of chemical pesticides resulted in several hazards to man and caused environmental problems. There is no difference of opinion about the usefulness and importance of plant based pesticides in homestead farming in Indian agriculture. However, the use of plant based pesticides in vegetable cultivation has not been to the desired extent due to various constraints. Inorder to popularise the use of plant based pesticides in vegetable cultivation an experimental study using different extension methods and audio-visual aids was attempted.

The study was undertaken with the following objectives.

5.1 Objectives

1. To develop a strategy for the promotion of the utilisation of plant based pesticides
2. To assess the level of knowledge of farmers about plant based pesticides in vegetable cultivation
3. To study the attitude of farmers towards use of plant based pesticides in vegetable cultivation
4. To know the symbolic adption of farmers in the use of plant based pesticides in vegetable cultivation
5. To study the impact of experiments using different extension methods and audio visual aids on the knowledge, attitude and symbolic adoption of plant based pesticides in vegetable cultivation

5.2 Methodology

The study was conducted during 1997 in Thrissur district. Puthur panchayat having maximum area under vegetable cultivation in Thrissur district was selected purposively for the study. 120 farmers having atleast some area under amaranthus and cowpea were selected as the respondents for the study.

The dependent variables of the study were knowledge, attitude and symbolic adoption of plant based pesticides. These dependent variables were quantified using measurement devices developed for the study. The independent variables selected were age, education, income, farming experience, occupation, cropping intensity, area under vegetable cultivation, social participation, economic motivation, cosmopoliteness, extension orientation, innovativeness, progressiveness, scientific orientation and risk orientation. The independent variables were quantified using already existing scales and established procedures. Constraints in the use of plant based pesticides in vegetable cultivation was the intervening variable.

The selected farmers were classified into four groups of 30 each based on their age and education. Different experimental treatments using extension methods and audio visual aids were applied to these groups. Impact of these treatments on the knowledge, attitude and symbolic adoption of the respondents was also ascertained.

Data were collected by conducting personal interviews with the farmer respondents using well structured and pre-tested interview schedule developed for the purpose. Respondents were exposed to different extension methods and their

impact was measured. The statistical tools used for the study were percentage analysis, correlation analysis, multiple regression analysis and 't' test.

5.3 Findings

The salient findings of the study are furnished below.

1. Regarding the distribution of respondents, majority of respondents were in the high category with respect to age, income, farming experience, occupation, cropping intensity, innovativeness, progressiveness and scientific orientation. With respect to variables like education, area under vegetables, social participation, economic motivation, cosmopoliteness and risk orientation majority of the respondents were in the low category.

2. Out of the 13 independent variables studied, social participation, economic motivation, cosmopoliteness, innovativeness, progressiveness, scientific orientation and risk orientation had positive and significant relationship with knowledge.

3. The results of multiple regression analysis indicated that 55 per cent of the total variation in the knowledge on plant based pesticides could be explained by the selected independent variables.

4. With regard to attitude towards plant based pesticides correlation analysis revealed that out of the 13 independent variables, economic motivation, progressiveness, scientific orientation and risk orientation were positively and significantly correlated with this dependent variable.

5. The results of multiple regression analysis indicated that 43 per cent of the variation in the attitude towards plant based pesticides could be explained by the selected independent variables.

6. Correlation analysis of symbolic adoption of farmers about plant based pesticides revealed that out of the 13 independent variables studied, social participation, innovativeness and risk orientation showed significant positive correlation.

7. Multiple regression analysis indicated that 26 per cent of the variation in the symbolic adoption could be explained by the selected independent variables.

8. 't' test was carried out to compare the change in knowledge, attitude and symbolic adoption of farmers after exposing them to different extension teaching methods and audiovisual aids like lecture, lecture + group discussion and lecture + group discussion + method demonstration. Significant changes were observed in the knowledge, attitude and symbolic adoption after exposing them to different treatments. The study revealed that maximum change was observed while using more number of combination of extension methods viz. lecture + group discussion + method demonstration.

9. The most important constraint experienced by the farmers in the use of plant based pesticide was the absence of immediate results. The other important constraints were high labour cost, inadequate knowledge among farmers and occurence of too many pests at a time.

5.4 Implications of the study

Based on the important results of the study a strategy to promote the ultilisation of plant based pesticides in vegetable cultivation is suggested as follows.

Strategy to promote the utilisation of plant based pesticides in vegetable cultivation

The ultimate objective of conducting experimental studies on the relative effectiveness of audiovisual and extension methods is to facilitate the formulation of agricultural promotional strategies for implementation by the developmental agencies concerned. Such an effort has also been made in this study which is based on the following findings of transcendal significance.

The study succinectly brought out the fact that there is immense scope for the use of plant based pesticides not only in the cultivation of cowpea and amaranthus which have been included in the study but also other important vegetables grown both in the homesteads as well as on a commercial basis in the state viewed from the perspectives of environment and hygiene, development agencies must seize of all opportunities to advocate such eco-friendly technologies in the cultivation of vegetable crops. It is heartening to observe that inspite of the boon even now lack of knowledge about plant based pesticides remain a major constraint to the increased utilisation of plant based pesticide. It is equally interesting to note that the most important hurdle to the increased use of plant based pesticide is the lack of immediacy of results in this context. This means that the observability dimension of the plant based pesticide technology is lacking in a shorter span of time. This implies that educational efforts on a campaign mode have to be geared urgently to inculcate the perspective utility element which is the hallmark in such eco-friendly technologies. Such educational efforts must obviously

make use of the most effective combination of audio-visual and extension techniques so as to cater to the information needs in relation to plant based pesticide technology which is attributed to have low observability of results in the immediate time frame.

This study though highlighted the near equal impact of the experimental treatments such as lecture, lecture + group discussion, lecture + group discussion + method demonstration, also provides proof that as the number of methods used increases, there was increase in the impact on the knowledge, attitude and symbolic adoption components of farmers behaviour with reference to use of plant based pesticides in vegetable cultivation. This calls for concerted efforts from the agricultural extension personnel in the state to popularise the utilisation of plant based pesticides in vegetable cultivation using a combination of audio-visual and extension techniques in an add on mode. With the massive programme like the 'Peoples Plan' being implemented by the government of Kerala during the nineth five year plan, the opportunities for conscientisation of the needs and priorities based on local resources in the "gramasabhas" and "neighbourhood assemblies", there is immense potential for the agricultural extension officials role as spark plugs in mixing the metaphors. The agricultural extension officials should make use of the opportunities available in the 'gramasabhas' and 'neighbourhood assemblies' to sensitise the farmers about the eco-friendly technologies such as plant based pesticides. Needless to add here that these plant based pesticides being invariably indigenous in nature, their acceptability and adaptability will also be higher when compared to exogenous technologies. The emphasis on the use of plant based pesticides in vegetable cultivation in the homesteads will definitely make a dent in the minds of the health conscious Keralite. It is also pertinent that the governments increased thrust on extending vegetable cultivation through a number of attractive promotional schemes must be matched with educational efforts to popularise the

production of pesticide free vegetables for consumption by the people of Kerala State. Only then there can be realisation of the objective of sustainable vegetable production with the human face in mind. The officials of the Department of Agriculture in Kerala State have therefore an increase responsibility in this regard.

5.5 Suggestions for future research

1. The study was confined to one panchayat. Therefore a comprehensive study including farmers from a wider geographical area should be undertaken.
2. Farmers growing only amaranthus and cowpea were studied. Research should give emphasis on other vegetables. Similarly use of other plant based pesticides also need to be studied.
3. A comparitive study on the knowledge, attitude and symbolic adoption of homestead farmers and big farmers in the use of plant based pesticided can be taken up.
4. Training need assessment of farmers about the use of different plant based pesticides may be attempted.
5. A comparative study on the adoption of plant based pesticides for a single crop in different socio-economic and agro-climatic conditions may be undertaken.
6. Studies of similar nature may also be undertaken in other agricultural crops.
7. Impact of more audio-visual aid combinations should also be undertaken in future.

References

REFERENCES

Ahiah, D.D. 1993. Knowledge and adoption of critical technology among paddy growers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

* Allport, G. 1935. Attitudes. *A Handbook of Social Psychology*.Murchinson, G. (Ed.), Mass Clark University Press, Worcestor

Ambastha, C.K. 1986. *Communication Pattern in Innovation, Development, Extension and Client Systems*. B.R. Publishing Corporation, New Delhi

Babu, M.N. 1995. Evaluative perception of homstead farmers in relation to appropriateness of farming systems and cropping patterns, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Badagaonkar, S.S. 1987. Measurement of farmers knowledge and factors affecting the adoption behaviour of groundnut cultivators of Uttara Kannada districts of Karnataka state. *Mysore J. Agrl. Sci.* **21**(3):363-365

Balan, S. 1987. Utilisation of soil recommendations by the farmers in Trivandrum district, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Balasubramaniam, P. 1992. Indigenous knowledge use in drylands - An exploratory study, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Bharadwaj, N. and Hansra, B.S. 1983. Effectiveness of some selected modes of communication in imparting knowledge to the member of ladies charcha mandals of Ludhiana district. *Indian J. Extn. Edn.* **19**(1/2):99-103

Bhaskaran, K. and Mahajan, B.S. 1968. Effectiveness of extension methods in gaining knowledge about and acceptance of Agrosan (GN) seed treatment to cotton. *Indian J. Extn. Edn.* 4(3&4):58-61

Bhaskaran, C. and Sushama, N.P. 1994. Problems of technology transfer in Kerala agriculture. *Abstracts of the International Congress on Kerala Studies*. AKG Centre for Research and Studies, Thiruvananthapuram

Bloom, B.s., Engalhard, M., Furnst, E. Hill, W. and Krathwhol, D.R. 1956. Long Taxonomy of Educational Objectives. The Cognitive Domain. Longmans Green, New York

Bonny, B.P. 1991. Adoption of improved agricultural practices by commercial vegetable growers of Ollukkara Block in Thrissur district, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Carter, H.D. 1953. Educational Psychology. *A. Rev. Psychology*. **4**:387-406

Chander and Munshi. 1995. Use and limitations of botanical pesticides. National Seminar on Changing Scenario in Pest and Pest Management, Hydrebad

Chandra, N. and Singh, R.P. 1992. Determinants and impact of new technology adoption on tribal agriculture in Bihar. *Indian J. agric. Econ.* **47**(3):397-403

Chandrakandan, K. 1982. Effectiveness of farm broadcast on listners affective cognitive and psychomotor behaviours, Ph.D. thesis, Tamil Nadu, Agricultural University, Coimbatore

Chaudhari, M.D. and Makode, V.V. 1992. Adoption of high yielding varieties of rainfed chilli and jowar. *Agrl. Extn. Rev.* **4**(1):6-10

Cherian, B.K. 1984. Awareness and attitude of farmers agricultural extension workers and officials towards T & V systems, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Chipirkar, B.P. and Khupse, T.S. 1992. A study of grape growers with special reference to the transfer of grape technology. *Maha. J. Extn. Edn.* **11**(3):313-318

Desai, N.K. 1961. problems of mixed farming. A study of a character farm. *Indian J. agric. Econ.* **16**(3):46-50

Dharmalingam, P. 1990. Weedicide technology diffusion among the farmers, M.Sc. (Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Edwards, A.L. 1957. *Techniques of Attitude Scale Construction*. Appleton Century Crafts, New York

Fathimabai, P.K. 1993. Welfare schemes for agricultural labourers. A multidimensional analysis, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Geethakutty, P.S. 1993. Fertilizer use behaviour of rice farmers of Kerala, Ph.D. thesis, Kerala Agricultural University, Thrissur

Godhandapani, G. 1985. Knowledge and adoption of nutrient recommendation for irrigated groundnut, M.Sc. (Ag.) thesis, Tamil Nadu Agricultural Univerity, Coimbatore

Gopal, R.V. 1974. A study on training needs of farmers in Coimbatore district, M.Sc. (Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Gopala, M. 1991. A study on adoption of recommended mulberry cultivation and silkworm rearing practices on developed and less developed areas of Kolar district, M.Sc. (Ag.) thesis, University of Agricultural Sciences, Bangalore

Gopala, M. and Krishna, K.S. 1993. Problems in adoption of recommended sericultural practices. Indian Silk. **32**(4):53

Jabbar, A.P.K. 1996. Feasibility and utilisation of improved vegetable production technologies in family farming by agricultural labourers in Thrissur district, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Jeyakrishnan, S. 1984. Adoption of low cost technology among paddy growers, M.Sc. (Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Jeyasubramanian, B. 1996. Impact of distance education programme of Tamil Nadu Agricultural University through correspondance course. A diagnostic analysis, M.Sc. (Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Jnanadevan, R. 1993. An analysis of selected development programmes for promoting coconut production in Kerala, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Kamarudeen, M. 1981. A study on the impact of National Demonstration Programme on paddy cultivation in Thrissur district, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Kangasabapathi, K. 1988. Training needs in agriculture of 'Irulas' of Attapady, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Kangasabapathi, K. 1990. Traditional practices in dry land agriculture. *Abstracts of the International Conference on Extension Strategy for Minimizing Risk in Rainfal Agriculture*. Indian Society of Extension Education, New Delhi

KAU. 1993. *Package of Practice Recommendations*. Directorate of Extension, Kerala Agricultural University, Thrissur

Khaleel, F.M.H. 1978. A study on the impact of National Demonstration Programme on paddy cultivation in Thrissur district, M.Sc. (Ag.) thesis, Kerala Agricultural University, Thrissur

Khara, J.S. 1967. Relative effectiveness of extension methods on the adoption of approved agricultural practices in selected N.E.S. blocks. *Indian J. Extn. Edn.* **3**(1/2):98-100

Krishnakumar, V. 1987. Farmers knowledge level and attitude towards soil conservation practices - an analysis, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Krishnamoorthy, R. 1988. Transfer of dry land technology, acceptance and constraints analysis, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

* Likert, R. 1932. A technique for the measurement of attitudes. *Arch. Psychol.* No.140

Manchanda, R.K. and Hansra, B.S. 1983. Gain and retention of nutritional knowledge by the members of ladies charcha mandals by the use of selected extension teaching methods. *Indian J. Extn. Edn.* **19**(3/4):94-96

Mangal, I.S. and Hansra, B.S. 1986. Knowledge gain through selected media combination by the farmers of Punjab. *Indian J. Extn. Edn.* **22**(3/4):122-125

Mani, K.C. 1980. Critical analysis of factors associated with participation and non participation of turmeric growers in regulated market, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Manivannan, N. 1980. A study on the knowledge and extent of adoption of sunflower growers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Manju, S.P. 1997. Indigenous practices in coconut farming in Thrissur district, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Manju, V. 1997. Indigenous practices of vegetable cultivation in Thrissur district, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

* Marks, L.G. 1955. The eyes have it but each sense plays a part. *Fatis Review*, European productivity agency, OEEC, Paris

Mathew, T.B., Beevi, N.S., Rajan, P.A. and Visalakshi, A. 1990. Insecticide contamination in vegetables in Kerala. *11th Ann. Sess. Acad. Environ. Biol.* Aurangabad, 21-23 Dec. 147-148

Meera, B. 1995. Differential adoption of plant protection technology by farmers of Kerala. A critical analysis. Ph.D. thesis, Kerala Agricultural University, Thrissur

Mercykutty, M.J. 1997. Analysis of transfer of technology with respect to biofertilizers, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Nagarajiah, C. and Rao, S.N. 1990. Neem as indigenous tree with multiple uses. *Indian Farmers Digest.* **24**(5):19-20

* Naik, B.K. 1981. Awareness and attitude of farmers and extension workers towards 'Intensive Agricultural Extension System' in Andhra Pradesh, M.Sc.(Ag.) thesis, S.V. Agricultural College, Thirupathi

* Nair, G.T. 1969. A multivariate study on adoption of high yielding paddy varieties of the farmers of Kerala state, Ph.D. thesis, IARI, New Delhi

* NAS (National Academy of Sciences). 1969. Insect Pest Management and Control. Washington D.C.

Nirmala, P. 1993. Knowledge and adoption of biofertilizers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Pandya, R.D. and Trivedi, J.C. 1988. An economic evaluation of SEDA for weaker sections in Haryana. *Indian J. agric. Econ.* **35**(4):49-58

Pereira, W. 1993. *Feeding the Earth. Traditional Sustainable Agriculture in India.* Earthcare Books, Bombay

Philip, H. 1995. Two dimensional and three dimensional visual for effective video programme production. An experimental study, Ph.D. thesis, Tamil Nadu Agricultural University, Coimbatore

Pitchai, S.S. 1987. Information sources of non contact paddy farmers, their knowledge and adoption behaviour, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Prabhu, K.R. 1988. Soil conservation programmes - impact and its consequences on the Nilgiris, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Prakash, R. 1980. A study on the impact of agricultural development programmes among the triabls of Kerala, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Prasad, R.M. 1978. A study on farmers functional literacy programme, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Preetha, L. 1997. Indigenous practices in rice farming in Thrissur district, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Ramdass, A. 1987. Comparitive analysis of knowledge level and adoption behaviour of rural and urban rice farmers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Ramkumar, S. 1987. Impact of correspondance course in diarying on adoption of improved dairy practices, M.Sc.(Vet.) Kerala Agricultural University, Thrissur

Rao, C.S.S. 1965. Effectiveness of audio visuals in disseminating information as testified by the extension workers. *Indian J. Extn. Edn.* **1**(1):41-46

Ratnabai, A.V. 1990. Information and innovation decision behaviour of registered and non registered sugarcane growers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Ravichandran, K. 1980. A study on attitude, extent of adoption and problems encountered by registered sugarcane growers, M.Sc. (Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Regupathy, A. 1988. Scope and need of environment risk assessment of use of pesticides in agriculture. *Keynote address delivered at 9th AEB and symposium of Valvada, 1988.*

Satheesh, D. 1990. A study on knowledge and adoption of chawki rearing practices by silkworm rearers of Kanakapura Taluk, Bangalore district, M.Sc.(Ag.) thesis, University of Agricultural Sciences, Bangalore

Sekar, V. 1985. A study on the adopters and non adopters of biofertilizer technology. Research project R-2, Department of Agricultural Extension, Tamil Nadu Agricultural University, Coimbatore

Selvanayam, M. 1986. Technocultural profile on dryland farming, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Selvanayagam, S. 1980. An experimental study of relative effectiveness of selecting training aids in educating small farmers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Selvaraj, C. 1997. Effectiveness of instructor controlled interactive video presentation, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Selvaraj, G. 1990. Effectiveness of video teaching on farmers affective, cognitive and psychomotor behaviour, Ph.D. theis, Tamil Nadu Agricultural University, Coimbatore

Sharma, O.P. 1965. Comparitive study of scales of Likert and Guttman - A technique for measuring attitude of extension personnel. Singh, P.R.R. (ed.) *Studies in Extension Education*, National Institute of Rural Development, Hydrebad.

Shukla, S.R. 1980. Adoption behaviour of small farmers. *Indian J. Extn. Edn.* **16**(1/2):55-58

Singh, K. 1977. A study of neomarginal farmers. Situation and socio economic impact of new agricultural technology, Ph.D. thesis, IARI, New Delhi

Singh, S.N. and Babu, R. 1984. Multimedia approach for accelerating the process of agricultural development. *Workshop on changing perspectives in Extension*. National Institute of Rural Development, Hydrebad

Singh, M. and Singh, M.D. 1990. Training affecting symbolic adoption. A multivariate approach. *Indian J. Extn. Edn.* **26**(1/2):61-66

Sinha, P.R.R. and Bhasin, H.S. 1968. Factors affecting low adoption of some improved farm practices. *Indian J. Extn. Edn.* **4**(3/4):58-65

Somasundaram, D. and Singh, S.N. 1978. Factors affecting the knowledge of adopter and non adopter small farmers. *Indian J. Extn. Edn.* **14**(1/2):30-34

Sulaiman, V.R. and Prasad, R.M. 1993. Fertilizer use of rice farmers of Palakkad and Kannur districts. *J. trop. agric.* **31**(1):96-100

Sumathi, P. and Annamalai, R. 1993. A correlative analysis of characteristics of farm women with their knowledge level in rice post harvest technology. *Indian J. Extn. Edn.* **4**(1):633-635

* Supe, S.V. 1969. Factors related to different degrees of rationality in decision making among farmers of Buldana district, Ph.D. thesis, IARI, New Delhi

Suresh, M. 1993. Nutrient management. An expost facto study among paddy growers, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Sureshkumar, R. 1994. Participation of farm family women in marginal homestead farming systems in Thrissur district, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Tripathi, A., Singh, K.N. and Shahoo, S. 1982. Constraints in adoption of high yielding rice technology in coastal Orissa. *Indian J. Extn. Edn.* **18**(1/2):51-58

UNESCO. 1958. What research says in audio visual aids. Technical report, UNESCO

Vasanthkumar, J. 1987. Constraints to agricultural development of small and marginal farmers. *J. of Rural Devp.* **6**(3):25-29

Vasudeva, P. 1976. *Social Change Analysis of Attitudes and Personality*. Sterling Publishers Pvt. Ltd., New Delhi

Vijayakumar, P. 1997. Neem based botanicals in rice farming - An analysis, M.Sc.(Ag.) thesis, Tamil Nadu Agricultural University, Coimbatore

Vijayalakshmi, K. 1993. Traditional Agriculture. *The Hindu*. **13**:15

Vipinkumar, V.P. 1994. Interpersonal communication behaviour of members of group farming committees in the adoption of rice production technology, M.Sc.(Ag.) thesis, Kerala Agricultural University, Thrissur

Vivekanandan, P. 1994. Indigenous pest control method. *Paper presented in the confernece on indigenous science and technology 24-26 Feb.* Bharathidasan University, Tamil Nadu

Waghmare, S.K. and Pandit, V.K. 1982. Constraints in adoption of wheat technology by the triabl farmers of Madhya Pradesh state. *Indian J. Extn. Edn.* **18**(1/2):95-98

* Originals not seen

Appendices

APPENDIX-I

The statements selected for developing the scale for measuring the attitude towards plant based pesticides

Statement	't' value
*1. Plant based pesticides are cheap means of plant protection	4.22
2. Plant based pesticides do not give immediate results	0.23
3. Plant based pesticides can be prepared easily	0.858
*4. Inputs for preparation of plant based pesticides are not locally available	7.00
5. Use of plant based pesticides by farmers will make farming more profitable	1.048
6. Use of plant based pesticides is not cost effective	0.5
*7. Application of plant based pesticides will improve the quality of the produce	7.20
*8. There is no need to adopt plant based pesticides as chemical pesticides are easily available in market	4.9
*9. Adoption of plant based pesticides will help in sustainable agriculture	5.02
*10. Emergence of new pests and diseases have made plant based pesticides less popular	6.703
11. Plant based pesticides are ecofriendly	2.083
*12. Preparation of plant based pesticides need more labour	0.197
*13. Plant based pesticides do not have residual effect	4.23
14. Vegetable grown by applying plant based pesticides are having more demand in the market now a days	0.305

*Statements selected

APPENDIX-II

Promotional strategy for the utilisation of plant based pesticides in vegetable cultivation - An experimental study

Panchayat	:	
District	:	
Respondent No.	:	
1. Name and address of the respondent	:	
2. Age	:	
3. Education	:	Illiterate/Primary school/Secondary school/Collegiate
4. Annual income		
a) from Agricultural sources	:	
b) from other sources	:	
Total income	:	
5. Farming experience	:	
6. Occupation	:	Farming as primary occupation Farming as secondary occupation
7. Cropping intensity How many crops do you raise in an year. Give details		
i) Wet land	:	Single/double/triple cropped
ii) Dry land	:	Single/double/more than 2 crops
8. Area under vegetables		
a) Amaranthus	:	
b) Cowpea	:	
Total	:	

9. Social participation

Are you a member/office bearer in any of the following organisation. If yes, please specify the organisation and rate

Sl No	Organisation	No membership	Member	Office bearer
i)	Panchayat			
ii)	Co-operative society			
iii)	Vegetable growers association			
iv)	Farmers organisations			
v)	Trade unions			
vi)	Political organisations			
vii)	Others (specify)			

If you are a member how frequently do you attend its meeting and other activities : Regularly attend/Occassionally attend/Never attend

10. Economic motivation

Statements	Agree/Undecided/Disagree
i) A farmer should work towards larger yields and economic profit	
ii) The most successful farmer is one who makes the maximum profit	
iii) A farmer should try any new farming idea may earn him more money	
iv) It is difficult for the farmers children to make good start unless he provides them with economic assistance	

11. Cosmopoliteness

i)	Frequency of visiting the nearest town	:	Twice or more times a week/once in a week/once in a fortnight/once in a month/very rarely/never
ii)	Purpose of visit	:	All visits related to agriculture/some related to agriculture/personal or domestic matters/Entertainment/No purpose

12. Extension orientation

a) Extension contact

Category of personnel	Frequency of contact
	Regularly/Occassionally/Never
i) Assistant Director of Agriculture	
ii) Agricultural Officer	
iii) Agricultural Assistant	

b) Extension participation

Activities	Attended whenever	Occassionally attended	Never attended
i) Study tours			
ii) Seminars			
iii) Farm fair/farm day			
iv) Demonstration			
v) Others (specify)			

13. Innovativeness

When would you prefer to adopt an improved practice in farming

i) As soon as it is brought to my knowledge
ii) After I have seen some farmers using it successfully
iii) Prefer to wait and take my own time

14. Progressiveness

Please indicate your agreement with the following statements

Sl.No	Statement	Agree	Undecided	Disagree
i)	Girls should be educated			
ii)	Caste system is of no more utility under present condition and therefore its restriction should be done away with			
iii)	Child birth is a human affair and not God given therefore should be under control of man			

15. Scientific orientation

Sl.No.	Statement	Agree	Undecided	Disagree
i)	New methods of farming gives better results to a farmer than old methods			
ii)	The way of farming of our forefathers is still the best way to farm today			
iii)	Even a farmer with a lot of farm experience should use new methods of farming			
iv)	A good farmer experiments with new ideas in farming			
v)	Though it takes time for a farmer to lean new methods in farming, it is worth the efforts			
vi)	Traditional methods of farming have to be changed inorder to raise the living of a farmer			

16. Risk orientation

Sl.No.	Statement	Agree	Undecided	Disagree
i)	A farmer should take more chance in making a big profit than to be content with a smaller but a less risky profit			
ii)	A farmer who is willing to take greater risk than the average farmer usually does better financially			
iii)	It is good for a farmer to take risk when he knows his chance of success is fairly high			
iv)	It is better for a farmer not to try a new farming method unless most others in the locality have used it with success			
v)	Trying entirely a new method in farming by a farmer involves risk but it is worth it.			

17. Knowledgeon plant based pesticides

1. Name of plant based pesticide which is widely used in your area
2. Name a plant based pesticide which can be used against pests of cowpea
3. Name a plant based pesticide which can be used against pests of amaranthus
4. Name the byproduct of oil recovery from neem seeds
5. Name the mode of application of neem kernel suspension
6. For how many hours crushed neem kernel should be suspended in water
7. For how many hours tobacco should be steeped in water

8. For 1 kg of tobacco how may litres of water is needed

9. How much soap should be added to 1 kg tobacco

10. Mention the trade name of a commercially available neem based pesticide

11. Should we apply plant based pesticides immediately after preparation Yes/No

12. Mention the time of spraying of need products - early morning/afternoon/ late evening

13. Does plant based pesticides have residual effect : Yes/No

14. Name the most common pest against which these plant based pesticides are used in vegetables

18. Attitude towards plant based pesticides

	A	UD	DA
1. Plant based pesticides are cheap means of plant protection			
2. Inputs for preparation of plant based pesticides are not locally available			
3. Adoption of plant based pesticides will help in sustainable agriculture			
4. There is no need to adopt plant based pesticides chemical pesticides are easily available in market			
5. Plant based pesticides do not have residual effect			
6. Emergence of new pests and diseases have made plant based pesticides less popular			
7. Application of plant based pesticides will improve the quality of the produce			
8. Preparation of plant based pesticides need more labour			

19. Symbolic adoption of plant based pesticides.

1.	Are you willing to use neem kernel suspension in cowpea	Yes/No
2.	Are you willing to use tobacco decoction in cowpea	Yes/No
3.	Are you willing to use neem kernel suspension in amaranthus	Yes/No
4.	Are you willing to use tobacco decoction in amaranthus	Yes/No

20. Constraints in adoption of plant based pesticides

Sl.No.	Statement	Agree	Undecided	Disagree
1.	Lack of availability of inputs locally			
2.	Occurance of too many pests at a time			
3.	Inadequate knowledge among farmers			
4.	Absence of immediate results			
5.	Lack of proper publicity			
6.	Need of application immediately after preparation			
7.	Time consuming methods			
8.	Environmental instability necessitating repetitive application			
9	High labour cost			
10.	Any other, please specify			

PROMOTIONAL STRATEGY FOR THE UTILIZATION OF PLANT BASED PESTICIDES IN VEGETABLE CULTIVATION IN THRISSUR DISTRICT - AN EXPERIMENTAL STUDY

By

RASHMI ANNIE JOSE

ABSTRACT OF THE THESIS

Submitted in partial fulfilment of the requirement for the degree of

Master of Science in Agriculture

(AGRICULTURAL EXTENSION)

Faculty of Agriculture

Kerala Agricultural University

Department of Agricultural Extension

COLLEGE OF HORTICULTURE

VELLANIKKARA, THRISSUR - 680654

KERALA

1998

ABSTRACT

The study was carried out in Puthur panchayat of Thrissur district to formulate a promotional strategy for the use of plant based pesticides in vegetable cultivation. The respondents consisted of 120 vegetable farmers.

The dependent variables of the study were the knowledge about plant based pesticides, attitude towards plant based pesticides and symbolic adoption. The independent variables included the personal, socio-economic and psychological characteristics of the farmers.

The study revealed that majority of the farmer respondents belonged to high category in their distribution with reference to the selected independent variables.

Respondents were in the low category with respect to knowledge and attitude towards plant based pesticides and in the high category with respect to symbolic adotpion.

Then these respondents were classified into four groups of 30 each. They were exposed to different experimental treatments of extension and audiovisual packages.

Results showed that there was significant change in the knowledge, attitude and symbolic adoption after explosing the respondents to experimental treatments. The most effective combination of the audio-visual aids and extension methods was lecture + group discussion + method demonstration.

The most important constraint experienced by the farmers in the use of plant based pesticide was the absence of immediate results. Lack of knowledge about plant based pesticides was also felt as an important constraint.

Based on the results of the study, a strategy to promote the utilisation of the plant based pesticide in vegetable cultivation has also been proposed.