# TECHNO-SOCIO-ECONOMIC ASSESSMENT OF FARMERS' PRACTICES IN THE CULTIVATION OF BITTERGOURD (*Momordica charantia L.*) IN THIRUVANANTHAPURAM DISTRICT

By
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## THESIS

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## DECLARATION

I hereby declare that the thesis entitled ' **Techno-socio-economic assessment of farmers' practices in the cultivation of bittergourd (*Momordica charantia L.*) in Thiruvananthapuram district'** 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.

Vellayani
6-11-1999

Manjusha J
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# CERTIFICATE

Certified that the thesis entitled ' **Techno-socio-economic assessment of farmers' practices in the cultivation of bittergourd (*Momordica charantia L.*) in Thiruvananthapuram district** ' is a record of research work done independently by Mrs. Manjusha Jayapalan, 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 her.

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**Manjusha Jayapalan**

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# Introduction

# CHAPTER I

# INTRODUCTION

In developing countries, existing research systems are not always able to generate the technologies needed to solve the problems of resource poor farmers due to constraints on man power and funds. Such farmers are forced to develop their own technologies to suit their particular conditions. This knowledge is the product of centuries of trial and error, natural selection, experimentation and keen observation that can form farmers' knowledge- base on which researchers and extension workers can plan their research and development strategy.

Research on farmers' ecological knowledge reveals that farmers are knowledgeable about their environment and this knowledge can be used as a basis for solving environmental problems. Many farmers know things that scientists do not and vice versa. The traditional farming systems are not static and are seen as source of sound ideas, locally adapted cultivars and practices which could lead to sustainable use of local resources (Reijntjes, *et.al* 1992).

Norman (1985) claims that understanding of farmers' practices can help in designing relevant improved technologies for farmers with limited resource.

Farmers continuously conduct their own trials, partially adopt and adapt technologies to their specific circumstances and spread innovations through their

networks. Their own analysis of farming systems offer important insights, different from that of scientists. Only if we consider such innovations, we will be able to develop the most appropriate agricultural systems for the future.

In recent years there has been a growing scientific interest in locally developed farming systems and technologies. The traditional practices that rely on indigenous knowledge are considered for productivity, sustainability, stability and equitability.

The local practices of a farming population living in a specified area is derived from the local peoples' past farming experience, both that handed down from previous generations and that of present generations. Farmers' knowledge is the information base for a society and is dynamic. They are highly localized, restricted and often integrated with belief systems and cultural norms. Alcorn (1984) and Hunn (1985) reported that practices of local farmers may reveal ideas which contain "seeds" of adaptive value.

Moreover, as farmers' knowledge is passed on from one generation to another by word of mouth, unless conscious efforts are made to collect and document them, valuable information may be lost. Knight (1980) has called for the systematic documentation of traditional farmers' knowledge into an " information bank" from which agronomists, extension workers and other farmers can draw enlightenment and insight. The existing knowledge of traditional agriculture should be consolidated, documented and the advantages of these

practices should be brought to light. This study is mainly an attempt in this direction to systematically document those information regarding bittergourd cultivation.

Bittergourd is widely cultivated in South India. As a vegetable, its nutritive value is very important. It is a rich source of minerals and vitamins, especially iron, phosphorus and vitamins A and C. Fruits of bittergourd is a good remedy for rheumatism and worm infestation, and it is used as a tonic, stomachic, stimulant, laxative, alterative and as a folk remedy for Diabetes mellitus (Nadkarni, 1927). The fruits contain two alkaloids also viz., momordicine and cucurbitacine which are responsible for the bitterness.

Hence a detailed study was conducted to identify the practices followed by the bittergourd farmers' in Thiruvananthapuram district. Besides, this is the first systematic study ever attempted in the field. The main objectives of the study were as follows :

1. To identify and document the various practices as followed by the farmers in bittergourd cultivation.

2. To assess the knowledge about the recommended practices by the farmers, and its relationship with the selected characteristics of the farmers.

3. To find out the extent of adoption of farmers' practices and its relationship with the selected characteristics of the farmers.

4. To study the techno-socio-economic aspects of farmers' practices in the cultivation of bittergourd.

5. To find out the efficiency of the farmers' practices as perceived by the researchers, the extension personnel and the farmers.

6. To assess the ecofriendly nature of farmers' practices as perceived by the farmers.

7. To study the constraints faced by farmers in bittergourd cultivation.

**Scope of the study**

Understanding what farmers know and do can provide crop researchers with better insights into agriculture and the agro-ecosystem, mainly because farmers have always integrated environmental, social, religious, political and family values into agricultural production decisions. So this knowledge of farmers' practices is very important, for the planning of research and extension. Such knowledge enables researchers and extension workers to directly focus on tackling inappropriate practices. This has been reiterated by Subedi (1997) who observed that agricultural research, especially in the last of subsistence farming should be based on local knowledge.

Many progressive farmers do not follow recommended practices of the scientists. They adopt their own local practices in the field, still getting bumper yield. This is an indication that these practices whether local or indigenous, could

be better than the recommended practices. There is a criticism that agricultural research is not need-based. The results of the study could be utilised for reorienting research priorities.

The present research study is the first of its kind in assessing scientifically the socio-economic and technical aspects of the farmers' practices in the cultivation of bittergourd in Kerala. Hence the results of this study would accelerate the technological change through reoriented research wherein eco-friendly traditional technology can be integrated with productive modern technology to evolve economically viable, socially acceptable and sustainable food production technology.

**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. Being a post-graduate research work, the study is confined only to Thiruvananthapuram district. Moreover, the study was confined to only one crop namely, bitter gourd. So it may not be possible to generalize the findings of this study for the entire State. In spite 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 has covered the objectives, scope and limitations of the study.

The second chapter deals with theoretical orientation 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 prime focus of this chapter is to present the theoretical and empirical information concerning the present study. Only during the past few years, researchers have been paying serious attention to the need and importance of farmers' practices. Not many research studies on this new emerging field were readily available to the researchers. However, the available studies related directly or indirectly to the topic are reviewed and presented in this chapter under the following headings.

2.1 Concept of farmers' practices

2.2 Studies on farmers' practices

2.3 Knowledge about recommended practices and its relationship with selected characteristics of respondents

2.4 Extent of adoption of farmers' practices and its relationship with selected characteristics of respondent

2.5 Techno-socio-economic assessment of farmers' practices as perceived by the farmers.

2.6 Efficiency of farmers' practices as perceived by farmers , researchers and extension personnel.

2.7 Constraints faced by the farmers in bittergourd cultivation

2.8 Conceptual frame work of the the study

## 2.1 Concept of farmers' practices

Rogers (1962) opined that adoption refers to the continued use of the recommended practices by an individual.

Rudramoorthy (1964) pointed out that a judicious combination of folk knowledge and scientific knowledge will help to speed up the adoption of improved practices by the farmers.

According to Gupta (1972) the concept of ' no tillage farming ' is based on the rational belief that if nature can grow luxuriant vegetation such as forests without tillage, it should be possible for man to grow food crops without ploughing or at least with minimum use of the plough.

Nand and Kumar (1980) concluded that it becomes necessary that the scientists investigate the rationality of each one of the technical beliefs held by farmers so that they can clearly accept or reject a technical belief.

Bentley (1993) suggested that scientists can learn most from farmers about factors in the farmers lives that are important and easy to observe.

In an in-depth study on the agricultural practices in the hills of Nepal , Subedi (1997) revealed that in most cases farmers' local knowledge concurred with formal experimental results.

Sangeetha (1997) suggested that the practices adopted by the commercial banana growers during the cultivation of banana included both the package of practices and the local or traditional or indigenous practices.

### 2.1.1 Meaning of farmers' practices

Knight (1980) called for the systematic documentation of traditional farmers' knowledge into an ' information bank ' from which agronomists, extension workers and other farmers can draw enlightenment and insight.

Brosius *et al* (1986) found out a new approach to understand traditional knowledge Ethnoecology. This forms the basis for structuring traditional agro ecosystems which is modified in the form of knowledge passed from generation to generation.

Titilosa (1990) proposed a method to evaluate the incorporation of indigenous / traditional knowledge in agriculture to development projects in less developed countries, so that the benefit of traditional farmers' resource management technique, as dictated by the environment and other social conditions can be harnessed and improved upon.

Much of the traditional agricultural practices have very little of modern technology *per se*, but they epitomise the scientific technological wisdom of generations after generations, and as such they have been naturalized and environmentalized whereas , most of the know-how based on modern science and technology are sophisticated, if not complicated (Vasu, 1994 ).

### 2.1.2 Importance of farmers' practices

Anonymous (1978) stated that it is important not to overlook the kind and extent of local knowledge, experience, technology, skills and institutions which exists in any total community. Such resources can often be very valuable indeed.

Srivastava (1980) opined that since traditional technologies have undergone a selective process over centuries of empirical testing, they are very likely to represent optimal solutions, but only optimal for the particular conditions, constraints, material and needs in response to which they are developed. The traditional tools and techniques should be studied systematically and organized effort made for improving their efficiency and productivity.

Narasimhan (1981) opined that before the problems arising from the modernization of the agricultural technology be considered, the status of folk knowledge and practices must be evaluated, only then it can be comprehensively updated.

Norman (1985) in an overview of research on African farmers' practices and potential for change, opined that an understanding of farmers' practices can help in designing relevant improved technologies for limited resource farmers.

Altieri and Liebman (1986) observed that traditional crop selection, planting times and cultivation practices often reflect efforts to minimize insect damage.

Bentley (1990) synthesized some of the seminal work that introduced the notion of farmers' participation into agricultural development in complex environment and observed : 'farmers have valuable knowledge, they undertake their own agricultural experimentation, and scientists should tap into this system to improve agrarian research and development'.

Vijayalekshmi (1993) suggested that knowing about and enriching tradition in Indian agricultural practices will help in finding ways of continuing with high yield farming without poisoning the soil, water and air with pesticides and fertilizers.

Chithiraichelvan (1994) reported that with the addition of farmers' indigenous/ traditional knowledge, the technologies developed get refined, the problems get restated and scientific solutions are evolved.

Meera (1995) opined that comprehending the science underlying indigenous practices would help us to understand the concepts and practices depicting the elements of sustainability to integrate with the modern information

system for efficient resource management. She identified the practice of 'controlled application of nutrients for reducing pests and diseases attack' as the most effective and scientifically rational practice in paddy cultivation and in vegetable cultivation, the practice, 'use of thulsikeni in pandals to trap and kill fruit flies'.

Altieri (1996) stated that, in this emerging conception of agricultural development, rural people's knowledge about plants, soils and animals gains unprecedented significance. He continued that scientists involved in small farm development must quickly systematize and incorporate farmers' knowledge, before this wealth of practical knowledge, is lost for ever, given that most traditional farming systems are rapidly disappearing in the face of major social, economic and political changes occurring in developing countries.

From the above review it could be concluded that the traditional/ farmers' practices are important in the process of agricultural development. Maximization of production is the prime goal of agricultural development for which new technologies are created by experts in the field of agriculture. The experts may consider the local practices while formulating technologies for increasing production.

## 2.2 Studies on farmers' practices

Navarez *et. al.* (1985) conducted a study on weed control by farmers' practices. They found that the weed growth can be effectively checked by the farmers' practices than the recommended practices.

Roling (1988) observed that new variety of tomato developed by 'Development Foundation of Turkey' having a harvesting period of only 20 days was not suitable for small farmers. They need a variety with its harvesting period spread over a long period so that they can have fresh ones for meals and also they can take small quantities for local market. The variety developed is advantageous to only those farmers who need a quick return for their capital investment.

A survey of Quintana and Arzadon (1989) on the use of plant materials for pest control in selected areas in the Philippines revealed the existence of indigenous and traditional methods of controlling pests that have evolved in these areas. The botanical pesticides were used mainly against rice pest.

Anabella *et al* (1991) were of the opinion that localized practices are significant inputs to be considered in the overall understanding and development of vital agricultural commodities of the less developed countries such as sweet potato.

Bharara (1991) described many traditional practices based on local evidences and empirical data regarding traditional knowledge of rainfed farming practices and soil water conservation in arid zones of Rajasthan.

Gnanadeepa (1991) has identified and categorized certain traditional beliefs. Some of them may be rational and some of them have been scientifically proved by the scientists. For example, the traditional belief, "There will be no incidence of pests or diseases if neem cakes are applied" has been proved as true by the IRRI scientists.

Kanagasabapathi (1991) has reported the results of a case study conducted on traditional practices in dryland agriculture. Many practices such as use of neem cake dissolved in cow's urine and use of ash or red earth for storage of pulse grains were reported as effective traditional practices. Details of practices with possible scientific explanations and suggestions for further development were also discussed.

Sanghi (1991) has illustrated a number of traditional farm management practices evolved by farmers to address the problem of risk due to drought, wet weather, frost ,pests, disease and market rate. Attempts have also been made to discuss about their relevance under the changing scenario in rainfed agriculture, and also to impress upon the need for blending the traditional practices of risk management with modern practices of high production.

One hundred and fifteen traditional beliefs covering various agricultural activities in rice farming was identified by Balasubramanion (1992) from Palladam block of Coimbatore district in Tamil Nadu.

Lupanga *et al.* (1995) conducted a study which examines ways of linking research, extension and farmers through a two way exchange of both Indigenous Technical Knowledge (ITK) and scientific knowledge in order to increase food production in Tanzania.

Gupta (1996) conducted a survey in 'Saurashtra' and identified the farmers' practices in vegetable cultivation.

Manju (1996) reported 83 indigenous practices of farmers in coconut cultivation.

Abraham and Thomas (1997) in their empirical study described the varieties developed by the Kerala farmers in cassava and cardamom. Ambakkadan variety of cassava developed by Ambakkadan Thommy has now spread all over Kerala and Njallani variety of cardamom developed by Njallani Varkey is widely accepted as a high yielding variety and a disease–resistant one. They also reported that aphids in paddy are controlled with a mixture of asafoetida and cattle urine or spraying a mixture of garlic, chilli and asafoetida in water, pasting ginger and yam seed material with cow dung, sun dried, smoked and kept so that the seeds can retain the moisture for a year.

Bheemappa and Hosamani (1997) compiled the farmers' practices for protection of pulse seeds from storage pests.

Manju (1997) identified 47 indigenous practices among vegetable growers of Thrissur district.

Preetha (1997) identified and documented 14 indigenous rodent control practices which are very effective for rice cultivation.

Vivekanandan (1997) described a farmers' practice in watermelon for its irrigation. Making a hole at the lower portion of a decaying fruit and keeping it on the root portion of the plant will irrigate it during the summer season.

In brief, systematic efforts for collecting farmers' practices were taken in different parts of the country. Hence there is a pressing need for the systematic documentation of farmers' practices before being lost. So it is imperative that scientists and extension workers collect and document such information for the benefit of researchers.

## 2.3 Knowledge about recommended practices and its relationship with selected characteristics of respondents.

### 2.3.1 Knowledge about recommended practices.

Faniran and Areola (1976) reported that in the field of crop production and the management of the soil, the knowledge and experience of local farmers are unrivalled and no alternative system of food production is found as competent as farmers' knowledge.

Bhaskaran (1978) observed that progressiveness of farmers was measured by taking knowledge of improved practices as one of the components of progressivism.

Jayakrishnan (1984) revealed that paddy growers had medium level of knowledge of low cost technology.

Sethy *et al* (1984) reported that knowledge of technology is the basis to adoption of high yielding rice technology for all categories of farmers.

Sagar (1989) reported that majority of the respondents had medium knowledge about recommended practices of paddy cultivation.

Reijntjes *et al* (1992) stated that indigenous knowledge is not uniformly spread through out a community and the individuals aptitudes for storing traditional knowledge and generating new knowledge differ. Each individual possesses only a part of community indigenous knowledge, he observed.

According to Balasubramanion (1992) 84 per cent of small farmers and all big farmers were aware of cattle penning practices to improve soil fertility.

Based on the review of literature and discussions with experts, 16 independent variables were selected for the study. The independent variables selected were age, education, occupation, farming experience, annual income, area under bitter gourd cultivation, information source utilization, social participation, extension orientation, economic motivation, innovativeness, cosmopoliteness, credit orientation, risk orientation, participation in Participatory Technology Development (P.T.D) and perception about P.T.D.

### 2.3.2 Relationship of independent variables with knowledge about recommended practices.

| Sl. No. | Author(s) who stated the relationship | Year | Relationship with the dependent variable * |
|---|---|---|---|
| | **Age Vs Knowledge** | | |
| 1 | Ahamed | 1981 | NS |
| 2 | Kamarudeen | 1981 | NS |
| 3 | Selvanayagam | 1986 | NS |
| 4 | Krishnamoorthy | 1988 | S |
| 5 | Thampan | 1990 | NS |
| 6 | Gnanadeepa | 1991 | P & S |
| 7 | Manju | 1996 | NS |
| 8 | Preetha | 1997 | NS |
| | **Education Vs Knowledge** | | |
| 1 | Krishnamoorthy | 1988 | P |
| 2 | Anithakumari | 1989 | P & S |
| 3 | Intodia | 1989 | P |
| 4 | Thampan | 1990 | P & S |
| 5 | Gnanadeepa | 1991 | N & S |
| 6 | Gangadharan | 1993 | P |
| 7 | Sumathi & Annamalai | 1993 | S |

*P-Positive NS-Nonsignificant

N-Negative S-Significant

| | | | |
|---|---|---|---|
| 8 | Babu | 1995 | P & S |
| 9 | Jeyasubramaniam | 1996 | P & S |
| 10 | Manju | 1996 | P & S |
| 11 | Manju | 1997 | N & S |
| 12 | Preetha | 1997 | N & S |
| | **Occupation Vs Knowledge** | | |
| 1 | Manju | 1996 | NS |
| 2 | Preetha | 1997 | P & S |
| 3 | Jose | 1998 | NS |
| | **Farming experience Vs knowledge** | | |
| 1 | Selvanayagam | 1986 | NS |
| 2 | Pitchai | 1987 | NS |
| 3 | Gnanadeepa | 1991 | P & S |
| 4 | Ahiah | 1993 | NS |
| 5 | Philip | 1995 | NS |
| 6 | Jeyasubramaniam | 1996 | P & S |
| 7 | Manju | 1996 | NS |
| 8 | Manju | 1997 | P & S |
| 9 | Preetha | 1997 | P & S |
| 10 | Jose | 1998 | N & S |
| | **Annual Income Vs knowledge** | | |
| 1 | Ahamed | 1981 | NS |
| 2 | Kamarudeen | 1981 | NS |

| | | | |
|---|---|---|---|
| 3 | Badagaonkar | 1987 | P & S |
| 4 | Jeyasubramaniam | 1996 | NS |
| 5 | Manju | 1996 | NS |
| 6 | Preetha | 1997 | NS |
| 7 | Jose | 1998 | NS |
| | **Area under bittergourd cultivation Vs knowledge** | | |
| 1 | Godhandapani | 1984 | NS |
| 2 | Sathesh | 1990 | P & S |
| 3 | Manju | 1996 | NS |
| 4 | Manju | 1997 | N & S |
| 5 | Preetha | 1997 | NS |
| 6 | Jose | 1998 | NS |
| | **Information source utilization Vs knowledge** | | |
| 1 | Selvanayagam | 1986 | NS |
| 2 | Gnanadeepa | 1991 | N & S |
| 3 | Gangadharan | 1993 | S |
| 4 | Manju | 1996 | NS |
| 5 | Preetha | 1997 | P & S |
| | **Irrigation Index Vs knowledge** | | |
| 1 | Manju | 1996 | NS |
| | **Social participation Vs knowledge** | | |
| 1 | Kamarudeen | 1981 | P & S |
| 2 | Haraprasad | 1982 | P & S |

| | | | |
|---|---|---|---|
| 3 | Selvanayagam | 1986 | NS |
| 4 | Ramdass | 1987 | P & S |
| 5 | Thampan | 1990 | P |
| 6 | Gnanadeepa | 1991 | NS |
| 7 | Ganagadharan | 1993 | P |
| 8 | Manju | 1996 | NS |
| 9 | Preetha | 1997 | NS |
| 10 | Jose | 1998 | S |
| | **Extension Orientation Vs knowledge** | | |
| 1 | Selvanayagam | 1986 | NS |
| 2 | Badagaonkar | 1987 | NS |
| 3 | Gnanadeepa | 1991 | NS |
| 4 | Gangadharan | 1993 | S |
| 5 | Manju | 1996 | NS |
| 6 | Manju | 1997 | P & S |
| 7 | Preetha | 1997 | NS |
| 8 | Jose | 1998 | NS |
| | **Economic motivation Vs knowledge** | | |
| 1 | Jeyakrishnan | 1984 | P & S |
| 2 | Selvanayagam | 1986 | NS |
| 3 | Gopala | 1991 | NS |
| 4 | Chaudhari & Makode | 1992 | P & S |
| 5 | Gangadharan | 1993 | P & S |

| | | | |
|---|---|---|---|
| 6 | Manju | 1996 | NS |
| 7 | Manju | 1997 | N & S |
| 8 | Preetha | 1997 | NS |
| 9 | Jose | 1998 | P & S |
| | **Innovativeness Vs knowledge** | | |
| 1 | Selvanayagam | 1986 | NS |
| 2 | Warren | 1989 | P & S |
| 3 | Gangadharan | 1993 | P & S |
| 4 | Nirmala | 1993 | P & S |
| 5 | Manju | 1996 | NS |
| 6 | Manju | 1997 | N & S |
| 7 | Preetha | 1997 | NS |
| 8 | Jose | 1998 | S |
| | **Cosmopotiteness Vs knowledge** | | |
| 1 | Kamarudeen | 1981 | NS |
| 2 | Viju | 1985 | P |
| 3 | Selvanayagam | 1986 | NS |
| 4 | Gnanadeepa | 1991 | N & S |
| 5 | Gangadharan | 1993 | P |
| 6 | Manju | 1996 | NS |
| 7 | Preetha | 1997 | NS |
| 8 | Jose | 1998 | P & S |

**Risk orientation Vs knowledge**

| | | | |
|---|---|---|---|
| 1 | Jeyakrishnan | 1984 | P & S |
| 2 | Viju | 1985 | P & S |
| 3 | Selvanayagam | 1986 | NS |
| 4 | Ratnabai | 1990 | NS |
| 5 | Gnanadeepa | 1991 | NS |
| 6 | Gangadharan | 1993 | P |
| 7 | Suresh | 1993 | P & S |
| 8 | Manju | 1996 | NS |
| 9 | Preetha | 1997 | P & S |
| 10 | Jose | 1998 | P & S |

## 2.4 Extent of adoption of farmers' practices and its relationship with selected characteristics of respondents.

### 2.4.1 Extent of adoption of farmers' practices.

According to Rogers (1962) adoption refers to the continued use of the recommended practices by an individual. He opined that adoption process is the mental process through which an individual passes from first hearing about an innovation to its final adoption.

Bhaskaran and Praveena (1982) informed that over two third of dry land farmers adopted off-season tillage, soil mulching and midterm correction whereas only less than five per cent of them adopted minimal irrigation techniques.

Jeyakrishnan (1984) observed that paddy growers had medium level of adoption of low cost technologies.

Balasubramanion (1982) reported that summer ploughing was adopted by majority of the farmers (92%) . He further found that sorghum raised as mixed crop with lab-lab was practised by 85 per cent of farmers.

Ramachandran (1988) reported that summer ploughing and intercropping, were adopted by all the farmers while adoption level of other technologies varied due to a variety of reasons.

Deepa (1992) studied the effect of relevant traditional beliefs on the adoption of improved rice technologies. It was found that beliefs which have positive effect facilitated the adoption and the beliefs which have negative effect acted as obstacles in the adoption of recommended practices.

According to Babu (1995) about 24.22 per cent of the farmers were in the habit of using polybags tied up on poles to ward off birds and rodents.

Manju (1996) reported that the adoption of Kumbom ( rat trap made of bamboo) against rodents by the coconut farmers was 45.83 per cent.

As observed by Preetha (1997), the practice of spraying a mixture of highly pungent pepper, garlic juice and asafoetida powder at panicle emergence and grain setting stages of paddy against rice bug was adopted by 27.4 per cent of farmers.

**2.4.2 Relationship of selected characteristics of respondents with adoption of farmers' practices.**

Since many research studies directly dealing with this topic have not been conducted, the following relationships are only indirectly related to the subject.

| Sl. No. | Author(s) who stated the relationship | Year | Relationship with the dependent variable |
|---|---|---|---|
| | **Age vs Adoption** | | |
| 1 | Kantharaj | 1980 | NS |
| 2 | Manivannan | 1980 | NS |
| 3 | Vijayakumar | 1983 | NS |
| 4. | Swaminathan | 1986 | NS |
| 5 | Prasannan | 1987 | NS |
| 6 | Adhiguru | 1991 | NS |
| 7 | Manju | 1996 | NS |
| 8 | Preetha | 1997 | NS |
| | **Education Vs Adoption** | | |
| 1 | Chakravarthy | 1982 | NS |
| 2 | Kappattanavar | 1983 | P & S |
| 3 | Vijayakumar | 1983 | P & S |
| 4 | Harish | 1985 | NS |
| 5 | Naika | 1985 | P & S |
| 6 | Khanal | 1986 | P & S |

| | | | |
|---|---|---|---|
| 7 | Swaminathan | 1986 | NS |
| 8 | Manju | 1996 | NS |
| 9 | Preetha | 1997 | NS |
| | **Occupation Vs Adoption** | | |
| 1 | Das & Sarkar | 1979 | P & S |
| 2 | Somasundaram & Singh | 1979 | NS |
| 3 | Jeyakrishnan | 1984 | P & S |
| 4 | Manju | 1996 | NS |
| 5. | Preetha | 1997 | NS |
| | **Farming experience Vs Adoption** | | |
| 1 | Kumbar | 1983 | NS |
| 2 | Jeyakrishnan | 1984 | P & S |
| 3 | Adhiguru | 1991 | N & S |
| 4 | Manju | 1996 | NS |
| 5 | Preetha | 1997 | NS |
| 6 | Sivaprasad | 1997 | NS |
| | **Annual Income Vs Adoption** | | |
| 1 | Chakravarthy | 1982 | NS |
| 2 | Viju | 1985 | P |
| 3 | Badgaonkar | 1987 | P |
| 4 | Aziz | 1988 | P |
| 5 | Manju | 1996 | NS |
| 6 | Preetha | 1997 | NS |

**Area under bittergourd cultivation Vs Adoption**

| | | | |
|---|---|---|---|
| 1 | Vijayakumar | 1983 | P |
| 2 | Prasannan | 1987 | P & S |
| 3 | Anithakumari | 1989 | NS |
| 4 | Bavalatti & Sundaraswamy | 1990 | P & S |
| 5 | Manju | 1996 | NS |
| 6 | Preetha | 1997 | NS |

**Information source utilization Vs Adoption**

| | | | |
|---|---|---|---|
| 1 | Jeyakrishnan | 1984 | P & S |
| 2 | Balasubramanion | 1985 | P & S |
| 3 | Godhandapani | 1984 | P & S |
| 4 | Jayapalan | 1985 | P & S |
| 5 | Wilson & Chaturvedi | 1985 | P & S |
| 6 | Prasannan | 1987 | P & S |
| 7 | Anithakumari | 1989 | P & S |
| 8 | Sajeevchandran | 1989 | P & S |
| 9 | Manju | 1996 | P & S |
| 10 | Preetha | 1997 | P & S |

**Social Participation Vs Adoption**

| | | | |
|---|---|---|---|
| 1 | Kamarudeen | 1981 | P & S |
| 2 | Haraprasad | 1982 | P & S |
| 3 | Selvanayagam | 1986 | P & NS |
| 4 | Ramdass | 1987 | P & S |

| | | | |
|---|---|---|---|
| 5 | Thampan | 1990 | P |
| 6 | Gnanadeepa | 1991 | NS |
| 7 | Gangadharan | 1993 | P |
| 8 | Manju | 1996 | N & NS |
| 9. | Preetha | 1997 | N & NS |
| 10. | Jose | 1998 | S |
| | **Economic Motivation Vs Adoption** | | |
| 1 | Balan | 1987 | P & S |
| 2 | Prasannan | 1987 | P & S |
| 3 | Anithakumari | 1989 | NS |
| 4 | Sajeevchandran | 1989 | P |
| 5 | Suthe *et al* | 1991 | P |
| 6 | Gangadharan | 1993 | N |
| 7 | Jnanadevan | 1993 | P |
| 8 | Meera | 1995 | P |
| 9 | Manju | 1996 | NS |
| 10 | Preetha | 1997 | NS |
| 11 | Sivaprasad | 1997 | P |
| | **Extension orientation Vs Adoption** | | |
| 1 | Jayaramaiah | 1987 | S |
| 2 | Somasekharappa & Manimegalan | 1987 | NS |
| 3 | Govind | 1992 | P |

| | | | |
|---|---|---|---|
| 4 | Gangadharan | 1993 | S |
| 5 | Jnanadevan | 1993 | NS |
| 6 | Manju | 1996 | NS |
| 7 | Preetha | 1997 | N & S |
| 8 | Sivaprasad | 1997 | NS |
| | **Innovativeness Vs Adoption** | | |
| 1 | Anithakumari | 1989 | NS |
| 2 | Gangadharan | 1993 | S |
| 3 | Manju | 1996 | NS |
| 4 | Preetha | 1997 | NS |
| | **Cosmopoliteness Vs Adoption** | | |
| 1 | Ahamed | 1981 | P |
| 2 | Kamarudeen | 1981 | P |
| 3 | Chakravarthy | 1982 | NS |
| 4 | Ferreira *et al* | 1983 | P |
| 5 | Viju | 1985 | P |
| 6 | Syamala | 1988 | NS |
| 7 | Jaleel | 1992 | P |
| 8 | Manju | 1996 | NS |
| 9 | Preetha | 1997 | N & S |
| | **Credit orientation Vs Adoption** | | |
| 1. | Manjunatha | 1980 | P |
| 2 | Venkateswaralu & Bhalerao | 1980 | P |

| | | | |
|---|---|---|---|
| 3 | Perumal & Mariappan | 1982 | P |
| 4 | Nandakumar | 1988 | NS |
| 5 | Jaleel | 1992 | NS |

**Risk orientation Vs Adoption**

| | | | |
|---|---|---|---|
| 1 | Pillai | 1983 | P |
| 2 | Prasannan | 1987 | P & NS |
| 3 | Babu | 1995 | N & Ns |
| 4 | Manju | 1996 | N & NS |
| 5 | Preetha | 1997 | P & S |

**Participatory Technology Development (P.T.D) Vs Adoption**

Paul (1970) concluded that farmers who participated in the Farmers' Training and Education programme differ significantly with regard to adoption of package of practices from those who have not participated.

Muthukrishnan (1981) found that majority of the users (93.00%) of biogas plants had better perception and attitude towards biogas plants.

## 2.5 Techno-socio-economic assessment of farmers' practices as perceived by the farmers.

Rao (1970) concluded in his study that compatability and complexity of recommended farm practices were significantly related to rate of adoption.

Rogers and Shoemaker (1971) generalized that relative advantage, compatibility, trialability, profitability and observability of new idea as perceived by members of social system were positively related to its rate of adoption.

Ramamoorthy (1973) inferred that complexity of innovations was significantly related to rate of adoption.

Holloway (1977) stated that relative advantage, compatibility, complexity, trialability, profitability and observability of a new idea were significantly related to rate of adoption.

**2.6 Efficiency of farmers' practices as perceived by the farmers, researchers and extension personnel.**

Radhakrishnan (1969) defined efficient farmer as one who produces a unit of output at low cost. But the farmer who produce only small output per unit of input at a low cost cannot obviously be called as an efficient farmer. This leads to another concept of efficiency viz., maximum yield per unit of input. But just as minimum cost with minimum yield of output, say, per acre cannot be considered as efficiency, higher yield accompanied by high cost of production cannot also be termed as efficiency.

Variation in the perception of various indigenous farm practice attributes by small, medium and big farmers were studied by Chakravarthy (1982).

Chithiraichelvan and Raman (1991) stated that despite advances in dry farming research the rainfed farmers depend more in traditional practices involving less cost, having ecological and farming system adaptability and providing more or less stable productivity under aberrant weather conditions to contain the risk.

Manju (1996) reported that 60.00 per cent of the research workers perceived the indigenous practices as low in terms of efficiency.

Sandhya (1992) observed that perishability, bulkiness and seasonality in production were some of the difficulties in the marketing of vegetables.

Meera (1995) reported that the major constraint in the adoption of plant protection technology was the difficulty in finding the dosage of chemicals and difficulty in the selection of alternative chemicals.

Manju (1996) identified inadequate irrigation facilities as a constraint to the farmers' practice of transplanting the coconut seeding in Bharani day of Kumbhom.

Consumption of large amount of time and labour are some of the major constraints reported by Preetha (1997) in using 'chakram' to dewater the rice fields.

## 2.8 Conceptual frame work of the study

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

It is an accepted fact that knowledge and extent of 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 contributing factors only would give a clear picture of the dependent variables viz. knowledge and extent of adoption.

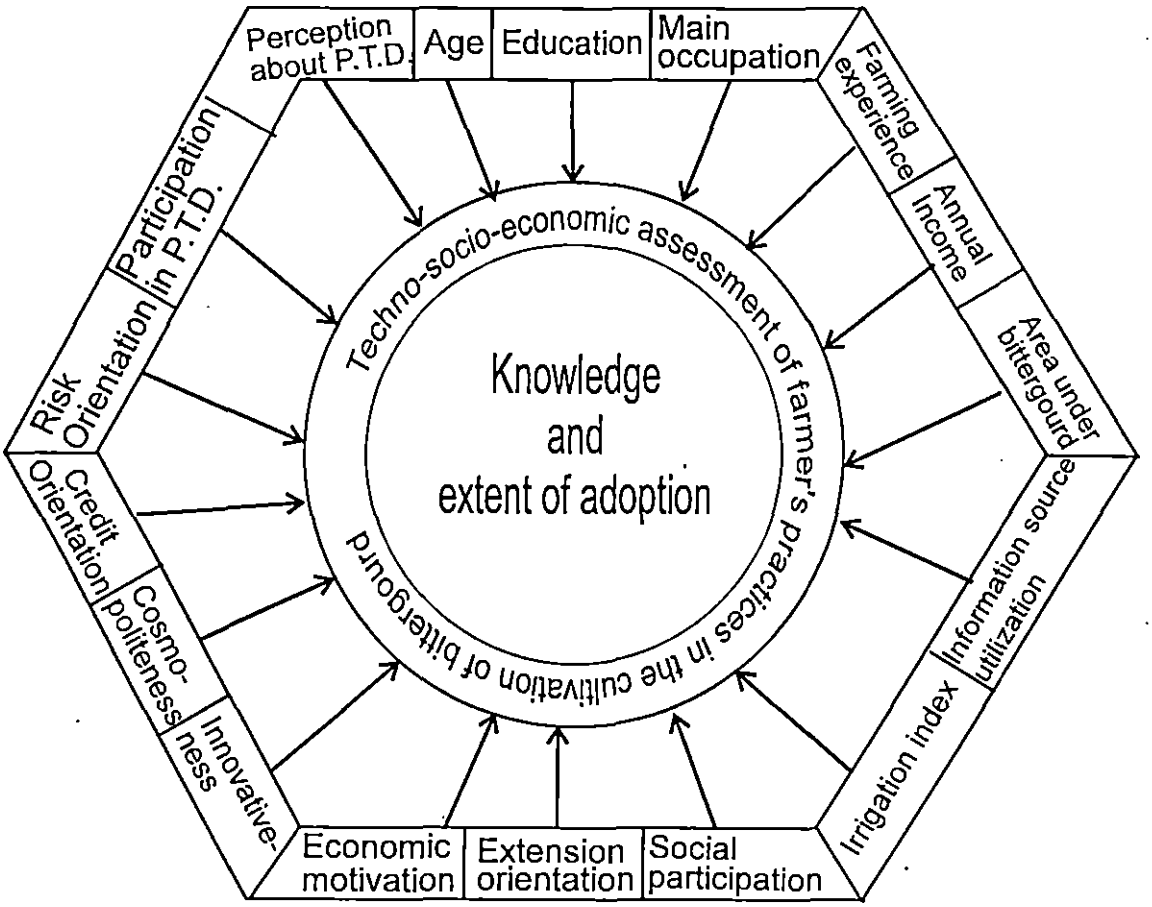



Fig.1. Conceptual model of the study.

# Methodology

# CHAPTER - 111

# METHODOLOGY

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

3.1 Research design

3.2 Locale of the study

3.3 Selection of sample

3.4 Operationalization and measurement of variables included in the study

3.5 Methods used for data collection

3.6 Statistical tools used for the study

## 3.1 Research design

This study was conducted adopting an *ex-post-facto* research design. *Ex-post-facto* research is systematic empirical enquiry in which the scientists do not have direct control over the independent variables because their manifestations have already occurred or because they are inherently not manipulatable (Kerlinger, 1964).

Inferences about relations among variables are made without direct intervention, from concomitant variation of independent and dependent variables. In this research study since the manifestation of the independent variables had

already occurred and there was no scope for manipulation of any variable, ex-post facto research design was resorted to.

### 3.2 Locale of the study

The study was conducted in Thiruvananthapuram district of Kerala. Thiruvananthapuram district was selected as the locale of the study for the following reasons .

1. Thiruvananthapuram district is one among the top districts with maximum area under bittergourd (Area – 5950 hectares. source : Directorate of Agriculture; Vegetable cell 1999).
2. There are traditional farmers and pockets of potential bittergourd cultivation in the district.
3. Research oriented cultivation is done in Thiruvananthapuram district.
4 Many progressive farmers of Thiruvananthapuram have received "Harithamithra" awards.
5. Many farmers of Thiruvananthapuram district received training from Kerala Horticulture Development Programme (KHDP).
6. It is one of the best working area of KHDP.
7. KHDP is conducting participatory training approach (PTD) experiments in this distirict.
8. The produce especially bittergourd fetch high price in the export markets according to marketing agencies.
9. It is convenient for data collection considering the proximity of the area to the researcher.

Kalliyoor Panchayat in Thiruvananthapuram district was selected as this is one of the best area in the cultivation of bittergourd (Gross area– 985 hectares. source: KHDP 1999). Map showing the area of the study is presented in Fig.2. This area was selected on the basis of rating by a panel of researchers, including the scientists of Kerala Agricultural University (KAU), technical officer and technical assistants of KHDP, agriculture officer of the Kalliyoor Krishi Bhavan, extension personnel and people's representatives in the district.

### 3.3 Selection of sample

Two sets of respondents were selected for the study.

1. Practising farmers
2. Extension workers and agricultural scientists working on bittergourd

Since the research programme was of exploratory and exhaustive nature involving non-participant observation for data gathering, only an appropriate sample size of farmers cultivating bittergourd were included as the respondents of the first category depending on the quantity of information to be generated and the logistics. Accordingly 40 farmers were included in the sample. For this the researcher contacted the agricultural officer of the Kalliyoor Krishi Bhavan and got the list of 80 bitter gourd growers who belonged to two Haritha sangams namely Sasthankovilnada and Erayankode. From this, selected 40 farmers who had comparitively maximum area and production by discussing with the technical officer, technical assistants of KHDP, agriculture officer, agriculture assistants of the Krishi Bhavan, members of the Haritha sangams, peoples' representatives and progressive farmers. Only 40 farmers were selected because the technique

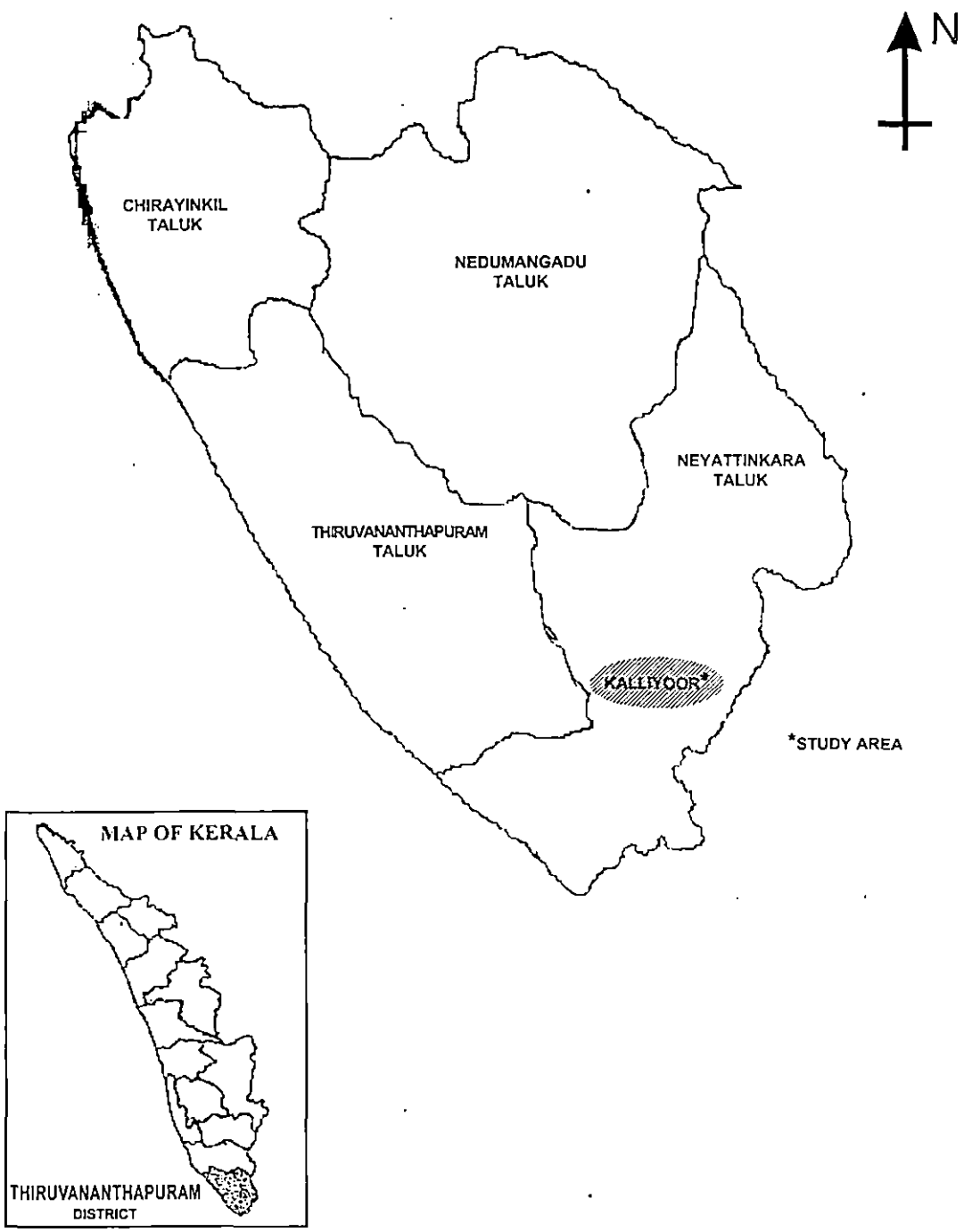



**Fig. 2 : Map showing the location of the study in Thiruvananthapuram District.**

used for the study is non-participant observation technique. This involved frequent visiting to the farmers' field, observed the pratices they did in their field and without their knowledge the information was recorded and collected. For a systematic and scientific study using this non-participant observation technique, the sample size should be concised.

In the second category 25 extension officials and 25 agriculture scientists were included. 25 extension officials included technical officer, technical assistant of KHDP, agriculture officer and agriculture assistants of various Krishi Bhavans in Thiruvananthapuram district.

Twenty five agriculture scientists included the reseachers who are directly related to bittergourd research and extension of various colleges of Kerala Agricultural University (KAU) i.e., Collge of Agriculture, Vellayani and College of Horticulture, Vellanikara.

### 3.4 Operationalisation and measurement of variables included in the study.

### 3.4.1 Operationalisation and measurement of dependent variables.

**1. Knowledge about recommended practices**

This variable refers to the extent of information possessed by the respondents on recommended practices.

Shankariah and Singh (1967) in a study on the predictive analysis of factors related with the knowledge of improved practices of vegetable cultivation, developed a schedule to test the knowledge of improved methods based on the teacher made tests.

The variable was measured using teacher made test developed for the study.

**Method of scoring**

Twelve recommended practices were included in the final schedule for measuring the knowledge. Each respondent was given one score for the practice which is known to him/her and zero score for the practice which is unknown to him/her. The total knowledge score for each respondent was calculated by summing up the scores given for each practice. Thus the maximum knowledge score that could be obtained by a respondent was 12 and the minimum zero.

**2. Extent of adoption of farmers' practices.**

Extent of adoption is the degree to which a farmer has actually adopted a practice.

The index developed by Manju (1996) was used in this study. As little study on this aspect of farmers' practices have been carried out so far, there were no criteria for ranking them. So the selection of practices for calculating the adoption index was a bit difficult. The only alternative that could be used was to approach the scientists who are working on bittergourd to suggest from the list, the practices which they thought to have some rationale.

Thus, the list of practices was administered to a group of scientists working on bittergourd and requested them to suggest the practices which they thought as important or worth studying. Thus, the practices were ranked in the order of their importance and twenty five practices were selected to be included in the final interview schedule for measuring the adoption index. These practices were ranked and given weightages within the subheadings of each cultivation practice.

In the present study, adoption index was calculated as given below :

$$AI = \frac{1}{S} \times \frac{\sum_{i=1}^{k} W_i}{\sum_{i=1}^{n} W_i} \times L_i \times A_i \times 100$$

where

AI = Adoption index

S = Number of subheadings

$\sum_{i=1}^{k} W_i$ = Sum of the weightages of the adopted practices where k is the number of adopted practices by each farmer.

$\sum_{i=1}^{n} W_i$ = Total weightage of all the practices where n is the number of total practices.

$L_i$ = Proportion of years since the respondent is following the $i^{th}$ practice (value ranging from zero to one with 15 years as the limit.)

$A_i$ = Proportion of area in which the respondent is following the $i^{th}$ practice (0–1).

### 3.4.2 Operationalization and measurement of independent variables

**1. Age**

Age was operationalized as the number of years the respondent had completed at the time of investigation since his or her birth. (Manju, 1996).

**2. Education**

It was operationalized as the extent of informal and formal learning acquired by the farmer. The scoring procedure used by Preetha (1997) was used.

The different educational levels of the respondents were scored as follows :

| Level of education | Score |
|---|---|
| Illiterate | 0 |
| Primary | 1 |
| Secondary | 2 |
| Collegiate | 3 |

**3. Main occupation**

The professional status of agriculture for a farmer respondent was measured by this variable. It refers to whether agriculture was the respondent's chief occupation or not. Scoring procedure followed by Manju (1996) was used. Scoring procedure was as follows :

| | |
|---|---|
| Farming as primary occupation | 2 |
| Farming as secondary occupation | 1 |

**4. Farming experience**

Farming experience was operationalized as the experience of the farmer in bittergourd cultivation which is expressed in terms of number of years. The variable was quantified by asking the respondents to indicate the number of years he has been practising bittergourd cultivation. The procedure used by Manju (1996) was followed.

**5. Annual income**

Annual income was operationally defined as the total earning of the farmer and the members of the family in an year from the farm and other sources in rupees. The procedure developed by Preetha (1997) was adopted in this study.

**6. Area under bittergourd cultivation**

It was operationalised as the area under bittergourd measured in acres.

**7. Information source utilization**

This referred to an individual's contact with various sources of information i.e., one's exposure to various sources of information and not influence or internalization of the message from these sources. Scoring procedure developed by Manju (1996) was used in the study.

Scores of 0,1 and 2 were given for responses never, occasionally and regularly respectively for each information source.

**8. Irrigation Index**

The extent to which the crop is being irrigated was measured by this variable.

The scoring procedure developed by Geethakutty (1993) was used with slight modification. Two dimensions, viz. availability of irrigation water and area covered under irrigation were considered for the purpose. The scores for these two dimensions were given as follows.

1. Availability of irrigation water.

| | |
|---|---|
| Throughout the year | 2 |
| Partial availability | 1 |
| Never | 0 |

2. Area irrigated

| | |
|---|---|
| 75% and above | 4 |

| | |
|---|---|
| Between 74.99 and 50.00% | 3 |
| Between 49.99 and 25.00% | 2 |
| Below 25% | 1 |

The scores obtained by a farmer for the availability of irrigation water and area under irrigation were multiplied to get the irrigation index.

**9. Social Participation**

It was operationally defined as the degree of involvement of respondent in formal and informal social organizations either as member or as office bearer which also included their degree of participation in organizational activities. The scale used by Subramanion (1986) was followed with necessary modification to suit the present study.

The scoring procedure is given below :

1. Membership in organization

| | |
|---|---|
| No membership in any organization | 0 |
| Membership in each organization | 1 |
| Office bearer in each organization | 2 |

2. Frequency of attending meetings

| | |
|---|---|
| Never attending any meeting | 0 |
| Occasionally attending a few | 1 |
| Regularly attending all meetings | 2 |

To obtain the final score of the respondent, the scores given as the member or office bearer were multiplied with scores given for attendance in the activities and added up for all the organizations.

**10. Extension orientation**

Extension orientation refers to the extent of contact a farmer had with different extension agencies and also his participation in various extension activities or programmes like meetings, seminars etc. organized by these agencies.

Bhaskaran (1979) measured extension orientation taking into account both extension contact and extension participation and the scoring pattern developed by him was adopted. Here the response for contact of a farmer with different extension personnel were measured as follows :

| Response | Score |
|---|---|
| Often | 2 |
| Frequently | 1 |
| Never | 0 |

The total score was obtained by adding up all the scores for different extension activities.

The extension participation was measured by summing up the scores obtained by a farmer for his participation in various extension activities. The scores were assigned to the respondent as follows :

| Response | Score |
|---|---|
| Whenever conducted | 2 |
| Sometimes | 1 |
| Never | 0 |

The total score was obtained by adding up the scores for all extension activities. The score for extension orientation for a respondent was arrived at by adding up the scores for extension contact and extension participation.

**11. Economic Motivation :**

It was operationalised as the drive of the respondent for occupational sources in terms of profit making and the relative value placed on economic ends. This was measured using Supe's scale (1969) with modification in the scoring procedure. Instead of a 5 point continuum of response as developed by Supe, a dichotomy of 'yes' or 'no' response pattern was used as done by Prasad (1983). The scale consisted of 6 statements of which 5 statements were positive, while the last one was negative. A score of one was assigned for the 'yes' response and 'zero' score for the no response in the case of positive statement. The scoring pattern was reversed in the case of negative statement. The score obtained on each statement was summated to obtain the total score of a respondent on this variable. The maximum score that could be obtained by a respondent was six and minimum zero.

**12. Innovativeness**

This was operationalised as the degree to which the respondent was relatively earlier in adopting new ideas. The procedure followed by Singh and Choudhary (1977) and adopted by Selvanayagam (1986) was used to measure the innovativeness of a farmer. In this procedure a question was asked as to when the farmer would like to adopt an improved practice in farming.

The responses were scored as follows :

| Response | Score |
|---|---|
| 1. As soon as it is brought to my knowledge | 3 |
| 2. After I have seen other farmers tried successfully in the farm | 2 |
| 3. I prefer to wait and take my own time | 1 |

**13. Cosmopoliteness.**

Rogers (1962) defined cosmopoliteness as the degree to which an individual's orientation is external to a particular social system.

In this study cosmopoliteness is operationally defined as the tendency of the farmers to be in contact with outside world based on the belief that all the needs of an individual cannot be satisfied within his own community. The variable was measured by using the scale developed by Desai (1981). The two dimensions of the variables are :

a) The frequency of visits to the nearest town in a month.

b) The purpose of visit to the town in a month.

The scoring pattern was as follows :

a) Frequency of visits to the nearest town

| | | |
|---|---|---|
| i) | twice or more a week | 5 |
| ii) | once a week | 4 |
| iii) | once a fortnight | 3 |
| iv) | once a month | 2 |
| v) | very rarely | 1 |
| vi) | never | 0 |

b) Purpose of visit to the town

| | | |
|---|---|---|
| i) | all visits relating to agriculture | 5 |
| ii) | some relating to agriculture | 4 |
| iii) | personal or domestic matter | 3 |
| iv) | entertainment | 2 |
| v) | any other purpose | 1 |
| vi) | no response | 0 |

The total score for each respondent was found out by adding the scores of the above two dimensions of cosmopoliteness.

**14) Credit orientation**

This referred to the favourable and positive attitude of a bittergourd grower towards obtaining credit from institutional sources.

The procedure developed by Beal and Sibley (1967) was adopted in the present study to measure the variable, credit orientation with slight modification in score assigned . The scores given to the responses along with the set of questions are described below.

| Questions/statements | Responses | Score |
|---|---|---|
| Do you think, a farmer like you | No | 1 |
| should borrow more for agricultural purpose ? | Yes | 2 |
| In your opinion, how difficult is to secure | Very difficult | 1 |
| credit for agricultural purpose | Difficult | 2 |
| | Easy | 3 |
| How a farmer is treated when he | Very badly | 1 |

| | | |
|---|---|---|
| goes to secure credit | Badly | 2 |
| | Fairly | 3 |
| | Very fairly | 4 |
| There is nothing wrong in taking | Strongly disagree | 1 |
| credit from institutional sources | Disagree | 2 |
| | Undecided | 3 |
| | Strongly agree | 4 |
| Did you take credit in | No | 1 |
| the last two years for cultivation | Yes | 2 |

The total score obtained by each respondent was considered as the score on credit orientation. The categorization of the respondent was done based on the following pattern.

| Category | Score range |
|---|---|
| Low | 5 – 9 |
| Medium | 10 – 13 |
| High | 14 – 17 |

**15. Risk Orientation**

Risk orientation was operationalized as the degree to which the respondent is oriented towards the risk and uncertainity and he exhibits courage to face problems of risk.

The scale developed by Supe (1969) was used to measure risk orientation of the respondent.

The scale consisted of six statements of which two were negative. The respondents were rated on a five point continuum with scores 4, 3, 2, 1 and 0 for their responses, strongly agree, agree, undecided, disagree and strongly disagree respectively. The scores obtained on each statement were cumulated to obtain the total score. Thus the maximum score that could be obtained for a respondent was 24 and the minimum 0.

**16. Participation in Participatory Technology Development (P.T.D)**

P.T.D. was operationlized as the process of combining the indigenous knowledge and research capacities of the local farming communities with that of research and development institutions in an interactive way, in order to identify, generate, test and apply new techniques and practices and to strengthen the existing experimental and technology management capacities of the farmers. Also referred to as People Centered Technology Development.

Participation in P.T.D was operationalized as the involvement of the farmers in the developmental activities carried out through the various package programmes. As little study on this aspect have been carried out so far, there were no criteria for measuring the participation in P.T.D. So it was necessary to develop criteria to measure the participation in P.T.D. The scale consisted of five programmes of P.T.D. on bittergourd cultivation in that area. A score of 'one' was assigned for the 'yes' response and '0' score for the 'No' response. The score obtained on each were added to obtain the total score of a respondent. The maximum score that could be obtained by a respondent was five and minimum zero.

**17. Perception about P.T.D.**

Perception was operationally defined as a dynamic phenomenon which involves not only perceiving stimuli but also interpreting and describing these stimuli in terms of what are meaningful to the individual. This was measured by the scale developed for the study. The scale consisted of six statements of which only one was positive, rest were negative. A score of '1' was assigned for the ' Agree' response and '0' score for 'disagree' response in the case of positive statement. The scoring procedure was reversed in the case of the negative statement. The scores obtained on each statement were cumulated to obtain the total score of the respondent on this variable.

**3.4.3 Operational definition of the techno- socio- economic assessment of farmers' practices**

Techno- socio- economic assessment was defined as the meaningful sensation of the respondent about the worth or value of the farmers' practices in terms of the dimensions, simplicity, profitability, input availability, labour utilization, relative advantage, compatability, complexity, trialablity and observability as perceived by the farmers.

Relative advantage is the degree to which a practice is perceived as being better than the idea supersedes.

Compatability is the degree to which a practice is perceived as being consistent with the existing values, past experience and needs of potential adopters.

Complexity is the degree to which a practice is difficult to understand and use.

Trialability is the degree to which a practice may be experimented with on a limited basis.

Observability is the degree to which the results of a practice are visible to others.

Simplicity is a degree to which a practice is perceived to be easier in adoption.

Profitability is the degree to which a practice is perceived to give better yield.

Labour utilization is the degree to which a practice is perceived to employ more family labour than hired labour.

Input avilability is the ease and ready availability of inputs required for a practice as perceived by the farmer.

For this, technical, social and economic indices were developed using matrix ranking. List of 25 practices were administered to the farmers. They were asked to suggest their responses on a four point continuum. Scores of 1, 2, 3 and 4 were given to the responses, 'extremely not technical', ' not technical', 'technical' and 'extremely technical' respectively. The score of each practice was worked out by adding the weightages of responce of each respondent and mean score was computed and ranked.

Same procedure was used to get the social and economic indices.

All the three indices(viz. technical, social and economic) were cumulated to get the techno-socio-economic index and ranked.

### 3.4.4 Operational definition and measurement of efficiency of farmers' practices as perceived by farmers, researchers and extension personnel.

Efficiency of farmers' practice was defined as the degree to which a practice can yield maximum output per unit of input.

List of 40 collected practices were administered to a group of scientists working on bittergourd and requested them to suggest few practices which they thought as important based on the rationality. Thus 25 practices were suggested by them.

The farmer respondents were asked to give their responses for efficiency towards the 25 selected farmers' practices.

Score of 1, 2, 3 and 4 were given to the responses ' extremely not efficient' , 'Not efficient' , 'efficient' and extremely efficient' respectively. The efficiency score of each practice was worked out by adding the weightages of responce of each respondent and mean score was computed and ranked. The efficiency of the selected farmers' practices as perceived by the researchers and the extension personnel was measured using the same procedure.

### 3.4.5 Eco-friendliness as perceived by the farmers

It was the degree to which a practice is perceived as profitable to the practitioner, conserve natural resource base and provide healthy and safe environment in the long run. List of 25 practices were administered to the farmers. They were asked to suggest their responses on a four point continuum. Scores of 1,2,3 and 4 were given to the responses 'extremely not ecofriendly' , ' not ecofriendly ' , ' ecofriendly' and ' extremely ecofriendly' respectively. The score

of each practice was worked out by adding the weightages of responce of each respondent and mean score was computed and ranked..

### 3.4.6. Constraints faced by the farmers in bittergourd cultivation.

In the present study , the constraints in the bittergourd cultivation as experienced by the farmers were identified by following the method adopted by Meera (1995) . A list of constraints collected through review of literature, discussion, experience of the researcher and pilot study were given and the respondents were asked to indicate whether they were experiencing the constraints or not in the cultivation of bittergourd. The frequency of responses for each of the constraint was found separately and ranked.

## 3.5 Methods used for data collection

The data pertaining to the present study were collected in two stages.

Stage I : The first stage was meant for the collection of data pertaining to the first objective of the study i.e., the identification of farmers' practices in the cultivation of bittergourd in the district.

For this purpose, 40 well experienced bittergourd growers were selected. Non-participant observation technique was used for collecting information regarding the farmers' practices in bittergourd cultivation. Non participant observation technique involves frequent visits to the farmers' field from planting till harvesting for collecting and recording information. With these information the list of all the farmers' practices followed and being followed by farmers in the district was prepared. A total of 40 practices or beliefs in adoption were identified and tested. Structured and pre-tested interview schedules were used for

collection of data about the profile characteristics of the farmers.

Stage II : A pretested structured interview schedule was prepared for farmers, extension workers and for scientists for collecting the needed data. The interview schedule was prepared after discussing with a group of experts and necessary modifications were made. The data were collected through personal interview by the researcher using the final interview schedule.

### 3.6 Statistical tools used for the study.

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

**Correlation analysis**

Correlation coefficient is a measure of the association between two variables. The Correlation coefficient was worked out to measure the relationship between two dependent variables (viz. the knowledge and extent of adoption) and the different personal, socio-economic and psychological variables.

In order to test the significance of the observed correlation coefficient, the student's t test at (n-2) degrees of freedom was used.

**Multiple linear regression analysis (MLR)**

Multiple linear regression analysis was done to find out the relative contribution of each of the significant personal, socio-economic and psychological variables to the knowledge on and extent of adoption of the identified farmers' practices.

This gives the percentage of variation that a set of independent variables jointly explain in each of the dependent variable. The high $R^2$ values and the

significant F values suggest the desirability of the regression analysis in predicting the dependent variable.

Besides, mean, standard deviation, and simple percentage analysis were also carried out for simple categorizations.

The statistical analysis were done using the computer facility available at the Department of Agricultural Statistics, College of Agriculture, Thrissur.

# Results and Discussion

## CHAPTER IV

# RESULTS AND DISCUSSION

This chapter deals with the results obtained in this study and the discussion based on the results. Keeping the objectives in view, the findings as well as the discussion on them are presented in the following sequence.

4.1 Identification of farmers' practices in the cultivation of bittergourd.

4.2 Distribution of respondents based on their personal, socio-economic characteristics.

4.3 Knowledge of the farmers', about recommended practices in bittergourd cultivation and its relationship with the selected characteristics of the farmers.

4.4 Extent of adoption of farmers' practices and its relationship with the selected characteristics of the farmers.

4.5 Techno-socio-economic assessment of farmers' practices in bittergourd.

4.6 Efficiency of farmers' practices as perceived by the farmers, researchers and extension personnel.

4.7 Ecofriendliness of farmers' practices as perceived by the farmers.

4.8 Constraints faced by the farmers in bittergourd cultivation.

4.9 Empirical models of the study.

## 4.1 Identification of farmers' practices in the cultivation of bittergourd

The farmers' practices and beliefs identified in the investigation are categorized under seven subheadings.

The description of the identified farmers' practices and opinions of subject matter specialists about these practices are discussed below.

### CATEGORY I SELECTION OF VARIETY

**1. Use of Preethi variety of bittergourd.**

Most of the farmers use Preethi or MC-84 variety of bittergourd. According to farmers, it is having high marketing quality. The reasons they suggested were of the medium long fruits , good transport quality, tolerant to fruit fly which is one of the major pests affecting bittergourd in the study area and a duration of 4-5 months.

Scientists also agreed with this and observed this as a rational practice.

### CATEGORY II PROCESSING OF SEEDS

**1. Preservation of seeds with poultry manure.**

**2. Preservation of seeds in the hearth of home kitchens.**

In rural areas, the farmers preserve the seeds by covering with a paste of cowdung or poultry manure, then fixed on the wall of the kitchen over hearth. The manure and seeds get dried gradually. This is an old practice and is intended for protecting the seeds from insect attack and to improve the viability of seeds. Seeds absorb the available potassium and nitrogen from the manure. This acts as a booster dose for the seeds.

Experts suggest that this practice is worth studying.

**3. Storing seeds in hollow bamboo stem or empty coconut shell**

This traditional way of storing seeds protects the seeds against the attack of rats as well as storage pests. However, scientists could not find any rationality behind such practices and beliefs.

**4. Soaking seeds in water for 24hrs.**

Before planting, seeds are soaked in water for 24 hrs, then wrapped in a cloth to drain the remaining water.

Water is the most important requirement for germination. In course of time, moisture content of seed reduces. So the moisture requirement of seeds is high and takes much time to absorb water. Imbibition of water activates the metabolic processes of the seeds and renews them.

According to experts, this practice can be rational.

**CATEGORY III LAND PREPARATION**

**1. Burning of dry leaves and twigs**

Three days before planting, land is prepared by digging at a depth of 45cm. Pits will be at a diameter of 50-60 cm and the spacing followed is 2m x 2 m. This is the recommended practice. After that farmers burn the dry leaves and twigs within it.

This serves two purposes according to the farmers 1) field sanitation 2) improving soil fertility because of ash obtained.

Burning previous crop stubbles is a rational practice as perceived by scientists due to the following reasons a) it increases soil K and b) destroys the resting stages of many insects and pathogens.

**2. Land kept as such for 3 days.**

After the land preparation, it is kept as such for 3 days for the destruction of weeds and pests.

Researchers have pointed out that this practice can be rationale only if it is practised during summer season for about a week. Thus it helps in 1) moisture conservation 2) weed growth can be eliminated 3) resting stages of insects and pathogens get destroyed when exposed to sunlight 4) it pulverizes the soil and increases the soil depth.

**3. Liming**

At the time of first digging, liming is done at a rate of 3 kg/cent.

Farmers consider liming as the panacea to all crop diseases. Liming acts as a soil amiliorent . Liming to some extent resists fungal diseases. This increases the soil $P^h$ and controls the growth of fungi because most of the fungi prefer low $P^H$. However, though a rational practice, its effectiveness is doubtful.

**4. Application of Fytolan**

At the time of land preparation, Fytolan at the rate of 100g per 40 litres of water is made out and 1 litre mug per pit is applied.

According to farmers, this will protect the crop from rotting diseases and pests.

Fytolan is used instead of bordeaux mixture. Though it is available in ready to use form, it is not as much efficient as bordeaux mixture. So scientists

could not find any rationality behind such practices and beliefs.

**5. Land preparation at a depth of 25-30 cm.**

During the first season, the land is prepared to a depth of 45 cm which is the recommended practice. Some farmers, during the second season, prepare the land to a depth of 25-30 cm. They believed that the soil was already loosened by the first land preparation and consider this as a cost effective and labour saving method.

Some researchers also agreed with this and hence it possesses scientific rationality.

**CATEGORY IV APPLICATION OF MANURES AND FERTILIZERS**

**1. Fertilizers and manures are applied only one week after planting.**

A very few farmers believe that at the initial stage, the roots of the seedlings will not be healthy and if fertilizers and manures are applied, it will be subjected to rotting. However, no reports have been published about this.

**2. Application of neem cake**

After the land preparation, neem cake at a rate of 100 g per pit is applied. As a soil amendment, the farmers incorporate a basal dose of neem cake. According to farmers, application of neem cake considerably reduces pests and diseases in bittergourd and also supplements nutrients.

Neem cake serves both as a fertilizer and plant protectant against pests and diseases as reported by Vivekanandan (1994).

*Neem cake contains 5.2 per cent nitrogen, 10 per cent phosphoric acid and 1.4 per cent potassium. 11 kg of neem cake gives the effect of 1 kg of urea or 2.2 kg of ammonium sulphate.

*Neem cake contains many alkaloids, the most important being azadirachtin. When neem cake is applied as fertilizer, this alkaloid protects the plant.

*Azadirachtin repels some of the pests.

*The activity of azadirachtin and other alkaloids persists in the field upto one month.

*Neem cake, besides acting as an organic manure, also increases the desirable micro organisms which suppress the harmful micro organisms and nematodes causing diseases (Jyothimani,1994).

**3. Basal application of poultry manure, cowdung and ash.**

**4. Split application of organic manures and ground nut cake.**

**5. Green leaf manuring**

Though these are traditional practices, now they are considered as part of scientific methods of farming. The importance of cowdung, poultry manure, ash and groundnut cake as manure needs no emphasis.

Green leaf manuring with thick leaves like that of mango, jack, cashew etc. are more preferred, since its residual effect lasts longer.

**CATEGORY V PLANTING**

**1. Spacing followed is 2.5 x 2.5 m.**

The recommended spacing of bittergourd is 2 x 2 m. Some farmers followed 2.5 x 2.5 m spacing instead of the recommended spacing. The major

reason for adopting this practice was that they could accommodate more number of plants per pit.

This practice is not studied scientifically.

**2. Seed rate is 5-6 kg/ha.**

This is a recommended practice.

**3. Sowing of seeds**

Well rotten FYM and fertilizers are mixed with top soil in the pit and seeds are sown at a rate of 4-5 numbers/pit.

The farmers opined that this practice help in covering seeds and protects them from direct sunlight and prevents both drying of seeds and drying of emerging seedlings. Moreover, the loosened soil even gives a dust mulch effect. It is a recommended practice.

**4. Application of sand on basins**

Sand is applied on basins of bittergourd plants, 15 days after sowing. The purpose is to maintain enough soil moisture for germinating seeds.

**5. Planting done in such a way so that seedling face the eastern side.**

Only very few farmers adopt this practice. They believe that if the seedlings face the eastern side, they will get maximum sun light.

**6. Seedling planted opposite to wind direction.**

In order to resist strong winds, seedlings are planted opposite to wind direction.

This is practised to avoid lodging of seedlings.

## CATEGORY VI TRAILING

### 1. Trailing using jute

The farmers fix a peg in the pit and a jute is tied from the pandal to the peg for trailing. This is a cost saving method.

### 2. Trailing using long sticks

A long stick is fixed in the pit, through which plant directly trails to the pandal. Though this practice is little bit costly, the plants can resist strong wind and hence they will be healthy.

## CATEGORY VII PLANT PROTECTION AND AFTER CARE

### 1. Spraying neem oil-garlic emulsion

60 g of bar soap is diluted in 1/2 litre of water to get soap solution. This soap solution is added to one litre neem oil under violent agitation. This is diluted in 60 litres of water. To this spray solution thus obtained, well crushed garlic is added at the rate of 20g per litre of spray solution. This spray solution is applied as fine spray on the lower surface of the leaves against jassids and aphids.

Neem oil possesses a strong insect repellant action . The antifeedant and repellent action of neem oil compels the pests to move about, facilitating the entry of insecticide through contact action.

Another insect repellent property may be the effect of pungent principle like allen in garlic.

### 2. Spraying neem oil emulsion on bittergourd plants

One litre of neem oil and 60g of bar soap are the ingredients of neem oil emulsion. Bar soap is diluted in 1/2 litre of water and is mixed with neem oil

under violent agitation. The emulsion thus obtained is diluted with 40 times of water. This is applied on both surfaces of leaves as a fine spray against white flies and aphids.

Management of mosaic is also possible through this practice as white flies and aphids are identified as the vectors of Mosaic virus.

**3. Application of cow's urine-kanthari mulagu extract**

A mixture of cow's urine (One litre per ten litre of water) and 10g of *Capsicum frutescens* (Kanthari mulagu) extract is used against pumpkin caterpillar (Margaronia indica) affecting bittergourd.

The purpose is to control insect attack with the insecticidal property of kanthari mulagu plant. These insect repellent property may be the effect of capsicin in chillies.

Most of the farmers did not follow the practice in fear of the burning sensation caused on the body in contact with kanthari mulagu.

Scientists advised to spray this mixture early in the morning because the atmosphere will be free from breeze and heat.

**4. Sprinkling cows' urine on bittergourd leaves**

A preparation of four litres of cows' urine in about 10 litres of water is prepared and sprinkled or sprayed over bittergourd plants. This is used for controlling sucking pests.

**5. Application of bird pepper extract on bittergourd plants.**

Extract of whole bird pepper plant locally known as 'Kanthari'is diluted with water and then mixed with soap solution, and using tied bundle of coconut

leaves, the solution is sprinkled over bittergourd plants. The purpose is to control insect attack with the insecticidal property of kanthari plant.

**6. Spraying starch solution-jaggery mixture over bittergourd plants.**

10g of one or two days old starch water and well powdered jaggery are taken in a coconut shell and was poisoned with 0.5g of furudan. This is used against fruit flies.

This practice was pointed out by researchers as extremely rational.

**7. Spraying malathion-jaggery suspension.**

It is a recommended technique used against fruit flies. Malathion 0.2% suspension containing sugar or jaggery 10g per litre is sprayed as coarse droplets on the ventral surface of leaves after fruit set initiation.

**8. Banana fruit trap**

The farmers and the researchers experienced that banana fruit trap is an insurance against the attack of fruit flies. The fruit flies mainly affect fruits of bittergourd resulting in small size of the fruit and cause great loss to the farmer.

The trap can be made by cutting an unpeeled palayamkodan fruit into three or four pieces according to size. One of the cut surface of the fruit is impregnated with 0.5g of carbofuran granules. Then this is placed in a coconut shell which should be hung within the pandal, so that the portion with carbofuran faces upwards.

**9. Ocimum trap against fruit flies**

This practice is followed by most of the traditional as well as modern farmers as a mechanical control against fruit flies.

A handful of ocimum leaves ,about 30g leaves is well crushed and the leaf extract with crushed leaf is taken in a coconut shell. About 50ml of water is added to this. Then this extract is mixed with 10g of well powdered jaggery, then poisoned with 0.5g of carbofuran.

This practice is very much rational as per the opinion of the scientists. The researchers suggest that to have better results, the two traps viz. banana fruit trap and ocimum trap should be suspended alternatively in the pandal at the rate of one trap for four pits.

**10. Sprinkling extract of leaves of *Ocimum sanctum***

The extract of leaves of ocimum locally known as 'Thulasi' is sprinkled around the bittergourd plants. This will keep away many harmful insects from attacking the crop.

**11. Kiriyathu leaf-garlic extract**

This is a widely accepted and adopted practice. The preparation of the mixture is as follows. The ingredients required are one litre of kiriyathu (*Andrographis paniculatum*) leaf extract, 60g of bar soap and 500 litres of water. The soap solution is then added to the leaf extract and the mixture is diluted with 500 litres of water to get the spray solution. To this well crushed garlic is added at the rate of 20g per spray solution. This is filtered and applied as fine spray to get full coverage on both the surface of the leaves to serve as repellent.

The farmers believe that the peculiar bitter taste of the extract repel the pests.

Scientists observe this as a rational practice.

**12. Nattapoochedi leaf extract**

This is prepared in the same way as that of kiriyathu leaf-garlic extract. In the above mixture ,instead of kiriyathu, nattapoochedi (*Hyptis suaveolens*) leaf extract is used and sprayed against all pests.

The scientific explanation behind this is that the piercing bad odour of the nattapoochedi leaves repel the pests.

**13. Smoking the field to drive away the pests.**

**14. Smoking dry chilli under the pandal**

**15. Smoking gun powder**

Fumigation of vegetable gardens was found to be a common indigenous practice. It is known that for any crop, smoking enhances flowering and fruit set, and it reduces pest attack. By smoking, the plants also get ash.

Unlike subject matter specialists ,farmers give importance to ash as compared to the smoke. Researchers also agree that the potash content can be higher in ash.

Though it seems as a crazy and destructive practice, this practice perform a cleaning function by removing unwanted and harmful wastes, insect pests and their larvae.

Another scientific explanation is that ethylene is produced as a result of intense smoking. Ethylene is a hormone which enhances flowering. This may be the reason for increase in yield after the treatment.

Researchers have pointed out this as a destructive practice.

**16. Application of fish oil soap**

First soap is dissolved in a litre of hot water and then the volume is made up. Mainly used against plant lice. This is a recommended practice in bittergourd cultivation.

**17. Destruction of egg masses and grubs of epilachna beetle**

Remove and destroy egg masses, grubs and adults occurring on leaves. This is a recommended practice.

**4.2 Distribution of respondents based on their personal, socio-economic characteristics.**

A perusal of the Table.1. revealed that majority of the respondents were in the low category in the case of the variables namely age, experience in bitter gourd cultivation, annual income, area under bitter gourd cultivation, information source utilization, extension orientation, economic motivation, innovativeness, cosmopoliteness, credit orientation, risk orientation and Participatory Technology Development (P.T.D), while for the variables such as education, main occupation, and social participation ,the distribution of the respondents in the high category was fairly high.

Maximum number of respondents (87.5%) in high category was observed for the variable main occupation followed by education (57.5%) and social participation( 55%). Regarding the rest of the variables , only less than 50per cent of the respondents were in the high category. Among them ,maximum number of respondents (85%) were found in the low category, in the case of variable participation in P.T.D followed by innovativeness(80%), cosmopoliteness(80%),

Table.1. Distribution of respondents based on their personal,socio-economic characteristics.

n=40

| Sl. No. | Charateristic | Category | Score | f | % |
|---|---|---|---|---|---|
| 1 | Age | Low | < 42.25 | 21 | 52.5 |
| | | High | ≥ 42.25 | 19 | 47.5 |
| 2 | Education | Low | > 1.58 | 17 | 42.5 |
| | | High | ≥ 1.58 | 23 | 57.5 |
| 3 | Main occupation | Low | < 1.88 | 5 | 12.5 |
| | | High | ≥ 1.88 | 35 | 87.5 |
| 4 | Experience | Low | < 17.83 | 23 | 57.5 |
| | | High | ≥ 17.83 | 17 | 42.5 |
| 5 | Annual Income | Low | < 398.70 | 23 | 57.5 |
| | | High | ≥ 398.70 | 17 | 42.5 |
| 6 | Area under bitter gourd cultivation | Low | < 0.60 | 24 | 60.0 |
| | | High | ≥ 0.60 | 16 | 40.0 |
| 7 | Information source utilization | Low | < 11.60 | 22 | 55.0 |
| | | High | ≥ 11.60 | 18 | 45.0 |
| 9 | Social Participation | Low | < 5.60 | 18 | 45.0 |
| | | High | ≥ 5.60 | 22 | 55.0 |
| 10 | Extension orientation | Low | < 9.70 | 21 | 52.5 |
| | | High | ≥ 9.70 | 19 | 47.5 |
| 11 | Economic motivation | Low | < 5.40 | 21 | 52.5 |
| | | High | ≥ 5.40 | 19 | 47.5 |
| 12 | Innovativeness | Low | < 2.20 | 32 | 80.0 |
| | | High | ≥ 2.20 | 8 | 20.0 |
| 13 | Cosmopoliteness | Low | < 8.20 | 32 | 80.0 |
| | | High | ≥ 8.20 | 8 | 20.0 |
| 14 | Credit orientation | Low | < 14.60 | 25 | 62.5 |
| | | High | ≥ 14.60 | 15 | 37.5 |
| 15 | Risk orientation | Low | < 16.70 | 27 | 67.5 |
| | | High | ≥ 16.70 | 13 | 32.5 |
| 16(a) | Participation in P.T.D. | Low | < 1.20 | 34 | 85.0 |
| | | High | ≥ 1.20 | 6 | 15.0 |
| 16(b) | Perception about P.T.D. | Low | < 10.50 | 21 | 52.5 |
| | | High | ≥ 10.50 | 19 | 47.5 |

risk orientation(67.5%), credit orientation(62.5%), area under bitter gourd cultivation(60%), farming experience(57.5%), annual income(57.5%), information source utilization (55%), age(52.5%), extension orientation(52.5%), economic motivation(52.5%) and perception about P.T.D(52.5%).

**4.3 Knowledge of farmers about the recommended practices in bittergourd cultivation and its relationship with the selected characteristics of the farmers.**

**4.3.1 Knowledge of the farmers about the recommended practices in bitter gourd cultivation**

**4.3.1.1 Distribution of farmers based on their knowledge about recommended practices in bitter gourd cultivation**

The distribution of farmers based on their knowledge about recommended practices in bittergourd cultivation is shown in Table.2. The table reveals that only 57.5 per cent of farmers belonged to the high knowledge category.42.5 per cent of farmers belonged to low knowledge category.

Scientific farming demands a thorough understanding of the package of practices to be followed in the cultivation of bittergourd . Knowledge about indigenous or traditional practices is obtained mainly as an ancestral property. Farmers are mixing both scientific and indigenous practices in their farming. They are not giving the prime importance to recommended practices.

**4.3.1.2 Percentage of knowledge about the recommended practices by the farmers**

A perusal of Table.3. revealed that all the respondents were aware of recommended practices coming under seed selection, spacing, land preparation, fertilizer application, intercultural operations and plant protection measures.

**Table.2. Distribution of farmers based on their knowledge about recommended practices in bittergourd cultivation**

n=40

| Category | Knowledge Score | Frequency | Percentage |
|---|---|---|---|
| Low ($<\overline{X}$) | $<9.75$ | 17 | 42.5 |
| High ($\geq\overline{X}$) | $\geq 9.75$ | 23 | 57.5 |
| Total | | 40 | 100 |

$\overline{X} = 9.75$

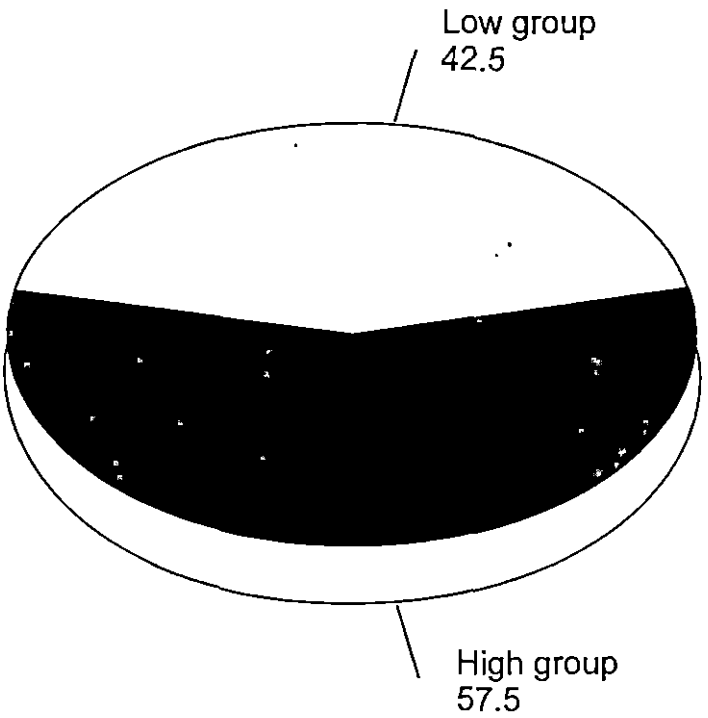



**Fig.3. Pie diagram showing the distribution of respondents based on their knowledge**

**Table.3. percentage of knowledge about recommended practices by the farmers**

n=40

| Sl. No. | Items/Practices | No | % |
|---|---|---|---|
| 1 | Spacing is 2 x 2 m | 40 | 100.0 |
| 2 | Varieties are Preethi, Priyanka, Priya, Arka Harit | 28 | 70.0 |
| 3 | Seed rate is 5–6 kg/ha | 31 | 77.5 |
| 4 | Pits at a depth of 30–45 cm | 40 | 100.0 |
| 5 | Retain 2–3 plants per pit | 40 | 100.0 |
| 6 | Top dressing in split doses at fortnightly intervals | 40 | 100.0 |
| 7 | Weeding and raking at the time of fertilizer application | 40 | 100.0 |
| 8 | Carbaryl 0.2% is sprayed against epilachna beetle | 40 | 100.0 |
| 9 | Destroy the affected and decayed fruits | 40 | 100.0 |
| 10 | Spray 0.5% nitrophenol against powdery mildew | 0 | 0.0 |
| 11 | Destruction of collateral hosts is a must | 40 | 100.0 |
| 12 | Harvest the fruits 10 days after fungicide application | 26 | 65.0 |

About 77.5 per cent of farmers were having knowledge about the exact seed rate of bitter gourd. 65per cent of farmers have knowledge about the exact waiting period (i.e. harvesting of the fruits 10 days after fungicidal application). Farmers were unaware of the poisonous nature of chemical pesticides and they needed to get the returns from the crop quickly. Probably , this may be the reason for the less popularity of some of the recommended practices.

The table clearly indicates that the recommended practice of spraying 0.5% nitrophenol against powdery mildew was not known by anybody. Bittergourd was mainly affected by mosaic in that area and there was no incidence of powdery mildew.

**4.3.2 Relationship of knowledge about the recommended practice with the selected characteristics of the farmers .**

The results of simple correlation analysis presented in Table . 4. revealed that there was no significant correlation between the dependent variable knowledge about the recommended practice and most of the independent variables. Only the variable i.e., education had a significant correlation with the knowledge of farmers about the recommended practices .Two variables viz.economic motivation and innovativeness had negative and nonsignificant correlation with the dependent variable where as all other variables viz. age, occupation, experience in bittergourd cultivation, annual income, area under bittergourd cultivation, information source utilization, social participation, extension orientation, cosmopoliteness , credit orientation ,risk orientation, and Participatory Technology Development (P.T.D) had positive and nonsignificant relationship with knowledge

**Table.4. Correlation between knowledge about recommended practices of the farmers and the independent variables .**

n=40

| Variable No. | Independent Variables | Correlation Coefficient (r) | |
|---|---|---|---|
| 1 | Age | 0.155 | NS |
| 2 | Education | 0.312* | S |
| 3 | Main occupation | 0.046 | NS |
| 4 | Experience in bittergourd cultivation | 0.179 | NS |
| 5 | Annual income | 0.101 | NS |
| 6 | Area under bittergourd cultivation | 0.090 | NS |
| 7 | Information source utilization | 0.071 | NS |
| 9 | Social participation | 0.188 | NS |
| 10 | Extension Orientation | 0.036 | NS |
| 11 | Economic motivation | –0.205 | NS |
| 12 | Innovativeness | –0.056 | NS |
| 13 | Cosmopoliteness | 0.034 | NS |
| 14 | Credit orientation | 0.079 | NS |
| 15 | Risk orientation | 0.019 | NS |
| 16 | Participation in P.T.D. | 0.051 | NS |
| | Perception about P.T.D. | 0.066 | NS |

* Significant at 5% level
NS– Not significant.
S – Significant

The variable irrigation index is constant for all the farmers in the study , so it stands cancelled .

Education might have enabled these farmers to perceive the importance of the recommended practices in farming especially in this progressive world of science

This finding is in agreement with the findings of Manju (1996) who found that education had significant positive relationship with the coconut farmers' degree of belief.

Though not significant certain relationships are notable in this table.

Experience in bittergourd cultivation and social participation are the two variables with a comparatively higher correlation coefficient.

It is quite understandable that with agriculture as primary or secondary occupation a farmer accumulates vast experience in various farm operations and recommended practices. His practical knowledge is reflected by his experience in farming. Numerous farming practices have been developed through the process of innovation and adaptation by the farmers. They learn to manipulate and derive advantage from local resources and natural processes by conducting various experiments. Similarly, social participation especially participation in panchayath committee, co-operatives, Kerala Horticulture Development Programme (K.H.D.P), Farmers' organizations might have made the farmers aware about the recommended practices of bittergourd.

## MULTIPLE LINEAR REGRESSION ANALYSIS

The results of multiple linear regression analysis are presented in table.5.

The $R^2$ value indicated that 16 variables taken together explained only 23.5 percent of variation in the dependent variable. The F value was also found to be not significant which would mean that a linear functional relationship between the independent and dependent variables could not be established here. Throughout the year water is available from the channel.

### 4.4 Extent of adoption of farmers' practices and its relationship with selected characteristics of farmers.

### 4.4.1 Extent of adoption of farmers' practices in bittergourd cultivation.

### 4.4.1.1Distribution of farmers based on their extent of adoption of farmers' practices.

Table .6. depicts the distribution of farmers on the basis of extent of adoption of farmers' practices. The adoption index of farmers ranged from 2.8 to 15.9. The average adoption index was found to be 8.12.

The table reveals that 47.5 per cent of the farmers belonged to the low adoption category whereas, 52.5 per cent of them belonged to the high adoption category.

The absence of an organized support from agricultural scientists and extension agencies for the adoption of traditional practices coupled with increased productivity levels of recommended practices has forced the farmers to rely more on new agricultural know how.

**Table.5. Results of multiple linear regression analysis of knowledge about recommended practices of the farmers and the independent variables.**

n=40

| Variable No. | Independent Variables | Regression Coefficient | t value | |
|---|---|---|---|---|
| 1 | Age | 0.005 | 0.160 | NS |
| 2 | Education | 1.200 | 1.470 | NS |
| 3 | Main occupation | 0.605 | 0.919 | NS |
| 4 | Experience in bittergourd cultivation | 0.016 | 0.428 | NS |
| 5 | Annual income | 0.005 | 0.230 | NS |
| 6 | Area under bittergourd cultivation | 0.278 | 0.571 | NS |
| 7 | Information source utilization | –0.077 | –0.946 | NS |
| 9 | Social participation | 0.109 | 1.058 | NS |
| 10 | Extension Orientation | 0.085 | 1.034 | NS |
| 11 | Economic motivation | –0.329 | –1.066 | NS |
| 12 | Innovativeness | –0.032 | –0.059 | NS |
| 13 | Cosmopoliteness | 0.039 | 0.080 | NS |
| 14 | Credit orientation | 0.142 | –0.744 | NS |
| 15 | Risk orientation | 0.046 | 0.625 | NS |
| 16 | Participation in P.T.D. . | 0.045 | 0.093 | NS |
| | Perception about P.T.D. | –0.047 | 0.277 | NS |

Intercept– 14.39
$R^2$ – 0.235
F value-1.67
NS- Not significant

**Table .6. Distribution of farmers based on their extent of adoption of farmers' practices**

n=40

| Category | Adoption index | Frequency | Percentage |
|---|---|---|---|
| Low ($< \overline{X}$) | $< 8.12$ | 19 | 47.5 |
| High ($\geq \overline{X}$) | $\geq 8.12$ | 21 | 52.5 |
| Total | | 40 | 100 |

$\overline{X} = 8.12$

### 4.4.1.2Adoption of farmers' practices in percentage

Cent per cent of the farmers adopted practices such as soaking of seeds in water, organic manuring and banana fruit trap (Table .7.). Practices such as burning of dry leaves after land preparation was adopted by 85 per cent of farmers. Green leaf manuring and ocimun trap were adopted by 92.5 per cent and 82.5 per cent of farmers respectively.

Use of Nattapoochedi leaf extract was the practice least adopted (37.5%). This is a practice followed against all pests of bitter gourd. The scientific explanation behind this is that the piercing bad odour of the nattapoochedi leaves repel the pests. Farmers were aware of this practice and its advantages, but they were not able to adopt it due to its non availability and high cost of transportation.

In the case of practices such as preservation of seeds with fresh cowdung, land preparation at a depth of 25 - 30 cm, and use of kiriyathu leaf extract were adopted by 40 per cent of the farmers. Seeds are covered with fresh cowdung and kept for drying. Seeds will absorb the available potassium and nitrogen from the cowdung. Majority of the farmers are not aware of the advantages of the practice and some were not adopting due to high cost of cowdung.

Majority of the farmers were adopting the recommended practice of land preparation i.e., digging the land at a depth of 45 cm. Only 40 per cent of farmers who prepared the land at a depth of 25- 30 cm believed that this is a cost effective and labour saving method.

Kiriyathu leaf extract was used as a repellent against all pests. Now- a-days farmers are interested to try plant protection measures which are effective to

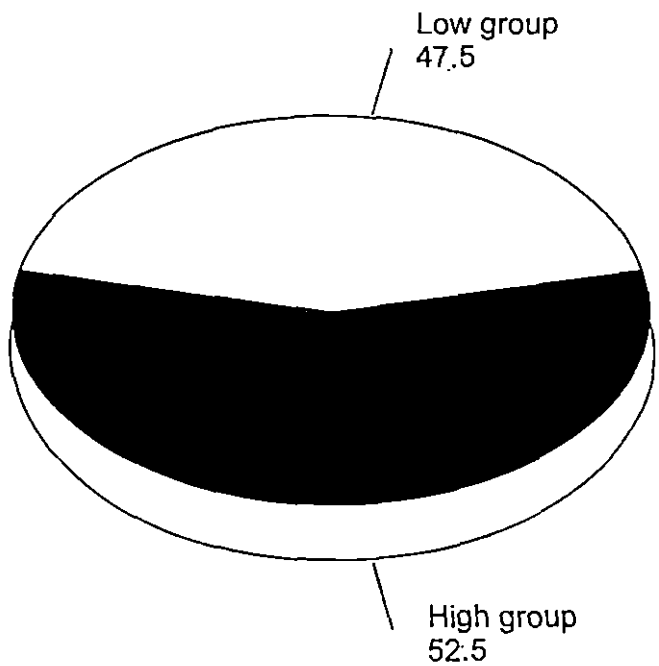



**Fig. 4. Pie diagram showing the distribution of respondents based on their extent of adoption.**

**Table .7. Adoption of the selected farmers practices by the respondents in percentage**

n=40

| Sl. No. | Items/ Practices | Adoption % |
|---|---|---|
| 1 | Soaking of seeds in water | 100.00 |
| 2 | Preservation of seeds with cowdung | 40.00 |
| 3 | Burning of dry leaves and twigs | 85.00 |
| 4 | Land preparation at a depth of 25–30 cm | 40.00 |
| 5 | Liming at a rate of 3 kg /cent | 60.00 |
| 6 | Application of neem cake | 50.00 |
| 7 | Organic manuring | 100.00 |
| 8 | Split application of organic manures | 62.50 |
| 9 | Green leaf manuring | 92.50 |
| 10 | Trailing using jute | 72.50 |
| 11 | Spraying neem oil–garlic emulsion | 55.00 |
| 12 | Spraying neem oil | 70.00 |
| 13 | Spraying a mixture of cow's urine and Kanthari mulagu | 47.50 |
| 14 | Application of starch solution–Jaggery mixture | 45.00 |
| 15 | Banana fruit trap | 100.00 |
| 16 | Ocimum trap | 82.50 |
| 17 | Kiriyathu leaf extract | 40.00 |
| 18 | Nattapoochedi leaf extract | 37.50 |

specific pests. Some farmers were unaware of its advantages, but some others were not able to adopt it due to its lack of availability.

Among the practices associated with main field preparation, 60 per cent of farmers commenced the field operation by liming at a rate of about 3 kg/cent. While neem cake application was practised by a lower percentage of farmer (50%). However, 'split application of cowdung, poultry manure and groundnut cake' which was a labour intensive practice was adopted by 62.5 per cent of the farmers.

As a part of integrated pest management, 55 per cent of farmers sprayed a mixture of neem oil-garlic emulsion against jassids and aphids. Spray solution of neem oil was used by 70 per cent of farmers. Similarly only 47.5 per cent of the farmers adopted the low cost practice of spraying a mixture of cow's urine (one litre diluted with 10 litre of water) and kanthari mulagu over the bittergourd crop against pumpkin caterpillar.

About 45 per cent of farmers applied starch -jaggery solution against fruit flies. From this we can see that farmers are giving importance to bioplant protection measures. This may be the result of awareness of farmers regarding the ill effects of chemicals and its high cost.

**4.4.2 Relationship between the extent of adoption of farmers' practices with the selected characteristics of the respondents.**

Table.8. reveals the results of simple correlation analysis between the extent of adoption and the various socio–economic and psychological characteristics of farmers.

**Table .8. Correlation between the extent of adoption of farmers' practices and the selected characteristics of the respondents**

n=40

| Variable No. | Independent Variables | Correlation Coefficient (r) | |
|---|---|---|---|
| 1 | Age | 0.093 | NS |
| 2 | Education | 0.021 | NS |
| 3 | Main occupation | 0.185 | NS |
| 4 | Experience in bittergourd cultivation | 0.202 | NS |
| 5 | Annual income | –0.037 | NS |
| 6 | Area under bittergourd cultivation | 0.009 | NS |
| 7 | Information source utilization | 0.052 | NS |
| 9 | Social participation | 0.229 | NS |
| 10 | Extension Orientation | 0.321* | S |
| 11 | Economic motivation | 0.014 | NS |
| 12 | Innovativeness | 0.036 | NS |
| 13 | Cosmopoliteness | 0.178 | NS |
| 14 | Credit orientation | 0.034 | NS |
| 15 | Risk orientation | 0.011 | NS |
| 16 | Participation in P.T.D. | 0.492** | S |
| | Perception about P.T.D. | 0.304 | NS |

** Significant at 1% level
* Significant at 5% level
NS– Not significant.
S – Significant.

It can be observed that as, in the case of knowledge, here also, majority of the variables possessed no significant relationship with the dependent variable. Extension orientation and participation in P.T.D were the only two variables which possessed a positive and significant relationship with the extent of adoption.

Probably contact with agricultural officers, scientist of KAU study tours, seminars, group farm meeting, etc. might have influenced their extent of adoption of farmers' practices. This finding is in agreement with the findings of Govind (1992) who found that extension orientation had significant positive relationship with extent of adoption of Integrated Pest Management (IPM) of the rice farmers.

Extent of adoption of farmers' practices increased with the participation in programmes of Participatory Technology Development (P.T.D). P.T.D programme functioning in the study area are experimentation with organic farming, Integrated Disease Management (IDM), Integrated Pest Management (IPM)control of fungal diseases etc. Probably these programmes might have influenced their adoption of practices.

The independent variables such as experience in bittergourd cultivation, social participation, cosmopoliteness and perception towards P.T.D showed higher correlation coefficient with the extent of adoption as compared to the remaining variables.

It is already observed that knowledge about recommended practices was comparatively highly correlated with experience in bittergourd cultivation. So

the comparatively higher correlation coefficient between experience in bittergourd cultivation and extent of adoption of farmers' practices is quite natural.

Annual income had a negative and nonsignificant relationship with the extent of adoption. It implies that if a farmer is having lower annual income, he will not give much importance to the practices in the field. In the same way, high cost of inputs, high transporting charge, high labour charge etc. also have an adverse effect on his interest in the practices.

**Multiple linear regression analysis**

Using 17 independent variables , multiple linear regression analysis was carried out in order to know the relative contribution of each of the independent variables to the dependent variable, extent of adoption. Table .9. presents the results of multiple linear regression analysis of the extent of adoption with the independent variables.

The $R^2$ value indicate that the 17 variables taken together explained 76.7 per cent of variation in the dependent variable. The F value obtained indicated that the variables together showed no significant contribution to the variation in extent of adoption.

Out of 17 variables studied, no variable showed any significant value in the analysis.

**Table.9. Results of multiple linear regression analysis of the extent of adoption of farmers' practices and the independent variables**

n=40

| Variable No. | Independent Variables | Regression Coefficient | t value |
|---|---|---|---|
| 1 | Age | 0.102 | 1.556 |
| 2 | Education | 0.492 | 0.539 |
| 3 | Main occupation | 0.056 | 0.043 |
| 4 | Experience in bittergourd cultivation | 0.061 | 0.785 |
| 5 | Annual income | 0.002 | 0.558 |
| 6 | Area under bittergourd cultivation | 0.023 | –0.024 |
| 7 | Information source utilization | 0.234 | –1.465 |
| 9 | Social participation | 0.168 | 1.013 |
| 10 | Extension Orientation | 0.003 | 0.005 |
| 11 | Economic motivation | 1.892 | 1.794 |
| 12 | Innovativeness | 1.465 | 1.484 |
| 13 | Cosmopoliteness | 0.174 | 0.449 |
| 14 | Credit orientation | 0.057 | 0.386 |
| 15 | Risk orientation | 1.310 | 1.244 |
| 16 | Participation in P.T.D. | 0.306 | 0.917 |
| 17 | Perception about P.T.D. | 0.413 | 1.025 |

Intercept -11.58
$R^2$ - 0.767
F value – 1.534

## 4.5 Techno-socio-economic assessment of farmers' practices in bittergourd

The results indicating the techno-socio-economic assessment of farmers' practices in bittergourd are furnished in Table .10.

The results from the Table .10. revealed that in general the overall perception of techno-socio-economic aspects of the practices was quite appreciable. It is only natural that for a cucurbitaceous crop like bittergourd which is considered very important to the Keralites, the practices in the field are considered critical.

Out of the 25 practices, green leaf manuring ranked the highest technical index (3.85), followed by organic manuring and banana fruit trap with technical indices 3.82 and 3.65 respectively. The reason being easy availablity of inputs, easy labour and low cost. Besides organic manuring increases the desirable micro organisms.

The practice, planting seedling opposite to wind direction, smoking the field, manuring only one week after planting and application of fytolan had registered the lowest technical index.

Burning of dry leaves and twigs, organic manuring, banana fruit trap and trailing using jute has secured the highest rank as far as the social index is concerned (3.9). According to farmers, these practices are easy to manage, less labour required and technology behind these practices are known to everybody.

Other practices that have secured higher social index are ocimum trap (3.8), green leaf manuring (3.8) and spraying neem oil-garlic emlusion (3.21). The farmers who have undergone training from KHDP have greater confidence in the bio-pest control methods from their own experience.

## Table.10. Techno-socio-economic assessment of farmers' practices

| Sl No. | Farmers' Practices | Technical Index | Rank | Social Index | Rank | Economic Index | Rank | Techno-socio economic index | Rank |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Soaking of seeds in water | 3.60 | 4 | 2.60 | 8 | 3.75 | 3 | 9.95 | 7 |
| 2 | Preservation of seeds with cowdung | 2.48 | 16 | 2.90 | 7 | 2.46 | 14 | 7.84 | 18 |
| 3 | During the second season, land preparation only at a depth of 25 - 30cm. | 2.45 | 17 | 3.01 | 6 | 2.50 | 13 | 7.96 | 17 |
| 4 | After preparation, land kept as such for three days | 2.49 | 15 | 2.90 | 7 | 2.25 | 17 | 7.64 | 19 |
| 5 | Burning of dry leaves and twigs | 3.60 | 4 | 3.90 | 1 | 3.90 | 1 | 11.40 | 1 |
| 6 | Liming | 3.03 | 11 | 3.01 | 6 | 3.35 | 7 | 9.39 | 12 |
| 7 | Neem application | 3.25 | 7 | 2.90 | 7 | 3.55 | 5 | 9.70 | 8 |
| 8 | Application of fytolan | 2.07 | 20 | 2.40 | 9 | 2.11 | 19 | 6.58 | 22 |
| 9 | Manuring is done only one week after palnting | 2.07 | 20 | 2.23 | 11 | 2.12 | 18 | 6.42 | 24 |
| 10 | Organic manuring | 3.82 | 2 | 3.90 | 1 | 3.40 | 6 | 11.12 | 4 |
| 11 | Split application of manures during top dressing | 3.13 | 9 | 3.21 | 3 | 3.35 | 7 | 9.69 | 9 |
| 12 | Green leaf manuring | 3.85 | 1 | 3.80 | 2 | 3.60 | 4 | 11.25 | 3 |
| 13 | Spacing followed is 2.5 x 2.5 m | 2.15 | 19 | 3.01 | 6 | 2.25 | 17 | 7.41 | 20 |
| 14 | Planting seedling opposite to wind direction | 2.05 | 21 | 2.03 | 14 | 2.12 | 18 | 6.20 | 25 |
| 15 | Trailing using jute | 3.42 | 6 | 3.90 | 1 | 3.10 | 10 | 10.42 | 6 |
| 16 | Trailing using long stick | 2.25 | 18 | 2.05 | 13 | 2.25 | 17 | 6.55 | 23 |
| 17 | Spraying neem oil–garlic emulsion | 3.10 | 10 | 3.21 | 3 | 3.22 | 8 | 9.53 | 11 |
| 18 | Spraying neem oil | 3.20 | 8 | 2.32 | 10 | 3.13 | 9 | 9.55 | 10 |
| 19 | Spraying cow's urine–Kanthari mulagu extract | 2.60 | 14 | 3.09 | 5 | 2.75 | 11 | 8.44 | 4 |
| 20 | Spraying starch solution–jaggery mixture | 2.7 | 12 | 3.01 | 6 | 2.45 | 15 | 8.16 | 16 |
| 21. | Banana fruit trap | 3.65 | 3 | 3.90 | 1 | 3.80 | 2 | 11.35 | 2 |
| 22. | Ocimum trap | 3.45 | 5 | 3.80 | 2 | 3.60 | 4 | 10.85 | 5 |
| 23. | Spraying kiriyattu leaf extract | 3.10 | 10 | 2.90 | 7 | 2.25 | 17 | 8.25 | 15 |
| 24. | Spraying nattapoochedi leaf extract | 2.65 | 13 | 3.10 | 4 | 2.65 | 12 | 9.00 | 13 |
| 25. | Smoking the field | 2.12 | 20 | 2.19 | 12 | 2.35 | 16 | 6.66 | 21 |

Burning of dry leaves and twigs (3.9), banana fruit trap (3.8) and soaking of seeds in water (3.75) scored the highest economic indices.

Burning of dry leaves and twigs serves several purposes according to farmers 1) field sanitation 2) improving soil fertility 3) increases soil potassium and 4) destroys the resting stages of many insects and pathogens. Soaking of seeds in water was considered by farmers as an economic practice as they can visualise the fact that imbibition of water activates the metabolic process of seeds and renews them.

Here also, application of fytolan , manuring only one week after planting, planting seedling opposite to wind direction ranked the lowest economic index. These practices do not increase the yield in any way.

The practice, burning of dry leaves and twigs ranked first with the highest techno-socio-economic index (11.4). It could be understood that all the farmers were aware of purposes of burning of dry leaves before planting such as field sanitation, ash obtained improve the soil fertility, increases the soil potassium, destroys the resting stages of many insects and pathogens etc.

This was followed by the two practices, banana fruit trap and green leaf manuring with techno-socio-economic indices 11.35 and 11.25 respectively and organic manuring 11.12.

Majority of the farmers agreed with these practices. They were of the opinion that these practices were highly sustainable. Relevance of these eco-friendly practices needs no emphasis. Unlike the modern practices, these only

enrich the soil. Environmental pollution is minimum and productivity of the land is not affected. It is evident that farmers also are aware of this.

The practices smoking the field to increase the yield and manuring done only one week after planting registered the lowest techno-socio-economic indices with 6.66 and 6.42 respectively. The farmers know that basal application of manures at the time of land preparation will help the seedling to absorb the nutrients which are in a absorbable form as a result of decomposition.If manuring is done one week after planting the heat generated during decomposition will harm the tender root system of the seedings. Many of the farmers were of the opinion that these practices were not effective, and not at all profitable under the present situation. Only a very few farmers who practised these practices are not aware of this.

**4.6 Efficiency of farmers' practices as perceived by the farmers, researchers and extension personnel**

Most of the selected farmers' practices were percieved as efficient by the farmers, researchers and extension personnel. There is no much variation in perception of farmers' practices by the researchers and extension personnel. So a pooled analysis was done.

A critical glance on the table.11. reveals that with regard to bittergourd cultivation, the practice, 'banana fruit trap' registered the highest mean score for efficiency (3.85) as perceived by the farmers. Nowadays more attention is being given to the indigenous or local practices in the control of pests and

**Table.11. Efficiency of selected farmers' practices as perceived by the farmers, researchers and extension personnel**

| Sl No. | Farmers' Practices | n =40 Farmers MS | Rank | n=50 Researchers and Extension Personnel MS | Rank |
|---|---|---|---|---|---|
| 1 | Soaking of seeds in water | 3.75 | 3 | 3.84 | 2 |
| 2 | Preservation of seeds with cowdung | 2.35 | 17 | 2.24 | 16 |
| 3 | During the second season, land preparation only at a depth of 25 - 30cm. | 2.45 | 16 | 3.06 | 9 |
| 4 | After preparation, land kept as such for three days | 2.25 | 18 | 1.80 | 19 |
| 5 | Burning of dry leaves and twigs | 3.60 | 4 | 3.56 | 6 |
| 6 | Liming | 3.35 | 8 | 3.76 | 4 |
| 7 | Neem application | 3.25 | 9 | 3.80 | 3 |
| 8 | Application of fytolan | 2.07 | 22 | 3.00 | 10 |
| 9 | Manuring is done only one week after palnting | 2.20 | 19 | 1.40 | 20 |
| 10 | Organic manuring | 3.82 | 2 | 3.40 | 7 |
| 11 | Split application of manures during top dressing | 3.13 | 11 | 3.88 | 1 |
| 12 | Green leaf manuring | 3.55 | 5 | 2.98 | 11 |
| 13 | Spacing followed is 2.5 x 2.5 m | 2.15 | 20 | 2.61 | 17 |
| 14 | Planting seedling opposite to wind direction | 2.25 | 18 | 2.00 | 18 |
| 15 | Trailing using jute | 3.42 | 7 | 3.06 | 9 |
| 16 | Trailing using long stick | 2.25 | 18 | 2.72 | 13 |
| 17 | Spraying neem oil–garlic emulsion | 3.10 | 12 | 3.56 | 6 |
| 18 | Spraying neem oil | 3.20 | 10 | 3.30 | 8 |
| 19 | Spraying cow's urine–Kanthari mulagu extract | 2.60 | 15 | 2.94 | 12 |
| 20 | Spraying starch solution–jaggery mixture | 2.70 | 13 | 3.06 | 9 |
| 21. | Banana fruit trap | 3.85 | 1 | 3.80 | 3 |
| 22. | Ocimum trap | 3.45 | 6 | 3.60 | 5 |
| 23. | Spraying kiriyattu leaf extract | 3.10 | 12 | 2.36 | 15 |
| 24. | Spraying nattapoochedi leaf extract | 2.65 | 14 | 2.40 | 14 |
| 25. | Smoking the field | 2.12 | 21 | 1.30 | 21 |

MS-Mean score

diseases in crops in different parts of the world. Modern science has approved that the pesticides if used in optimum quantities will not cause any problem of residual toxicity which is a major problem as far as the use of pesticides especially in vegetables are concerned. Moreover the excess amount required for the pesticides can also be saved.

This was followed by the practice of organic manuring ( 3.82) and soaking of seeds in water ( 3.75). Organic manuring was perceived as efficient as most of the farming system comprised of crop and livestock in which wastes of one enterprise was more efficiently used as input in another within the system. The animals were raised on agricultural waste and the dung used as manure and fuel.

The pratices of application of fytolan (mean score 2.07) was perceived as less efficient by the farmers followed by smoking the field ( mean score 2.12). Farmers are aware that fytolan is not as efficient as bordeaux mixture though it is available in a ready to use form.

Application of split doses of fertilizer (mean score 3.88) registered the highest mean score (3.88) for efficiency as perceived by the researchers and extenstion personnel as we all know that it is a recommended practice. This was followed by soaking of seeds in water before planting (mean score 3.84) and banana fruit trap (mean score 3.8). Farmers also approved the efficiency of this practice.

Smoking the field, manuring one week after planting and land kept as such for 3 days were perceived as least efficient by the researchers and extension

personnel. Keeping the field as such for 1 week or more after land preparation will serve several purposes. It destroys egg masses, larvae, resting stages of pathogens and also weeds. It improves the air circulation in the soil and help in deep penetration of roots.

Almost all the other farmers' practices of plant protection like spraying neem oil–garlic emulsion , spraying neem oil, spraying cow's urine–kanthari mulagu extract, spraying starch solution–jaggery mixture, ocimum trap, spraying kiriyathu leaf extract and spraying nattapoochedi leaf extract were found efficient to control pests and diseases.

Very little research is being done to develop modern integrated farming system with emphasis on farmers' practices. Obiviously, there is a need to reorient out research to develop location specific integrated farming system suitable for small farms. This calls for a strong recognition and acknowledgement of the efficiency of farmers' practices.

**4.7 Ecofriendliness of farmers' practices as perceived by the farmers.**

Soaking of seeds in water(mean score 3.8), burning of dry leaves and twigs(mean score 3.8), spraying nattapoochedi leaf extract(mean score 3.6) , organic manuring(mean score 3.5) and green leaf manuring (mean score 3.5) are the most ecofriendly practices as identified by the farmers. These traditional and farmers' practices promote the biodiversity of natural enemies, prevent the outbreak of secondary pests and save the food and ecosystem from contamination. We have to include the ecofriendly practices in modern sustainable farming which is mainly intended to maintain or enhance the quality of the environment. (Table.12.)

**Table .12. Ecofriendliness of farmer's pracitces as perceived by the farmers.**

n=40

| Sl No. | Farmers' Practices | Ecofriendliness MS | Rank |
|---|---|---|---|
| 1 | Soaking of seeds in water | 3.8 | 1 |
| 2 | Preservation of seeds with cowdung | 2.9 | 8 |
| 3 | During the second season, land preparation only at a depth of 25 - 30cm. | 1.4 | 17 |
| 4 | After preparation, land kept as such for three days | 3.3 | 4 |
| 5 | Burning of dry leaves and twigs | 3.8 | 1 |
| 6 | Liming | 3.2 | 5 |
| 7 | Neem application | 2.3 | 14 |
| 8 | Application of fytolan | 2.3 | 14 |
| 9 | Manuring is done only one week after palnting | 2.3 | 14 |
| 10 | Organic manuring | 3.5 | 3 |
| 11 | Split application of manures during top dressing | 3.1 | 6 |
| 12 | Green leaf manuring | 3.5 | 3 |
| 13 | Spacing followed is 2.5 x 2.5 m | 2.6 | 10 |
| 14 | Planting seedling opposite to wind direction | 2.3 | 13 |
| 15 | Trailing using jute | 2.3 | 15 |
| 16 | Trailing using long stick | 2.8 | 9 |
| 17 | Spraying neem oil–garlic emulsion | 3.1 | 6 |
| 18 | Spraying neem oil | 2.4 | 12 |
| 19 | Spraying cow's urine–Kanthari mulagu extract | 2.3 | 14 |
| 20 | Spraying starch solution–jaggery mixture | 2.8 | 9 |
| 21. | Banana fruit trap | 2.5 | 11 |
| 22. | Ocimum trap | 3.3 | 4 |
| 23. | Spraying kiriyattu leaf extract | 2.5 | 11 |
| 24. | Spraying nattapoochedi leaf extract | 3.6 | 2 |
| 25. | Smoking the field | 2.1 | 16 |

MS-Mean score

## 4.8 Constraints faced by the farmers in bittergourd cultivation

The farmers face a number of constraints in the cultivation of bittergourd. The constraints as perceived by the farmers were collected and the obtained frequency distribution is given in Table 13.

The constraints were grouped into production and economic constraints . A cursory look at the results presented in table reveals that, among the production constraints , incidence of pests and diseases ranked first followed by labour scarcity. Non availability of inputs ranked third followed by weather problems in the fourth position. The other constraints included uneven production and unawareness of plant protection measures.

Among the economic constraints, high cost of material inputs ranked first followed by high labour charge.Price fluctuation of the produce was the third important constraint faced by the bittergourd farmers. Inadequate credit facilities ranked fourth and high transporting charges in the fifth position. Inadequate marketing facilities obtained the sixth rank among the economic constraints.

## 4.9 Empirical models of the study.

The fig. 5. diagrammatically represents the results on the knowledge of farmers about the recommended practices.

The knowledge of farmers about the recommended practices in bittergourd cultivation is depicted by the middle circle. The knowledge is influenced by various external and internal factors like the personal,

**Table.13. Frequency distribution of constraints in bittergourd cultivation as perceived by the farmers.**

| Sl No. | Constraints | Frequency | Rank |
|---|---|---|---|
| I | Production constraints | | |
| (i) | Incidence of pests and diseases | 35 | 1 |
| (ii) | Labour scarcity | 32 | 2 |
| (iii) | Non availability of inputs | 28 | 2 |
| (iv) | Weather problems | 20 | 4 |
| (v) | Uneven production | 12 | 5 |
| (vi) | Unawareness of plant protection measures | 8 | 6 |
| II | Economic constraints | | |
| (i) | High cost of material inputs | 36 | 1 |
| (ii) | High labour charge | 34 | 2 |
| (iii) | Price fluctuation of the produce | 20 | 3 |
| (iv) | Inadequate credit facilities | 12 | 4 |
| (v) | High transporting charges | 4 | 5 |
| (vi) | Inadequate marketing facilities | 3 | 6 |

socio-economic and psychological characteristics of the farmers. These are represented by small compartments of the hexagon which encloses the circle.

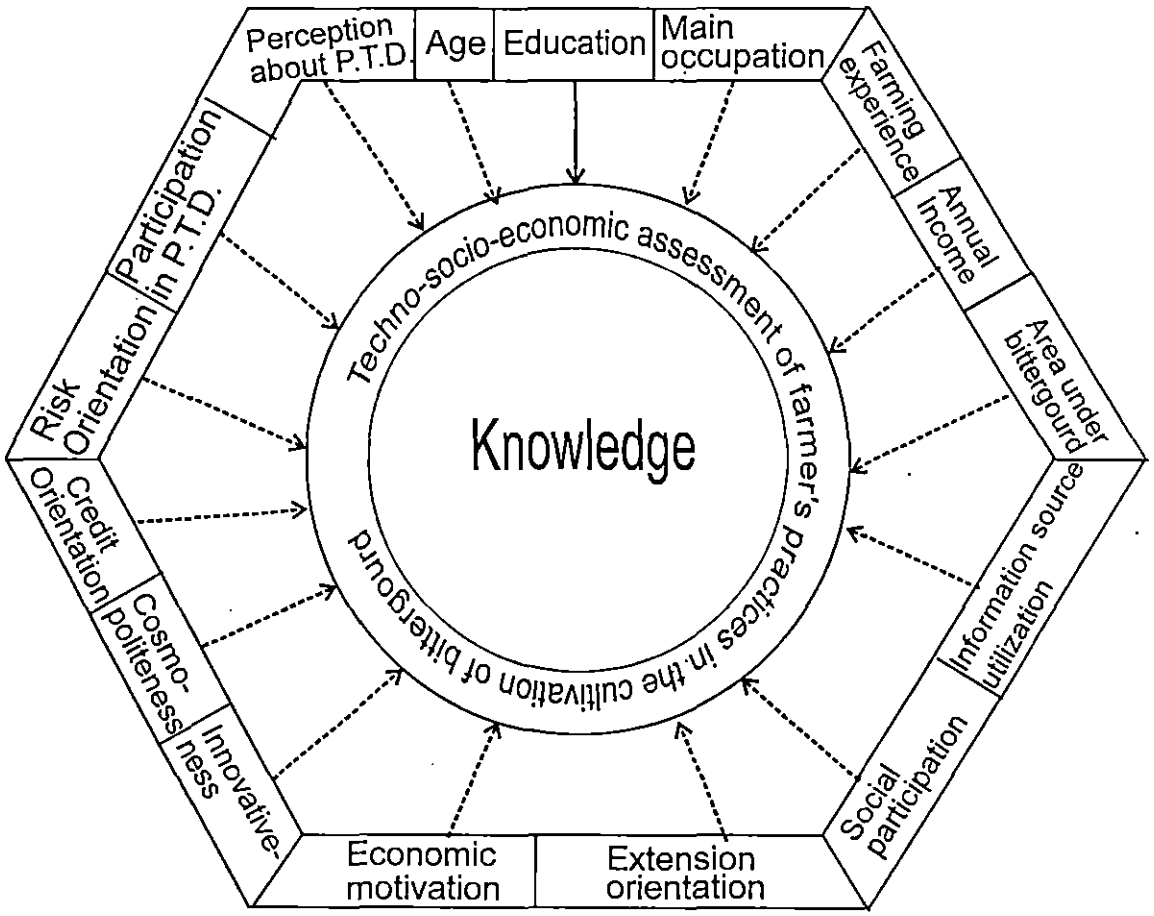
Education was the only variable significant in predicting the knowledge. All the other variables were found nonsignificant which is indicated with dotted lines.

Results on the extent of adoption of farmers' practices by the farmers is presented in fig.6.

Here the middle circle represents the extent of adoption. The personal , socio-economic and psychological characteristics are indicated within the outside frame .

Extension orientation and participation in Participatory Technology Development(P.T.D) were the variables showing significant relationship with the extent of adoption. The dotted lines indicate the nonsignificant relationship of the other variables with the extent of adoption.

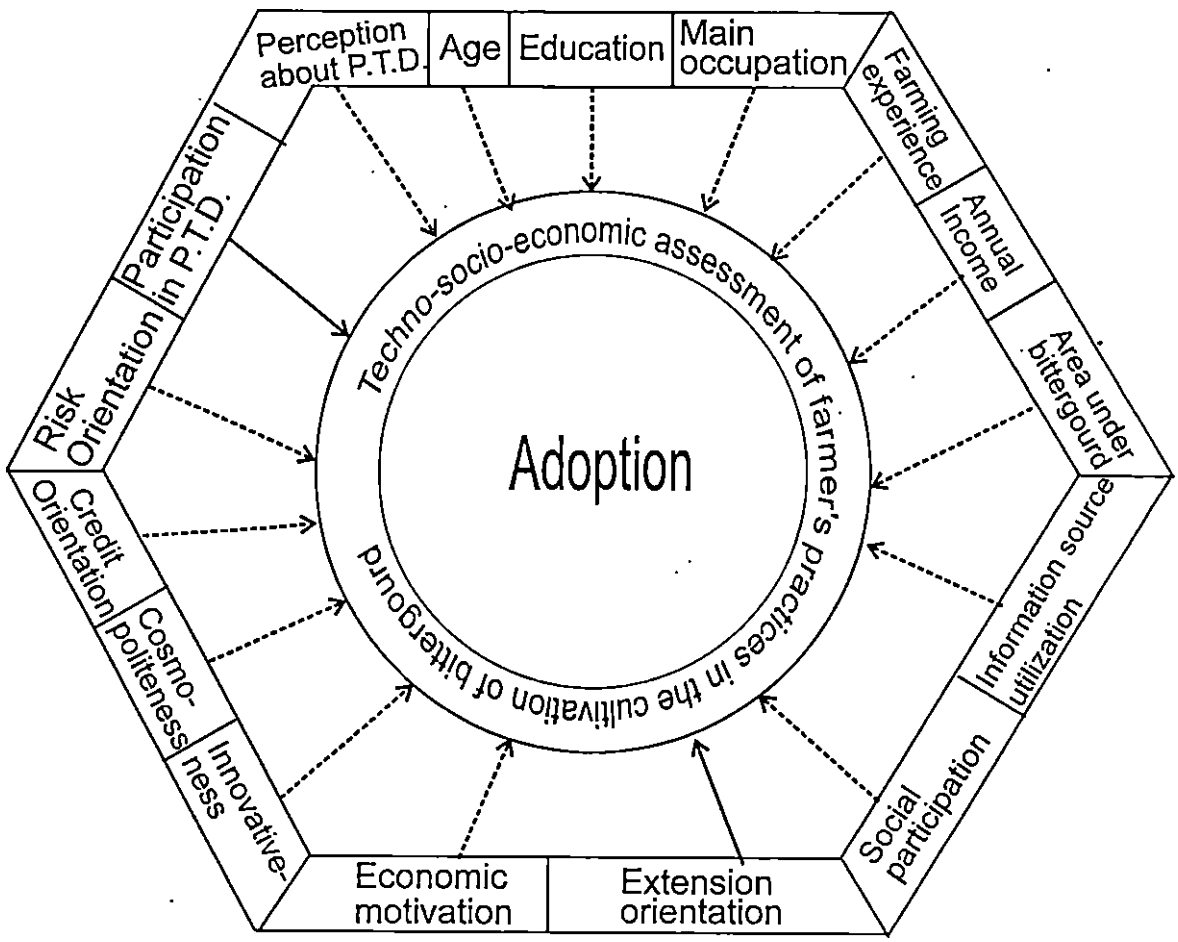
Fig.5. Empirical model of the study showing the relationship between selected personal, socio-economic and psychological characteristics and the knowledge about the recommended practices.




.....indicates non-significant relationship.

——indicates significant relationship.

Fig.6. Empirical model of the study showing the relationship between selected personal, socio-economic and psychological characteristics and the extent of adoption.




.....indicates non-significant relationship.

——indicates significant relationship.

# Summary and Conclusion

# CHAPTER V

# SUMMARY AND CONCLUSION

The overall developement of Kerala depends on agriculture which has two systems : traditional and the modern. Here, existing research systems are not always able to generate the technologies needed to solve the problems of resource-poor farmers due to constraints on man power and funds. Such farmers are forced to develop their own technologies to suit their particular conditions. Knowledge of farmers' practices is very important for the planning of research and extension. Such knowledge enables researchers and extension workers to directly focus on tackling inappropriate practices. This study is mainly an attempt at collecting these valuable information from the farmers and documenting them in a useful form. The specific objectives of the study were as follows :

## 5.1 Objectives

1. To identify and document the various practices as followed by the farmers in bittergourd cultivation.
2. To assess the knowledge about the recommended practices by the farmers and its relationship with the selected characteristics of the farmers.
3. To find out the extent of adoption of farmers' practices and its relationship with the selected characteristics of the farmers.
4. To study the techno-socio-economic aspects of farmers' practices in the cultivation of bittergourd.

5. To find out the efficiency of farmers' practices as perceived by the researchers, extension personnel and farmers.
6. To assess the ecofriendly nature of farmers' practices as perceived by the farmers.
7. To study the constraints faced by the farners in bittergourd cultivation.

## 5.2 Methodology

The study was confined to Thiruvananthapuram district of Kerala. Since the study envisaged indepth probing of the farmers' practices through the non-participant observation technique, the study had to be limited to Kalliyoor panchayat which was significant as for the cultivation of bittergourd is concerned.

Since the research was of exploratory and exhaustive nature involving non-participant observation for data gathering, only 40 farmers were selected as farmer respondents. Similarly 25 extension officials and 25 agricultural scientists who have sufficient experience in extension and research were selected as second category of respondents.

The dependent variables for the study were, the knowledge about the recommended practices and the extent of adoption of farmers' practices. These variables were quanitfied using measurement devices developed for the study. 17 independent variables were selected for the study which included age, education, main occupation, farming experience, annual income, area under bitter gourd cultivation, irrigation index, social participation, extension orientation, economic motivation, innovativeness, cosmopoliteness, credit orientation, risk orientation,

participation in P.T.D and perception about participatory technology developemt (P.T.D).

All these independent variables were quantified with the help of available measurement procedures. Efficiency, ecofriendliness and techno-socio-economic aspects of farmers' practices were measured using scales developed for the study.

The data were collected during the months of December, January and February, 1998–1999 using a pre-tested and structured interview schedule prepared for the purpose. The statistical tools used were correlation analysis, categorization, percentage analysis and multiple linear regression analysis.

## 5.3 Findings

The salient findings of the study are summarized and presented below :

1. In total, forty farmers' practices related to bittergourd were identified during the first stage of investigation. It was interesting to find that the plant protection practices outnumbered the management practices. The identified practices were documented under different sub-practices and described along with its rationality, as pointed out by literature and experts.

2. There was significant variation in the knowledge score of recommended practices of farmers. 42.5 per cent of farmers secured below 9.25 and they belonged to the low knowledge category. 57.5 per cent belonged to high knowledge category.

3. Analysis of knowledge of recommended practices revealed that all the respondents were aware of most of the recommended practices in the cultivation of bittergourd.

4. Adoption index too showed significant variation with a range of 2.8 to 15.9. The average adoption index was found to be 8.12. Of the total farmers 47.5% of farmers had low adoption index, while 52.5% had high adoption index.

5. The simple correlation analysis to study the influence of personal, socio-economic and psychological characteristics of farmers on their knowledge in recommended practices revealed that out of 17 variables, only education showed a significant positive correlation. The results of multiple linear regression analysis revealed that the F value obtained were not significant indicating that the variables did not contribute significantly to the variation in knowledge.

6. The simple correlation analysis to study the influence of personal, socio-economic and psychological characteristics of farmers on their extent of adoption of farmers' practices recorded that out of 17 variables, extension orientation and participation in participatory technilogy development (P.T.D) showed positive and significant relation. The multiple linear regression analysis showed that unlike in the case of knowledge, here also, the variables contributed significantly to the variation in the extent of adoption.

7. Burning of dry leaves and twigs, banana fruit trap and green leaf manuring registered the highest techno-socio-economic indices, 11.40, 11.35 and 11.25 respectively.

8. Banana fruit trap, organic manuring, soaking of seeds in water are the most efficient practices with mean scores 3.85, 3.82 and 3.75 respectively as perceived by the farmers. Application of split doses of fertilizers registered as the

highest efficient practice with mean score 3.88 as perceived by the researchers and extension personnel. This was followed by soaking of seeds in water before planting(mean score 3.84) and banana fruit trap(mean score 3.8).

9. Soaking of seeds in water, burning of dry leaves and twigs, spraying nattapoochedi leaf extract, organic manuring and green leaf manuring are the most ecofriendly practices as identified by the farmers.

10. The most important production contraint in the cultivation of bittergourd as given by the respondents was 'incidence of pests and diseases' followed by 'labour scarcity', 'non availability of inputs', 'weather problems' , 'uneven production', and ' unawareness of plant protection measures'.

11. 'High cost of material inputs' was the most important economic constraint in the bittergourd cultivation followed by 'high labour charge', 'price fluctuation of the produce', 'inadequate credit facilities', 'high transport charges' and 'inadequate marketing facilities'.

## 5.4 Implications

We need to systematically gather and utilize traditional knowledge of farmers. Scientists should look back for our old farm-farmer-and ecofriendly system of traditional agriculture. We should treat farrmers as people with valuable information and knowledge about the local environment.

Collection, classification and documentation of farmers' practices are needed in other districts of the state which calls for sincere efforts on the part of researchers and extension machinery.

By this, we can consider a sustainable agriculture backed up by green technologies in an integrated farming system.

## 5.5 Suggestions for future research

The study was confined to only one panchayat of Thiruvananthapuram district of Kerala state. The practices of farmers are location specific. Other practices may be prevailing in other districts on the same crop. These, also, are to be collected and comparitive studies can be made thereafter.

# References

# REFERENCES

Abraham, J.and Thomas, R.1997.Ten times harvest: seed selection and crop management in Kerala. *Honey Bee* 8(1):12

Adhiguru,P.1991.Integrated Programme for rice development in Pondicherry union territory-An analysis.M.Sc.(Ag.) thesis, T.N.A.U, Coimbatore.

Ahamed, P.1981.Effectiveness of the training programmes for farmers. M.Sc. (Ag.) thesis.K.A.U, Thrissur.

Ahiah, D.D.1993. Knowledge and adoption of critical technology among paddy growers, M.Sc .(Ag.) thesis, T.N.A.U, Coimbatore

Alcorn, J.B.1984. *Huastic Mayan Ethnobotany*. Austin.University of Texas Press:982

* Altieri, M.A.and Liebman, M.Z. 1986. Insect, weed and plant disease management in multiple cropping systems. *Multiple Cropping Systems* (New York:Macmillan):183-218

Altieri, M. 1996. Indigenous knowledge revalued in Andean agriculture. *ILEIA Newsletter*. 12(1) : 748

Anabella,T. , Bautista and Belita, A.V. 1991. Indigenous Knowledge Systems on sweet potato farming among Maranao muslims in Northern Mundanao. *Proc. The Second Annual UPWARD International Conference*, Los Banos, Philippines

Anantharaman, M., Ramanathan, S.Gadewar, A.U. and Lekshmi, K.R. 1986.Adoption barriers to improved cultivation practice of cassava. *J. Root Crops.* 12(1) : 1-5

Anithakumari. 1989. Transfer of technology in pulses and oil seeds in the Onattukara tract of Kerala. M.Sc. (Ag.) thesis, KAU, Thrissur

Anonymous. 1978.*Guidelines for new projects* , D.O.Letter No. 11011/2/79 A.C.dated 1st June . Government of Tamil nadu

Aziz, A.E. 1988.Adoption of drought management practice by farmers -A critical analysis. M.Sc. (Ag.) thesis, KAU, Thrissur

Babu, M.N. 1995. Evaluative perception of homestead farmers in relation to appropriateness of farming systems and cropping pattern. M.Sc.(Ag.) thesis,KAU Thrissur

Badagaonkar, S.S. 1987. Measurement of farmers' knowledge and factors affecting the adoption behaviour of groundnut cultivators of Uttara Kannada district of Karnataka State. *The Mysore Journal of Agril. Sciences.* 21(3): 363

Balan, S. 1987. Utilization of soil test recommendations by the farmers in Trivandrum district, M.Sc. (Ag.) thesis, KAU ,Thrissur

Balasubrahmanion, P.1992.Indigenous knowledge use in drylands - an exploratory study. M.Sc.(Ag.) thesis T.N.A.U, Coimbatore

Bavalatti, V.G. and Sundraswamy, B. 1990 . Adoption of dryland practices by the farmers of Bijapur district. *Ind. J.Extn. Edn.* Vol. 26: 67-69

Beal G.M.and Sibley , D.N. 1967. *Adoption of agricultural technology by the Indians of Guatimala. Rural Sociology Reports. 62* Department of sociology and Anthropology, IOWA State University

.Bentley , J. 1990. Facts, fantascies and failures of farmer participation-Introduction to the symposium volume. *Proc. of the symposium participation del Agricultor enla Investigation Y Extension Agricola, Semana Cientifica* . Universidad Nacioinal Autonoma Honduras

Bentley, J. 1993. 'What farmers' don't know'. *CERES*: 141

Bharara, L.P. 1991. Traditional wisdom in rainfed farming practices and development needs in arid zone of Rajasthan. Abstracts of the International Conference on Extension Strategy for minimising risk in Rainfed Agriculture . *Ind.soc. Extn. Edn.* New Delhi: 76

Bhaskaran, K. and Praveena, C. 1982. Adoption with improved dryland Agricultural Technology in an Integrated dryland Agricultural Development Project in Andhra Pradesh. *Ind. J. Extn. Edn.* 18(3&4): 32- 39

Bhaskaran, C. 1979. A critical analysis of the interpersonal communication behaviour of small and other farmers in a less progressive and more progressive village in Kanyakumari district of Tamilnadu. Ph. D. thesis, UAS, Bangalore

Bhaskaran, S. 1978. To study the impact of institutional credit and its influence in the behaviour of farmers in adopting high yielding varieties of paddy cultivation . M.Sc. (Ag.) thesis, KAU, Thrissur

Bheemappa, A., and Hosamani, M.M. 1997. Cashew and Camphor to keep humidity away. *Honey bee.* 7(4): 9

Bony, B.P. 1991. Adoption of improved agricultural practices by commercial vegetable growers of ollukara block in Thrissur district.M.Sc.(Ag.) thesis , KAU, Thrissur

Brosius, J.P., Lovelace, G.W. and Mortan, G.G. 1986. Traditional agriculture in South-East Asia- A human ecology perspective. Intermediate Technology Publications, OQEH. Boulder, Colarado, USA: 187-198

Chakravarthy, K. 1982. Indigenous Farm Practices: Their influence. M.Sc.(Ag.) thesis, TNAU, 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

Chithiraichelvan, 1994. Use of ITK in farming systems research. *Proc.International workshop on Genetic Resources*. UPWARD, los Banos, Philippines

Chithiraichelvan, R. and Raman, K.V. 1991. Traditional farming practices for risk management in rainfed agriculture. International Conference on Extension strategy for minimizing risk in rainfed agriculture-Abstracts *Ind. Soc. Ext.Educ,* New Delhi: 70

Das, K.K. and Sarkar, D.R. 1979. Economic motivation and adoption of farm practices. Ind. J.Extn.Edn. 6(1&2): 103-107

Deepa, G.A.1992. Techno-cultural profile of rice farmers. M.Sc.(Ag.) thesis, TNAU, Coimbatore

Desai, G.R. 1981. A critical analysis of the contribution of educational and extension guidance to economic performance of cotton farmers of Karnataka state. Ph.D. thesis, UAS, Bangalore

* Faniran, A. and Areola, 1976. The concept of resources and resource utilisation among local communities in western state, Nigeria. *African Environment,* 2(3)

Ferreira, J.G., Machado, Filho, F., Francis, D.G.and Fortes, N.T.1983. Adoption of maize production technology at Lavras, *Minas Gerais* 30(167): 63-80

Gangadharan, K.K.1993.Adoption of improved agricultural practices by pepper growers of Idukki district. M.Sc(Ag.) thesis, KAU, Thrissur

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

Gnanadeepa, A. 1991. Techno-cultural profile of rice farmers. M.Sc. thesis, TNAU, Coimbatore

Godhandapani, R. 1984. Knowledge and adoption of nutrient recommendation for irrigated groundnut. Ph.D. thesis. TNAU, 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,UAS,Bangalore

Govind, S. 1992. IPM in rice achievement and opportunities. Ph.D. thesis, TNAU,Coimbatore

Gupta, A.K. 1996. Survey of grass root innovations-part XVI. *Honey Bee* 7(3):15-17

Gupta, O.P. 1972. No tillage farming *Span* 4:20-23

Haraprasad, D. 1982. Study on the impact of the Agricultural Programmes implemented by the Small Farmers Development Agency among farmers of Trivandrum district. M.Sc. (Ag.) thesis, KAU, Thrissur

Harish, M. 1985. A critical study of the impact of Village Adoption Programme in Dharwad district in Karnataka state. M.Sc.(Ag.) thesis, UAS, Bangalore.

Holloway, R.E.1977. Perceptions of an innovation: Syracuse University project advance , Ph.D. thesis, Syracuse University, New York

* Hunn, E. 1985. The utilitarian in folk biological classification . In: Doughery, Janet,(ed.), *Directions in Cognitive Anthropology.* Urbana, University of Illinois press.

Intodia, S.L. 1989. *Problems of tribals in Southern Rajasthan - A case study.* Rajasthan Agricultural University, Udaipur

Jaleel, M.M.1992. Factors influencing the development of agriculture among the Kanikkar tribe of Kerala. M.Sc.(Ag.) thesis, KAU,Thrissur

Jayakrishnan, S. 1984. Adoption of low cost technology among paddy growers. M.Sc.(Ag.) thesis. TNAU, Coimbatore

Jayapalan, R. 1985. Constraint involved in certified rice seed production- An analysis. M.Sc.( Ag.) thesis, TNAU, Coimbatore

Jayaramaiah, K. M. 1987. Adoption of recommended levels of fertilisers - Some contributing variables and constraints. *Fertilizer promotion for agricultural production.* UAS, Bangalore

Jayasubramaniam, B. 1996. Impact of distance education programme of Tamil nadu Agricultural University through correspondence course, A diagnostic analysis, M.Sc. (Ag.) thesis, TNAU, Coimbatore

Jyothimani, S. 1994. Organic farming in coconut. *Ind. coconut J.* 25 (7):48-50

Knight, C.G. 1980. Ethnoscience and African farmer : rationale and strategy. *Indigenous knowledge systems and development.* (Eds.) Brokensha, D.W., Warren, D.M and Werner,O. University press of America, Boston

Krishnamoorthy, R. 1988. Transfer of dryland technology, acceptance and constraints analysis, M.Sc. (Ag.) thesis, TNAU, Coimbatore

Kumbar, S.V. 1983. A study on the adoption behaviour and consultency pattern of grape growers of Bijapur district in Karnataka state. M.Sc. (Ag.) thesis, UAS, Bangalore

Lupanga, I.J., Mvena, Z.S.K. and Forster, P.G. 1995. The role of indigenious technical knowledge in increased food production in Tanzania. In Forster, P.G. and Maghimbi, S.1995. (Eds.) *The Tanzanian peasantry: further studies:* 198-217

Manivannan, M.1980. A study on knowledge and content of adoption of sunflower growers. M.Sc. (Ag.) thesis, TNAU, Coimbatore

Manju, S.P. 1996. Indigenous practices in coconut farming in Thrissur district. M.Sc. (Ag.) thesis. KAU, Thrissur

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

Manjunatha, G. 1980. A Study on the impact of village adoption programme operated by an input agency in Mandya district. M.Sc. (Ag.) thesis, UAS, Bangalore

Meera, B. 1995. Differential adoption of plant protection technology by farmers of Kerala – A critical analysis Ph.D. thesis., KAU, Vellayani

Muthukrishnan, S. 1981. Utilization of biogas plants – An analysis. M.Sc. (Ag.) thesis, TNAU, Coimbatore

Nadkarni, K.M. 1927. *Indian Materia Medica*. Nadkarni and Co., Bombay:4.

Naika, K.V. 1985. Study of village adoption programme in selected villages of Mysore district, Karnataka. district. M.Sc. (Ag.) thesis, UAS, Bangalore

Nand, H. and Kumar, K. 1980. Folk beliefs associated with dry farming. *Ind. J. Extn. Edu.* 16(3) : 4

Nandakumar, P.P. 1988. Impact of I.T.D.P. on Yerava tribal community in virajpet Taluk of Kodagu district, Karnataka District. M.Sc. (Ag.) thesis, UAS, Bangalore

Narasimhan, C.L. 1981. An overview of rural development – a study. *Kurukshetra* 29 (10) : 4 – 16

Navarez, D.C., Estano, D.B. and Moody, K. 1985. *12th Annual proc. pest control council of the philippines*, Philippines : 102

Nirmala, P. 1993. Knowledge and adoption of bioferlitizers, M.Sc. (Ag.) thesis, TNAU, Coimbatore

Norman, D.W. 1985. *Proc. of fertilizer efficiency research and tecnology transfer workshop for Africa south of the Sahara.* Dowala Cameroon, International Fertilizer Development Center. Alabama : 23–67

Norman, S.J.T. 1982. Production and marketing of vegetables in Malappuram district.M.Sc. (Ag.) thesis, KAU, Thrissur

Paul, R.S. 1970. A critical study of Farmers' Training and Education Programme in relation to the changes in their behavioural compoents. Ph.D. thesis. IARI. New Delhi

Perumal, G. and Mariappan, K. 1982. A study on the influence of rural community settings on the adoption of improved agriculutral practices. *Rural Development Review.* 1(2) : 135 – 137

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

Pillai, G.B. 1983. An analytical study of the integrated soil conservation practices in Kerala. Ph. D. thesis , TNAU, Coimbatore

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

Prasad, R.M. 1983. Comparitive analysis of achivement motivation of rice grower of three states in India. Ph. D. thesis. UAS, Bangalore

Prasannan, K.M. 1987. Extent of adoption of messages by contact farmers in T and V system. M.Sc. (Ag.) thesis, KAU, Thrissur

Preetha, L. 1997. Indigenous practices in rice cultivation in Thrissur district. M.Sc. (Ag.) thesis KAU, Thrissur

*Quintana, E.G. and Arzadon, D.L. 1989. PCARD – Monitor (Philippines). 17(5) : 5

Radhakrishnan, D. 1969. Determination of efficient farmers : A discriminant analysis approach, *Ind. J. Agric. Econ.* 24(1) : 79–84.

Ramachandran, P. 1988. Adoption of Dryland Technology – A constraint analysis. M.Sc. (Ag.) thesis, TNAU, Coimbatore

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

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

Ramamoorthy, H.S. 1973. Some factors influencing IR.8. adopter's perception of characteristics of innovations and its relation to adoption. M.Sc. (Ag.) thesis, GKVK, Bangalore

Rao, K.A. 1970. A study of relationship between rate of adoption of recommended farm practices and their attitudes. M.Sc. (Ag.) thesis, A.P.AU, Hyderabad

Reijntjes, Coen, Haverkort, Bertus and Bayer. 1992. *Farming for future – An introduction to low - external input sustainable agriculture.* Macmillan, Leusden, Netherlands

Rogers, Everett M. 1962. *Diffusion of innovations*. The Free Press, New York : 124–126

Rogers, E.M. and Shoemaker F.F. 1971. *Communication of Innovation – A cross cultural approach*, The Free Press, New York

Roling, N. 1988. *Extension Science–Information systems in Agricultural Development.* Cambridge Unversity press : 5–7

Rudramoorthy, B. 1964. *Extension in planned soical change : the Indian experience.* Allied pub. Pvt. Ltd. Bombay : 10–11 & 117

Sagar, R.L. 1989. Determinants of farmer productivity of crops. In. Roy, G.L. (Ed.) *Studies in Agricultural Extension and Management.* Mittal Publication, New Delhi.

Sajeevchandran, A. 1989. Impact of development programmes in promoting pepper prodcuts in Kerala M.Sc. (Ag.) thesis, KAU, Thrissur

Sangeetha, K.G. 1997. Managerial behaviour of commercial banana growers in Thiruvananthapuram district. M.Sc. (Ag.) thesis, KAU, Thrissur

Sanghi, N.K. 1991. Traditional farming practices for management of risk in rainfed agriculture. *Abstracts of the international conference on extension strategy for minimising risk in rainfed agriculture*

Sandhya, V. 1992. Economics of production and marketing of vegetables in Ollukara block. M.Sc. (Ag.) thesis, KAU, Thrissur

Selvanayagam, M. 1986. "Techno–cultural profile of dryland farming." M.Sc. (Ag.) thesis, TNAU., Coimbatore

Sathesh, D. 1990. A study on knowledge and adoption os chawki rearing practices by silkworm rearers of Kanakapura Taluk, Bangalore district, M.Sc. (Ag.) thesis, UAS, Bangalore

Seshachar, K. 1980. A study on adoption behaviour, consultancy pattern and value orientation of chilli cultivators in Dharwad district of Karanataka state. M.Sc. (Ag.) thesis, UAS, Bangalore

Sethy, B., Sinha, B.P. and Bahal, R. 1984. Some enterpreneurial characteristics in adoption of improved farm technology. *Ind. J. Extn. Edu :* 20 (1& 2)

Shankariah, C. and Singh, K.N. 1967. Predictive Analysis of factors related with knowledge of improved practices of vegetable cultivation. *Ind. J. Extn. Edu.* 3(1 & 2) : 67–73

Singh, R.K. and Chowdhary, B.D. 1977. *Biometrical Methods in quantitative genetic anaglysis.* Kalyani Publishers, New Delhi : 69–78

Sivaprasad, S. 1997. Problems and Prospects of self employment of trained rural youth in agriculture. M.Sc. (Ag.) thesis, KAU, Thrissur

Somasekharappa, G. and Manimegalan, M. 1987. Influence of cost on fertilizer consumption. F*ertilizer promotion for agricultural production.* UAS, Bangalore

Somasundaran, D. and Singh, S.N. 1979. Differential characteristics of adopter and non-adopter small farmers growing paddy. *Madras Agric. J.,* 66 (4) : 250 – 254

Srivastava, J.C. 1980. Technology for rural development – *I. Khadi Gramodyog.* 27 (1) : 25–41

Subedi, K.D. 1997. Farmers' local knowledge agrees with formal experimental results. *LEISA* 13(3)

Subramaniam, K. 1986. Communication behaviour of tribal farmers- A system analysis. M.Sc. (Ag.) thesis, KAU, Thrissur.

Sumathi, P. and Annamalai, R. 1993. A correlative analysis of characteristics of farm women with their knowedge level in rice post harvest tecnology. *Ind. J. Extn. Edu*, 4(1) : 633 – 635

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

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

Suthe, T., Muthiah, M. and Annamalai, R. 1991. Differential knowledge level and adoption behaviour of rubber growers. *Tamil Nadu J. Extn. Edu*. 2(4) : 340 – 343

Swaminathan, N. 1986 Impact of pulse minikit demonstration for small marginal farmers in Chengalpattu district. M.Sc. (Ag.) thesis, TNAU, Coimbatore

Syamala, K.S. 1988. An anlaysis of the effectiveness of National Demonstration conducted by the Kerala Agricultural university, M.Sc. (Ag.) thesis, KAU, Thrissur

Thampan, C. 1990 . Training strategy for the farmers of Kasargode district. M.Sc. (Ag.) thesis, KAU, Thrissur

Titilosa, S.O. 1990. The economics of incorporating indigenous knowledge systems into agricultural development : a model and analytical framework. *Studies in Technology and Social change.* 17 (111) : 54

Vasu, K.I. 1994. Indigenous know-how. *Science, Technology and Self Reliance* (Ed.) Ravikumar, R. State committe on Science, Technology and Environment, Govt. of Kerala, January

Venkateswaralu, U. and Bhalerao, M.M. 1980 Impact of co-operative finance on agriculture – An assessment in A.P. *Indian Co-operative review.* 18 (1) : 29 – 38

Vijayakumar, P. 1983. Impact of SADU on Agrl. development of rural areas of Kerala. M.Sc. (Ag.) thesis, KAU, Thrissur

Vijayalekshmi, K. 1993. Traditional agriculture – potential and prospects. *Congress on Traditional Sciences and Tecnologies of India.* PPST Foundation and IIT, Bombay : 113

Viju, A. 1985. Adoption behaviour of tribal farmers towards improved agricultural practices. M.Sc. (Ag.) thesis, KAU, Thrissur

Vivekanandan, P. 1994 Indigenous pest control methods. *Paper presented to the conference on Indigenous Science and Technology*, 24-26 February, Bharathidasan University, Tiruchirappalli, Tamil Nadu

Vivekanandan, P. 1997. Irrigation through melons, moth control through marigold. *Honey Bee* 8(1) : 15

Warren, D.M. 1989. Indegenous knowledge : A definition. *CIKARD* News : 1(1)

Wilson, M.J. and Chaturvedi, J. 1985. Adoption of improved tecnology of Flue cured virginia (F.C.V.) Tobacco in Andrapradesh. *Ind. J. Extn. Edn.* 21 (3 & 4) : 108–109

*** Originals not seen.**

# Appendices

## APPENDIX - I

തിരുവനന്തപുരം ജില്ലയിലെ പാവൽ കർഷകരുടെ കൃഷിരീതികളുടെ സാമ്പത്തിക-സാമൂഹ്യ അവലോകനം.

| | | | |
|---|---|---|---|
| തീയതി | | : | |
| പഞ്ചായത്ത് | | : | |
| വാർഡ് | | : | |
| വക്താവിന്റെ ക്രമനമ്പർ | | : | |
| 1. | പേര്, മേൽവിലാസം | : | |
| 2. | വയസ്സ് (പൂർത്തിയായ വർഷത്തിൽ) | : | |
| 3. | വിദ്യാഭ്യാസം | : | നിരക്ഷകർ/പ്രൈമറിതലം/സെക്കന്ററിതലം/ കോളേജ്തലം |
| 4. | പ്രധാനതൊഴിൽ | : | കൃഷി പ്രാഥമിക തൊഴിൽ/കൃഷി ഉപതൊഴിൽ |
| 5. | കൃഷിയിൽ എത്ര വർഷത്തെ പരിചയം | : | |
| 6. | വാർഷിക വരുമാനം | : | |
| | എ) കൃഷിയിൽ നിന്ന് ലഭിക്കുന്നത് | : | |
| | ബി) മറ്റുവിധത്തിൽ ലഭിക്കുന്നത് | : | |
| | ആകെ | : | |
| 7. | കൃഷിഭൂമിയുടെ വലുപ്പം | : | |
| | എ) സ്വന്തമായുള്ളത് | : | |
| | ബി) പാട്ടത്തിനെടുത്തത് | : | |
| | സി) പാട്ടത്തിന് കൊടുത്തത് | : | |

ആണെങ്കിൽ,

| ക്രമനമ്പർ | സംഘടന | സംഘടനയിലെ സ്ഥാനം | പങ്കാളിത്വത്തിന്റെ ആവൃത്തി |
|---|---|---|---|
| | | | സ്ഥിരമായി വല്ലപ്പോഴും ഒരിക്കലുമില്ല. |
| 1. | പഞ്ചായത്ത് | | |
| 2. | സഹകരണസംഘം | | |
| 3. | കെ.എച്ച്.ഡി.പി. | | |
| 4. | ഹരിതസംഘടനകൾ | | |
| 5. | ഹരിതസംഘം | | |
| 6. | മറ്റുള്ളവ | | |

12. വിജ്ഞാന വ്യാപനാഭിമുഖ്യം

എ) വിജ്ഞാന വ്യാപനവിഭാഗവുമായുള്ള ബന്ധം

| ക്രമനമ്പർ | വിവിധവിഭാഗം | സ്ഥിരമായി | വല്ലപ്പോഴും | ഒരിക്കലുമില്ല |
|---|---|---|---|---|
| 1. | ശാസ്ത്രജ്ഞൻ | | | |
| 2. | കൃഷി ഓഫീസർ | | | |
| 3. | കൃഷിഅസിസ്റ്റന്റ് | | | |
| 4. | മറ്റുള്ളവർ | | | |
| | ആകെ | | | |

ബി) വിജ്ഞാന വ്യാപന പങ്കാളിത്തം

| ക്രമനമ്പർ | പ്രവർത്തനങ്ങൾ | സ്ഥിരമായി പങ്കെടുക്കുന്നു. | വല്ലപ്പോഴും | ഒരിക്കലുമില്ല. |
|---|---|---|---|---|
| 1. | പഠനയാത്രകൾ | | | |
| 2. | സെമിനാറുകൾ | | | |
| 3. | മേളകൾ | | | |
| 4. | കൂട്ടുകൃഷി മീറ്റിംഗുകൾ | | | |
| 5. | പ്രകടനം | | | |
| 6. | പുരോഗമനകർഷകരുടെ പരിശീലന ക്ലാസ്സുകൾ | | | |

8. പാവൽ കൃഷി ചെയ്യുന്ന സ്ഥലം :

9. കൃഷിയെക്കുറിച്ചുള്ള വിവരങ്ങൾ എവിടെ നിന്ന് ലഭിക്കുന്നു ? എപ്പോഴൊക്കെ ഉപയോഗിക്കുന്നു ?

| ക്രമനമ്പർ | മാർഗ്ഗങ്ങൾ | ഒരിക്കലുമില്ല | വല്ലപ്പോഴും | സ്ഥിരമായി |
|---|---|---|---|---|
| 1. | കൃഷി ഓഫീസർ | | | |
| 2. | കൃഷി അസിസ്റ്റന്റ് | | | |
| 3. | പുരോഗമന കർഷകൻ | | | |
| 4. | ശാസ്ത്രജ്ഞർ | | | |
| 5. | കുടുംബാംഗങ്ങൾ | | | |
| 6. | അയൽവാസികൾ | | | |
| 7. | അച്ചടി മാധ്യമം | | | |
| 8. | റേഡിയോ | | | |
| 9. | ദൂരദർശൻ | | | |
| 10. | സെമിനാറുകൾ | | | |

10. ജലസേചനസൗകര്യം

| ക്രമനമ്പർ | ജലസേചനസ്രോതസ്സ് | വെള്ളം ലഭിക്കുന്നകാലയളവ് വർഷം മുഴുവനും ഭാഗികമായി | ഒരിക്കലുമില്ല. | നനയ്ക്കുന്നസ്ഥലം |
|---|---|---|---|---|
| 1. | ടാങ്ക് | | | |
| 2. | കിണർ | | | |
| 3. | ചാനൽ | | | |
| 4. | നദി | | | |
| 5. | മറ്റുള്ളവ | | | |

11. സാമൂഹിക പങ്കാളിത്തം

താങ്കൾ ഏതെങ്കിലും ,സംഘടനയിൽ അംഗമാണോ ? ആണ്/അല്ല

ആണെങ്കിൽ,

| ക്രമനമ്പർ | സംഘടന | സംഘടനയിലെ സ്ഥാനം | പങ്കാളിത്തത്തിന്റെ ആവൃത്തി |
|---|---|---|---|
| | | | സ്ഥിരമായി വല്ലപ്പോഴും ഒരിക്കലുമില്ല. |
| 1. | പഞ്ചായത്ത് | | |
| 2. | സഹകരണസംഘം | | |
| 3. | കെ.എച്ച്.ഡി.പി. | | |
| 4. | ഹരിതസംഘടനകൾ | | |
| 5. | ഹരിതസംഘം | | |
| 6. | മറ്റുള്ളവ | | |

12. വിഞ്ജാന വ്യാപനാഭിമുഖ്യം

എ) വിഞ്ജാന വ്യാപനവിഭാഗവുമായുള്ള ബന്ധം

| ക്രമനമ്പർ | വിവിധവിഭാഗം | സ്ഥിരമായി | വല്ലപ്പോഴും | ഒരിക്കലുമില്ല |
|---|---|---|---|---|
| 1. | ശാസ്ത്രജ്ഞൻ | | | |
| 2. | കൃഷി ഓഫീസർ | | | |
| 3. | കൃഷിഅസിസ്റ്റന്റ് | | | |
| 4. | മറ്റുള്ളവർ | | | |
| | ആകെ | | | |

ബി) വിഞ്ജാന വ്യാപന പങ്കാളിത്തം

| ക്രമനമ്പർ | പ്രവർത്തനങ്ങൾ | സ്ഥിരമായി പങ്കെടുക്കുന്നു. | വല്ലപ്പോഴും | ഒരിക്കലുമില്ല. |
|---|---|---|---|---|
| 1. | പഠനയാത്രകൾ | | | |
| 2. | സെമിനാറുകൾ | | | |
| 3. | മേളകൾ | | | |
| 4. | കൂട്ടുകൃഷി മീറ്റിംഗുകൾ | | | |
| 5. | പ്രകടനം | | | |
| 6. | പുരോഗമനകർഷകരുടെ പരിശീലന ക്ലാസ്സുകൾ | | | |

7. മറ്റുള്ളവ

ആകെ

13. സാമ്പത്തിക ഉത്തേജനം

താങ്കൾ താഴെ പറയുന്ന പ്രസ്താവനകളോട് യോജിക്കുന്നോ അതോ വിയോജിക്കുന്നോ ?

| ക്രമനമ്പർ | പ്രസ്താവന | യോജിക്കുന്നു | വിയോജിക്കുന്നു |
|---|---|---|---|
| 1. | ഒരു കർഷകൻ കൂടുതൽ വിളവിനും ലാഭത്തിനും വേണ്ടി കൃഷി ചെയ്യണം | | |
| 2. | ഏറ്റവും വിജയിക്കുന്നത് ഏറ്റവും കൂടുതൽ ലാഭമുണ്ടാക്കുന്ന കർഷകൻ ആയിരിക്കും. | | |
| 3. | കൂടുതൽ പണം ലഭിക്കുന്ന എത് നൂതന ആശയവും കർഷകൻ പ്രാവർത്തികമാക്കണം. | | |
| 4. | വീട്ടാവശ്യങ്ങൾക്ക് ഉപയോഗുക്കുന്ന ഭക്ഷ്യവിളകളേക്കാളും സാമ്പത്തികനേട്ടം വർദ്ധിപ്പിക്കുന്നതിന് ഒരു കർഷകൻ നാണ്യവിളകൾ കൃഷിചെയ്യണം. | | |
| 5. | കർഷകരുടെ സാമ്പത്തിക സഹായമില്ലാതെ അദ്ദേഹത്തിന്റെ മക്കൾക്ക് ഒരു നല്ലതുടക്കം ബുദ്ധിമുട്ടായിരിക്കും. | | |
| 6. | ഒരു കർഷകൻ ജീവിക്കാൻ വേണ്ടി സമ്പാദിക്കണം; പക്ഷേ ജീവിതത്തിലെ പ്രധാനകാര്യങ്ങളെ ഒരിക്കലും സാമ്പത്തിക രീതിയിൽ നിർവ്വചിക്കരുത്. | | |

14. ചോ : ഒരു പുതിയ കൃഷി രീതി താങ്കൾ എപ്പോഴാണ് സ്വീകരിക്കുന്നത് ?

1. എനിയ്ക്ക് ബോദ്ധ്യമായ ഉടനെ

2. മറ്റുള്ള കൃഷിക്കാർ വിജയ്കരമായി പരീക്ഷിച്ചതിന് ശേഷം.

3. എന്റേതായ സമയമെടുത്ത് കാത്തിരിക്കുക.

15. എ) ഏറ്റവും അടുത്ത് പട്ടണം സന്ദർശിക്കുന്നതിന്റെ ആവൃത്തി

ആഴ്ചയിൽ രണ്ടോ അതിലധികമോ പ്രാവശ്യം/ആഴ്ചയിൽ ഒരു പ്രാവശ്യം/രണ്ടാഴ്ചയിലൊരിക്കൽ/മാസത്തിലൊരിക്കൽ/വളരെ അപൂർവ്വമായി/ഒരിക്കലുമില്ല.

ബി. സന്ദർശനോദ്ദേശ്യം

എല്ലാ സന്ദർശനവും കൃഷി വൃത്തിയുമായി ബന്ധപ്പെട്ട്/ചിലവ കൃഷിയുമായി ബന്ധപ്പെട്ട്/വ്യക്തിപരമായി അല്ലെങ്കിൽ കുടുംബപ്രശ്നങ്ങൾ/ വിനോദം/മറ്റുദ്ദേശ്യങ്ങൾ.

16. വായ്പാഭിമുഖ്യം

1) താങ്കളെപ്പോലെയുള്ള ഒരു കർഷകൻ കൃഷിക്കാവശ്യത്തിനായി വായ്പ എടുക്കേണ്ടതുണ്ടോ ?

ഉണ്ട്/ഇല്ല

2) താങ്കളുടെ അഭിപ്രായത്തിൽ കാർഷികാവശ്യത്തിന് വായ്പയെടുക്കാൻ എത്രമാത്രംപ്രയാസമുണ്ട് ?

വളരെ പ്രയാസം/പ്രയാസം/എളുപ്പം/വളരെ എളുപ്പം.

3) വായ്പ എടുക്കാനെത്തുന്ന ഒരു കർഷകനോട് ബന്ധപ്പെട്ട ഉദ്യോഗസ്ഥന്മാരുടെ പെരുമാറ്റം എങ്ങനെയാണ് ?

വളരെ മോശമായി/മോശമായി/നല്ലരീതിയിൽ/വളരെ നല്ലരീതിയിൽ

4) കാർഷികോത്പാദനം വർദ്ധിപ്പിക്കുതിനായി സ്ഥാപനങ്ങളിൽ നിന്നും വായ്പ എടുക്കുന്നതിൽ തെറ്റില്ല എന്നാണോ താങ്കളുടെ അഭിപ്രായം ?

ശക്തമായി യോജിക്കുന്നു/യോജിക്കുന്നു/അഭിപ്രായമില്ല/വിയോജിക്കുന്നു/ശക്തമായി വായോജിക്കുന്നു.

5) കഴിഞ്ഞ 2 വർഷത്തിനിടയിൽ താങ്കൾ കാർഷികാവശ്യത്തിനായി വായ്പ എടുത്തിട്ടുണ്ടോ ?

ഉണ്ട്/ഇല്ല.

17. നഷ്ട സംഭാവ്യത നിർവ്വഹണം

| പ്രസ്താവന | ശക്തമായി യോജിക്കുന്നു | യോജിക്കുന്നു | അഭിപ്രായമില്ല | വിയോജിക്കുന്നു | ശക്തമായി വിയോജിക്കുന്നു. |
|---|---|---|---|---|---|
| ഒന്നോരണ്ടോ വിളയിറക്കുന്നതിനുള്ള നഷ്ട സാദ്ധ്യത ഒഴിവാക്കാനായി ഒരു കർഷകൻ കൂടുതൽ വിളകൾ കൃഷിചെയ്യണം. | | | | | |
| ഒരു കർഷകൻ നഷ്ട സാദ്ധ്യതയില്ലാത്തതും കുറച്ചു ലാഭം തരുന്നതുമായ കൃഷികൾ മാത്രം ചെയ്യാതെ കൂടുതൽ ലാഭമുണ്ടാക്കുന്നവ ഏറ്റെടുക്കണം. | | | | | |
| നഷ്ടസാദ്ധ്യതകളെ നേരിടാൻ തയ്യാറുള്ള കർഷകന് മറ്റ് കർഷകരെക്കാൾ കൂടുതൽ നേട്ടമുണ്ടാകും. | | | | | |
| വിജയസാദ്ധ്യത കൂടുതലുള്ളപ്പോൾ നഷ്ട സംഭാവ്യത ഏറ്റെടുക്കുന്നത് ഒരു കർഷകന് നല്ലതാണ്. | | | | | |
| കൃഷിയിലെ പുതിയ ആശയങ്ങൾ മറ്റുള്ളവർ പരീക്ഷിച്ചതിന് ശേഷം ചെയ്യുന്നതാണ് നല്ലത്. | | | | | |
| നൂതനാശയങ്ങൾ പരീക്ഷിക്കുന്നതിൽ അപകടസാദ്ധ്യത ഉണ്ടെങ്കിലും അത് ഉപകാരപ്രദമായിരിക്കും. | | | | | |

18. സാങ്കേതിക വിദ്യാ പുരോഗതി പങ്കാളിത്വത്തിലൂടെ

| പങ്കാളിത്തം | ഉണ്ട് | ഇല്ല |
|---|---|---|
| 1) ഹോർമോൺ ഉപയോഗം | | |
| 2) ജൈവകൃഷി പരീക്ഷണം | | |
| 3) കുമിൾ രോഗ നിയന്ത്രണം | | |
| 4) സംയോജിത രോഗ നിയന്ത്രണം | | |
| 5) നിമാസോൾ പരീക്ഷണം | | |

19.

| | | യോജിക്കുന്നു | വിയോജിക്കുന്നു |
|---|---|---|---|
| 1) | പ്രദേശികാധിഷ്ഠിത കാർഷിക പ്രശ്നങ്ങൾ പരീക്ഷിക്കുന്നതിനുള്ള ഒരു യഥാർത്ഥ മാർഗ്ഗമാണ് പി.റ്റി.ഡി. | | |
| 2) | പി.റ്റി.ഡി ഒരു വ്യർത്ഥപ്രയത്നമാണ്. | | |
| 3) | പി.റ്റി.ഡി കൃഷിക്കാരുടെ ഇടയിൽ മത്സരം വളർത്താനേ ഉപകരിക്കൂ. | | |
| 4) | പി.റ്റി.ഡി. എല്ലായ്പ്പോഴും കർഷകനെ ഗവേഷകരിൽ ആശ്രയിപ്പിക്കുന്നു. | | |
| 5) | പി.റ്റി.ഡി.പരീക്ഷണത്തിൽ പങ്കെടുക്കുന്നത് ഒരു സമയ നഷ്ടമായ കാര്യമാണ്. | | |
| 6) | പി.റ്റി.ഡി. പൂർണ്ണമായും ഗവേഷകരിൽ നിക്ഷിപ്തമാണ്, കർഷകന് യാതൊരു പ്രാധാന്യവുമില്ല. | | |

**APPENDIX - II**

KERALA AGRICULTURAL UNIVERSITY

# COLLEGE OF AGRICULTURE

VELLAYANI

Dr. N.P. Kumari Sushama

Associate professor

Dept. of Agrl. Extension

Dated :.....

Sir/Madam,

Mrs. Manjusha Jayapalan, one of the M.Sc. (Ag.) students of the Department is undertaking a research study titled ' Techno-Socio-Economic assessment of farmer's practices in the cultivation of 'bittergourd' as a part of her reasearch work under my guidance.

In view of your professional experience and expertise you have been identified as a judge for evaluating the farmer's practices listed. Your degree of response (extremely efficient, efficient, not efficient, extremely not efficient) to the attribute has to be indicated using a '✓' mark.

I request you to kindly spare some of your valuable time for the purpose and return the list duly filled at the earliest.

Hoping your kind co-operation.

Yours Sincerely,

(Dr. N.P. Kumari Sushama)

*Please indicate your degree of response by putting a '✓' mark.*

| | Extremely Efficient | Efficient | Not Efficient | Exremely Not Efficient |
|---|---|---|---|---|
| **I PROCESSING OF SEEDS** | | | | |
| i) Seeds are covered with poultry manure and sundried for 3 days, then stored in closed bottles or earthen pots. | | | | |
| ii) Before planting, seeds are soaked in water for 24 hrs, then wrapped in a cloth to drain the remaining water. | | | | |
| iii) Seeds are covered with fresh cowdung, kept on the wall as such for 1 month for drying. Before planting, seeds are separated from dried cowdung and wrapping them in a cloth, soaked in water for 24 hrs and hanging the cloth bag for 3-4 days. In the mean while, this is watered twice a day. | | | | |
| **II LAND PREPARATION** | | | | |
| i) 3 days before planting, the land is prepared by digging at a depth of 45 cm and burn the dry leaves and twigs within it. | | | | |
| ii) After the land preparation, it is kept as such for 3 days for the destruction of weeds and pests. | | | | |
| iii) At the time of first digging, land is strewn with lime stone at a rate of 3 kg / cent. | | | | |
| iv) At the time of land preparation, fytolan at the rate of 100g per 40 litre of water is made and 1 mug per pit is applied. | | | | |
| v) During the second season, the land is prepared at a depth of 25-30 cm only since the soil is already loosened by the first land preparation. | | | | |
| **III APPLICATION OF MANURES AND FERTILIZERS.** | | | | |
| i) Fertilizers and manures are applied only 1 week after planting. | | | | |

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| ii) After the land preparation, neemcake at the rate of 100g/pit is applied. | | | | |
| iii) A mixture of 1/2 kg poultry manure and 1 kg cowdung is applied per pit. | | | | |
| iv) 20 days after planting, 3 kg cowdung, 2 kg poultry manure and 100 g ground nut cake are applied per pit, 30 days after planting, 3 kg poultry manure, 250 g groundnut cake is given. | | | | |
| v) 1 month after planting, green leaf manure is given at a rate of 5-6 kg/pit. | | | | |
| **IV PLANTING**<br>i) Spacing followed is 2.5 x 2.5 m in order to accommodate more plants per pit. | | | | |
| ii) The seed is planted in such a way that seedling face the eastern side to get maximum sunlight. | | | | |
| iii) Seed is planted in such a way that seedling will be in the direction of wind to avoid injury. | | | | |
| **V TRAILING.** | | | | |
| i) A peg is fixed in the pit and a jute is tied from the pandal to the peg for trailing. | | | | |
| ii) A long stick is fixed in the pit, through this plant directly trails to the pandal | | | | |
| **VI PLANT PROTECTION AND AFTERCARE** | | | | |
| i) A mixture of neem oil emulsion and garlic is sprayed against jassids and aphids. | | | | |
| ii) Neem oil emulsion is sprayed against the white flies, aphids, and serpentine leaf miner. | | | | |
| iii) A mixture of cow's urine 1 litre / 10 litre of water and 10g of capsicum frutescens (Kanthari Mulagu) extract is used against pumpkin caterpillar (Margaronia indica) | | | | |

| | | | | |
|---|---|---|---|---|
| iv) Starch solution and well powdered Jaggery 10 g is taken in a coconut shell and is poisoned with 0.5 g of carbofuran is used against fruit flies. | | | | |
| v) Banana fruit trap used against fruit flies. | | | | |
| vi) Ocimum trap against fruit flies. | | | | |
| vii) A mixture of 1 litre Kriyattu leaf extract, 60 g Bar soap in 500 litre of water, 20 g garlic is applied to get full coverage over the plant and used against all pests as a repellent. | | | | |
| viii) In the above mixture, instead of Keriyathu, Nattapoochedi leaf extract is used, and sprayed against all pests. | | | | |
| ix) After planting, smoking the field to drive away the pests. | | | | |
| x) At the fruiting stage, smoking with dry chilli under the pandal to drive away the pests. | | | | |
| xi) To increase the yield, smoking with gun powder is practised. | | | | |

## APPENDIX - III

### WEIGHTAGES GIVEN TO THE SELECTED FARMERS' PRACTICES

| Sl. No. | Items/ Practices | Weightages |
|---|---|---|
| 1 | Soaking of seeds in water | 2.98 |
| 2 | Preservation of seeds with cowdung | 2.24 |
| 3 | Burning of dry leaves and twigs | 3.56 |
| 4 | Land preparation at a depth of 25–30 cm | 3.00 |
| 5 | Liming at a rate of 3 kg /cent | 3.04 |
| 6 | Application of neem cake | 3.04 |
| 7 | Organic manuring | 2.99 |
| 8 | Split application of organic manures | 3.20 |
| 9 | Green leaf manuring | 3.45 |
| 10 | Trailing using jute | 2.54 |
| 11 | Spraying neem oil–garlic emulsion | 3.56 |
| 12 | Spraying neem oil | 3.54 |
| 13 | Spraying a mixture of cow's urine and Kanthari mulagu extract | 2.22 |
| 14 | Application of starch solution–Jaggery mixture | 2.80 |
| 15 | Banana fruit trap | 3.00 |
| 16 | Ocimum trap | 2.36 |
| 17 | Kiriyathu leaf extract | 2.70 |
| 18 | Nattapoochedi leaf extract | 2.65 |

# TECHNO-SOCIO-ECONOMIC ASSESSMENT OF FARMERS' PRACTICES IN THE CULTIVATION OF BITTERGOURD (*Momordica charantia L.*) IN THIRUVANANTHAPURAM DISTRICT

By
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## ABSTRACT OF THE THESIS

Submitted in partial fulfilment of the
requirement for the degree of

Master of Science in Agriculture

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# ABSTRACT

The study was carried out in Thiruvananthapuram district of Kerala on the farmers' practices followed in bittergourd cultivation.

The study aimed at identifying the farmers' practices, assessing the knowledge about recommended practices, extent of adoption of farmers' practices, techno-socio-economic aspects, efficiency and ecofriendliness of these practices and also constraints faced by farmers in bittergourd cultivation.

The respondents consisted of 40 farmer respondents selected from Kalliyoor panchayat of the district, 25 extension personnel and 25 research personnel working on bittergourd.

The dependent variables for the study were, the knowledge about recommended practices and the extent of adoption of selected farmers' practices by farmers.

The independent variables included the personal, socio-economic and psychological characteristics of farmers.

In total, 40 farmers' practices were identified. Of which, the plant protection practices outnumbered the management practices. All the respondents were aware of most of the recommended practices in bittergourd cultivation. 'Soaking of seeds in water' , 'organic manuring' and 'banana fruit trap' were the practices adopted by 100 per cent of the farmers.

'Education' was the single variable which showed a significant positive correlation with knowledge whereas , 'extension orientation' and 'participation in P.T.D.' were the two variables exhibiting a significant positive relationship with the extent of adoption of farmers' practices.

The practices, 'burning of dry leaves and twigs', 'banana fruit trap' and green leaf manuring registered the highest techno-socio-economic indices.

'Banana fruit trap' , 'organic manuring' and 'soaking of seeds in water' were the most efficient practices as perceived by researchers, extension personnel and farmers.

'Soaking of seeds in water', 'burning of dry leaves and twigs' , 'spraying nattapoochedi leaf extract', 'oraganic manuring' and 'green leaf manuring' were the most ecofriendly practices as identified by the farmers.

The most important production constraint experienced by the farmers was 'incidence of pests and diseases'. The common pests were fruit fly, epilachna beetle, pumpkin beetle and plant lice. Mosaic and leaf spot were the common diseases. 'High cost of material inputs' was the most important economic constraint.