ADOPTION OF IMPROVED AGRICULTURAL PRACTICES BY COMMERCIAL VEGETABLE GROWERS OF OLLUKKARA BLOCK IN TRICHUR DISTRICT

By

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THESIS

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DECLARATION

I hereby declare that this thesis entitled "Adoption of Improved Agricultural Practices by Commercial Vegetable Growers of Ollukkara Block in Trichur 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, associateship or other similar title of any other University or Society.

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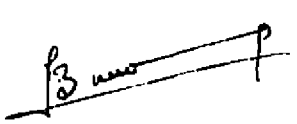

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CERTIFICATE

Certified that this thesis entitled "Adoption of Improved Agricultural Practices by Commercial Vegetable Growers of Ollukkara Block in Trichur District", is a record of work done independently by Smt.Binoo P. Bonny, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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Introduction

CHAPTER I
INTRODUCTION

Indian agrarian scene embedded in traditions, often limited by religious taboos and always operating near the brink of economic ruin has presented an apparent stagnation down the years. In fact, it is not the dearth of feasible technology that impede agricultural development in India. Rather, the scientific tools and competence to achieve a major breakthrough in agricultural production tend to be lost in the complicated and difficult problems of transfer of technology.

Our experience with the 'Green revolution' emphasised the fact that it is not the technology that accounted for the renaissance it brought about in agriculture, but, what people did with the available know-how. Any kind of social change is, in fact, the consequence of human decisions hedged to a great extent by innumerable pressures of physical and social environment. Researches undertaken to assess the consequences of green revolution in terms of its gains and losses on Indian agriculture confirmed that the achievements and changes were strictly confined to the field of foodgrain production. Thus, much was left to be achieved in other potent fields of agriculture like vegetable sector.

Vegetables constitute a neglected but potentially important segment of our agricultural economy. Now there is increased awareness

among our farmers in its capacity to contribute directly to the income, employment and nutrition. All promises of food security and the so called food self sufficiency get exposed to the grave jeopardy of floundering on the rock of a nutrition crisis of the first magnitude. This reflects the low availability and inclusion of vegetables in Indian diets despite its capacity to be an 'effective 'protective supplementary food' to the predominant cereal diet.

India is the second largest producer of vegetables in the world, next only to China. The vegetable production is estimated at 45 million tonnes which works out to barely 120g per capita per day consumption which is deplorably below the dietary standards of 280 g recommended by the Indian Council of Medical Research (ICMR). Even this low level does not fully reflect the consumption pattern of vegetables in the rural households where it may be 70 or 80 g a day. The total area under vegetables is hardly 2.0 to 2.5 per cent of the total cropped area in India. Compared to the developed and other developing countries, the average productivity of vegetables is also very low which results in reduced availability. Thus there is a paramount national need to increase productivity for which intensified research and development efforts by the Government are being attuned. The targets are fixed for short and long term production of vegetables as furnished in Table 1 (Seshadri, 1990).

Table 1. Vegetable Production Target for India

Period	Area (million ha)	Production (million tonnes)	Yield (tonnes/ha)
Present 1989-90	4.0	45.0	10.0
Short term (1990-1995)	6.0	75.0	12.5
Long term (2000 AD)	8.0	120.0	15.0

As the availability of more land for vegetable cultivation is severly restricted because of limitations of irrigation facilities, fast urbanisation and industrial development, efforts should be focussed at intensive cultivation to bridge the enormous gap between the present and projected targets. To realise this, it becomes imperative to adopt the HYVs and other proven technologies developed for vegetable production. In short, the 'man behind the plough' should no longer be afforded to function as a grower and harvester merely relying on his instincts, but should be enabled to emerge as a full scale farm manager endowed with enterpreneurial abilities and negotiating skills.

The specialised and extensive vegetable growing on a commercial basis demands an altogether different approach compared to other commercial crops. This is largely due to the short duration of crops, labour intensive cultivation and significance of vegetables

in the whole cropping pattern with its relatively low investment. Hence, it was rightly decided that an exclusive study of commercial vegetable growers indicating the adoption pattern of improved vegetable growing practices will be highly relevant in the present wake of boosting vegetable production.

Scope and importance of the study

In Kerala, where holdings are small and possibilities for enlarging them are non existent, more intensive land use through multiple cropping is recommended in which vegetable cultivation finds an ideal prospect. The potentialities in terms of agroclimatic and edaphic characteristics for vegetable cultivation in the state are also encouraging. However, there exists a number of factors which limit vegetable production in the state to a meagre 1.50 lakh tonnes against a current requirement of 3 lakh tonnes (Directorate of Economics and Statistics). Thus, about 50% of our requirements are met by procurement from other states. In fact, the target of 3 lakh tonnes can meet only a per capita requirement of 30 g/day which is deplorably below the recommended standards. To achieve a reasonably high standard of 150 g/day/capita, the current requirement of vegetables works out to 15 lakh tonnes. Hence the need for intensification of vegetable cultivation for self sufficiency in Kerala is high.

Many of the factors which influence vegetable production in the State are complex and beyond the control of the farmers

themselves. The most important of these factors are undoubtedly the technological innovations in vegetable production together with their appropriateness, introduction, acceptance and application by the clients. No systematic investigation was undertaken in the State to ascertain the extent of adoption of improved practices in commercial vegetable cultivation. It was against this background that the present study was undertaken. It was assumed that the study will also help in the identification of the constraints in commercial vegetable cultivation which when surmounted could lead to streamlining of vegetable production efforts in the right direction.

Objectives of the study

The study is designed with the following specific objectives:

1. To measure knowledge of commercial vegetable growers on improved practices of vegetable cultivation.
2. To identify training needs of commercial vegetable growers in vegetable cultivation.
3. To study extent of adoption of improved practices in vegetable cultivation by commercial vegetable growers.
4. To identify relationship of knowledge, training need and extent of adoption with agro-economic, socio-psychological and extension communication variables.
5. To study constraints, if any, in commercial production of vegetables.

Limitations of the study

The study was conducted as a part of a post graduate research work and hence it had the inherent limitations of time and resources. It was restricted to two panchayats of Ollukkara Block and as such it may not be possible to generalise the findings for the entire State. The extent of adoption of practices of vegetables was studied in general though many variations do exist in the recommended practices for different types of vegetables. Hence the results as such may not be applicable to a specific type of vegetable.

Inspite of these limitations, no effort was spared to make the study as objective and systematic as possible.

Plan of the study

The thesis is presented under five chapters. The first chapter deals with introduction, giving the need, objectives, importance and scope and limitations of study. The second chapter presents the theoretical orientation and review of literature pertaining to the area. In the third chapter, the methodology used in the research work including the operationalization of the concepts, measurement procedures of variables and statistical procedures used are presented. The fourth chapter deals with the results of the study and the discussions theron. The last chapter summarises the study.

The references and appendices are given at the end.

Theoretical Orientation

CHAPTER II
THEORETICAL ORIENTATION

A review of the nature and quantum of research studies already undertaken in the area of study helps the researcher in designing the theoretical framework for the study. In this chapter an attempt is made to explain the theoretical perspective of the study and to link it with the relevant findings of other research studies. The review is presented under the following heads.

1. Theoretical concepts in the study
2. Review on dependent variables of the study
3. Relationship of selected independent variables with dependent variables
4. Constraints in the adoption of improved agricultural practices

1. Theoretical concepts in the study

1.1. Commercial vegetable grower

Webster's dictionary (1979) has defined the term Commercial as: 'to put on a business basis especially so as to make profit'.

Tindall (1968) explained a commercial vegetable grower as one who grows his crops for financial reward and if his marketing is organised on a sound basis, he should be able to make a satisfactory profit.

For the present study commercial vegetable grower was operationally defined as one who has taken up cultivation of vegetables mainly for the purpose of market to make profit.

1.2. Adoption behaviour

Wilkening (1952) postulated adoption of innovation as a process composed of learning, deciding and acting over a period of time.

Copp et al. (1958) defined adoption as an activity of farmer taking place over a period of time. They perceived adoption of farm practices as a bundle of related events flowing through time which is not instantaneous.

According to Ramsey et al. (1959) adoption behaviour involved two components - (i) cognitive which includes obtaining knowledge and critical evaluation of the practices in terms of individual situations, and (ii) behavioural which involves the actual use of the practices.

Rogers (1962) defined adoption process as the mental process through which an individual passes from first hearing about an innovation to its final adoption.

Chattopadhyay (1963) defined adoption as the stage in adoption process where decision making is complete regarding use of a practice and action with regard to such a decision commences.

Rogers and Shoemaker (1971) defined adoption as a decision to continue full use of an innovation as the best course of action.

For the present study, the term adoption was used to refer to the observable action of a farmer in the form of acceptance and use of various improved practices in vegetable cultivation.

1.3. Knowledge

Knowledge was defined by Bloom et al. (1956) as those behaviours and test situations which emphasised the remembering either by recognition or recall of ideal material or phenomenon.

English and English (1958) defined knowledge as a body of understood information possessed by an individual or by a culture.

Knowledge in this study was operationally defined as the body of information possessed by farmer with respect to the different cultivation practices in vegetable production.

1.4. Training Need

Rao (1969) defined farmers' training as an intensive learning activity for a group of selected farmers assisted by competent trainers to understand and practice the skills required in the adoption of new technology at a place where appropriate facilities exist and at a time and duration considered suitable by them.

Talbot (1975) interpreted training need in terms of skill and knowledge requirements resulting from change or expected change. He explained training need as a reactive need.

Bhatnagar (1987) remarked that in training, focus is on learning by an individual new ways of doing things in terms of better performance and, the transfer of learning in work situation directed to greater organisational effectiveness. Training need is actually the difference between 'What is' and 'What ought to be'

In this study, training need was operationalised as the discrepancy between actual requirements in terms of knowledge and skill as perceived by the farmers and knowledge and skill which they possess as assessed by themselves.

2. Review on dependent variables of the study

Human behaviour is never a chance or random phenomenon. It is a response to a cause or stimulus and is always purposeful and goal oriented. Newcomb (1950) stated that human action is a function of interaction among the variables, viz., experience, current values and attitudes and prevailing situation. In the present study, the concept of human behaviour is explicited to the lower level of adoption behaviour. Adoption behaviour demands knowledge of the innovations (theoretical knowledge) and knowledge of the actual use of these innovations (skill) by an individual. Favourable changes in attitude and increased level of knowledge should necessarily result in a higher

rate of adoption which can be effected through efficient training methods. However, effective training requires motivation for effective learning which can be brought about by planning trainings, which have a full bearing on the felt needs of participants. Assessing the training need helps in exploring those areas wherein training is needed by the participants. Thus assessment of training need helps in providing with necessary cognitive and psychomotor components facilitating a higher level of knowledge which in turn contributes to a higher level of adoption. It is based on these assumptions that the level of knowledge, training need and extent of adoption of improved agricultural practices of commercial vegetable growers were treated as dependent variables of the study.

2.1. Knowledge about improved agricultural practices

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

Jayakrishnan (1984) observed that majority of paddy growers had only a medium level of knowledge about selected low cost technologies of paddy.

Alexander (1985) in his study on small rubber growers found that majority of them had medium level of knowledge.

Godhandapani (1985) stated that majority of the irrigated groundnut growers had medium level of knowledge about nutrient recommendations. The trend was from medium to high level knowledge in general under fertilizer application. The farmers lacked knowledge about quantity of fertilizers to be applied and advantage of soil testing for application of fertilizers.

Chenniappan (1987) stated that the majority of irrigated cotton growers had medium level of knowledge on the practices recommended for irrigated cotton. The trend was from medium to high level of knowledge in general.

Rotti (1987) found that majority of sugarcane growers had knowledge of the recommended practices like sowing time, seed rate, spacing, variety, FYM dose, N, P, K doses and top dressing.

Patel and Jadhav (1987) in their study on onion growers revealed that most of the farmers did not have accurate knowledge of fertilizer requirements, pests and diseases and the appropriate control measures to be undertaken.

Aziz (1988) indicated that majority of farmers belonged to medium group in the case of knowledge about drought management practices of rice and coconut.

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

2.2. Training need of farmers

Patil and Kale (1972) observed that a majority of the farmers had training need in subjects like use of fertilizers, pests and diseases and their control measures, soil analysis and improving soils and preparatory tillage.

Training need assessment of cotton growers by Gopal (1974) revealed a very high level of training need in the various aspects of cultivation of cotton.

Chandrasekharan (1981) reported that the small tea growers required training in subject matter areas of plant protection followed by pruning, care of young plants, manures and manuring, after cultivation, soil conservation, planting and propagation.

Singh and Singh (1981) in their study of the training needs of tribal farmers revealed that the main areas in order of training need were agriculture, animal husbandary, poultry keeping, storage of foodgrains, marketing of produce and gobar gas plant.

Gupta (1982) found that training need of farmers were perceived high in order of importance in respect of crop husbandry, followed by poultry and dairy. The next in order was fruit growing and fruit and vegetable preservation followed by vegetable cultivation.

Alexander (1985) in his study on the training need of small rubber growers observed that areas in which the small growers preferred to undergo training both in knowledge and skill aspects were plant protection, manures and manuring and plant propagation in that order.

Babu and Singh (1986) studied the cropwise training needs of young farmers which showed that an overwhelming majority of farmers wanted information on pulse crop followed by wheat and vegetables.

Mathiyazhagan and Singh (1986) reported that the banana growers expressed the highest training need in manuring and fertilizer application. The other areas in which training was perceived as the most needed by respondents in descending order were propagation, pruning and desuckering, plant protection, improved varieties of banana and storage.

Kanakasabapathi (1988) showed that nearly half of the tribal farmers perceived only a low level of training need. With regard to the perception of training need in respect to major operations in general, plant protection was perceived as the area having the most important training need.

2.3. Extent of adoption of technologies

Reddy and Reddy (1972) indicated that extent of adoption

of practices like seed rate seed treatment, green leaf manuring and use of fertilizers were low in paddy. In case of jowar, use of optimum seed rate was adopted to a high extent while use of improved seeds, seed treatments, line sowing, use of fertilizers and use of plant protection measures were adopted to a very low extent.

Sharma and Nair (1974), from their study on adoption of HYV of paddy revealed that the majority of the farmers cultivating HYV of paddy were medium adopters. The adoption of practices was far below the recommended levels.

Rajendran (1978) stated that majority of the small farmers were either low adopters or medium adopters of improved rice technology.

Bhat (1983) reported that HYV of paddy and kharif jowar showed higher adoption level compared to wheat and bajra.

Godhandapani (1985) showed that extent of adoption of nutrient recommendation was found to be medium to high for irrigated groundnut cultivators.

Rahman et al. (1986) reported that seed rates used by vegetable growers were quite high compared to the package of practices recommendations. They also identified that in contrast to the package of practices recommendations of specific chemicals for protecting

vegetable crops from insect pests, they applied chemicals of their own choice.

Chenniappan (1987) revealed that extent of adoption of improved practices for irrigated cotton was medium.

Aziz (1988) indicated that majority of the farmers belonged to medium group in the extent of adoption of drought management practices in rice and coconut.

Nehru et al. (1988) stated that 64 per cent of the lab-to-land beneficiary farmers adopted the recommended dose of nitrogen and 72 per cent adopted the recommended dose of potash for vegetable cultivation.

3. Relationship of selected independent variables with dependent variables

The dependent variables selected for the study, viz. knowledge, training need and extent of adoption of improved practices of vegetable cultivation were conceptualised as being influenced by a number of factors grouped under the broad heads of agro-economic, socio-psychological and extension communication variables.

The selected variables under each of these categories were:

I Agro-economic variables

1. Annual income
2. Area under vegetable
3. Land tenure status
4. Experience in vegetable cultivation
5. Indebtedness
6. Labour input
7. Cropping intensity
8. Irrigation potential

II Socio-psychological variables

1. Education
2. Social participation
3. Economic motivation
4. Risk preference
5. Scientific orientation
6. Achievement motivation
7. Management orientation

III Extension communication variables

1. Extension orientation
2. Information source utilisation
3. Personal guidance on scientific farming

3.1. Agro-economic variables

1. Annual income

Godhandapani (1985) showed a nonsignificant relationship between annual income and extent of knowledge of irrigated groundnut growers.

Patil (1985) reported a significant relationship between knowledge and annual income of farmers. Baadgaonkar (1987) also confirmed this finding.

Chenniappan (1987), however, reported a negative relationship of knowledge of irrigated cotton growers with annual income.

Thangaraju (1979) while comparing the characteristics of trained and untrained sericulturists found that there was no significant difference between trained and untrained groups with respect to their annual income.

Chandrasekaran (1981) indicated that economic status showed significant negative relationship with the training need of small tea growers. It was confirmed by Alexander (1985).

However, Arumugam (1983) reported that economic status had significant positive relationship with the training need of small farmers.

Kanakasabapathi (1988) also observed significant positive relation between annual income and training need of tribal farmers.

A nonsignificant relation of annual income with extent of adoption of improved practices was reported by Balasubramaniam and Kaul (1982). Naik (1988) also confirmed a similar kind of relation between annual income and extent of adoption of improved practices in paddy.

However, Kaleel (1978), Viju (1985), Baadgaonkar (1987) and Aziz (1988) observed a significant positive relation between annual income and extent of adoption of improved agricultural practices. Based on above findings, it was concluded for the present study that there would be a positive relationship between the three dependent variables, viz. knowledge, training need and extent of adoption of improved practices of commercial vegetable growers and their annual incomes.

2. Area under vegetables

Sankariah and Singh (1967) reported that farm size did not contribute significantly to the knowledge of improved practices of vegetable cultivation.

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

Rotti (1985) and Chenniappan (1987) observed a significant positive relation between knowledge level and farm size.

Godhandapani (1985) and Baadgaonkar (1987) found that there existed no significant relationship between farm size and knowledge of farmers in agricultural practices.

Mathiazhagan (1978) observed positive significant relationship between farm size and training needs of farmers. Alexander (1985) reported that there was no significant association between farm size and training need of small rubber growers. This was in conformity with the findings of Patel (1988).

Jha and Shaktawat (1972) indicated that farm size was not sigificantly associated with extent of adoption of hybrid bajra.

Manivannan (1980), Singh (1983), Balan (1987), Alauddin and Tisdall (1988), Aziz (1988), Viajyan (1989) all reported a significant relationship between farm size and extent of adoption of farm practices.

Since the findings related to knowledge and training need are not conclusive, in the present study it was hypothesised that area under vegetables and these dependent variables were positively related. Similarly, a positive relation was envisaged between farm size and extent of adoption also.

3. Land tenure status

Tripathy (1977) observed negative relationship between land tenure status and technological gap index of farmers in adoption of new rice technology.

Pillai (1983) reported that status of land tenancy had no association with technological gap in integrated soil conservation practices.

Singh (1981) found no significant relation of adoption of farm practices with the status of land ownership, except for marginal farmers, where it was positive and significantly correlated.

Singh and Ray (1985) showed a positive and significant association of status of land tenancy with the level of fertilizer use. Bhuiyan (1987) also showed significant positive relation of status of land tenancy with adoption of improved seed, fertilizer and irrigation technology.

Kanakasabapathi (1988) indicated a significant negative relation of status of land tenancy with training need of tribal farmers.

For the present investigation, all the dependent variables were assumed to have negative relation with the status of land tenancy based on above reviews.

4. Experience in vegetable cultivation

Godhandapani (1985) found negative relation between farming experience and knowledge level of farmers in irrigated groundnut cultivation.

Chenniappan (1987) also observed farming experience to have a negative relation with knowledge level of irrigated cotton farmers.

However, Sanjeev (1987) reported that farming experience had a significant relation with knowledge about improved paddy cultivation.

Chandrashekaran (1981) indicated a significant negative relationship with training need of small tea growers.

Arumugam (1983) stated that farming experience had significant association with training need of sericulturists.

Patel (1988) reported that farming experience had no significant association with the training need of farm women. This was confirmed by Kanakasabapathi (1988).

Balasubramaniam and Kaul (1982) observed that no significant relation existed between farming experience and adoption of improved practices.

Jayakrishnan (1984) reported a positive and significant association between farming experience and extent of adoption of low cost technology in paddy.

Though the findings were not consistent, it was postulated in the present study that there would be a positive relation of farming experience with knowledge, training need and extent of adoption.

5. Indebtedness

Sadamate (1978) reported that indebtedness was positively but not significantly related to the technological gap in the tribal farming system.

Prakash (1980) found a positive significant relation between indebtedness and extent of adoption of improved agricultural practices in the medium developed tribal areas of Wayanad, while this relationship was not significant in less developed areas.

Viju (1985) also observed a significant relation between indebtedness and extent of adoption of improved agricultural practices. However, he reported positive but nonsignificant relation between indebtedness and level of knowledge.

Kanakasabapathi (1988) indicated significant negative relation between indebtedness and training needs of tribal farmers.

In the present study, it was hypothesised that indebtedness and all the three dependent variables will be negatively related.

6. Labour input

Sharma and Nair (1974) observed significant relation between labour input and adoption of HYV of paddy.

Rajendran (1978) reported nonsignificant relation between labour input and adoption of improved practices in paddy.

Studies indicating the association of labour input with training need and extent of knowledge on improved practices could not be reviewed since the researcher could not come across.

In the present study, knowledge, training need and extent of adoption were postulated to have positive relation with labour input.

7. Cropping intensity

Prasad (1978) observed significant relation between cropping intensity and adoption of improved practices by rice growers.

Shukla (1980) reported that cropping intensity is one of the most important variables which influence the adoption behaviour of farmers. Balan (1987) also confirmed this finding indicating significant relation between cropping intensity and level of fertilizer use.

Rotti (1987) indicated a negative but nonsignificant relation between cropping intensity and extent of adoption of improved sugarcane practices and positive but nonsignificant relation with the level of knowledge.

Himantharaju (1988) did not find any association of cropping intensity with adoption of selected paddy practices.

Based on these studies, it was assumed that there will be positive relation between cropping intensity and extent of adoption of improved practices, knowledge and training need of farmers.

8. Irrigation potential

Nair (1974) showed that irrigation potential had significant relation with the extent of adoption of paddy practices.

Godhandapani (1985) reported negative but significant relation of irrigation potential with the extent of adoption of improved practices and also with the knowledge level of selected agricultural practices in irrigated cotton.

Himantharaju (1988) observed nonsignificant relation between irrigation potential and extent of adoption of selected practices in paddy.

Mann (1989) confirmed significant relation between irrigation potential and adoption of HYV in wheat.

Based on the above reviews, it was postulated that there exists a positive relationship between irrigation potential and the extent of adoption. But a negative relationship was conceptualised between irrigation potential and knowledge level. It was hypothesised that irrigation potential was also positively related with training need.

3.2. Socio-psychological variables

1. Education

Kaleel (1978) noted positive and significant influence of education on knowledge of paddy growers, which was confirmed by the findings of Jayakrishnan (1984), Godhandapani (1985), Baadgaonkar (1987) and Sheela (1989). However, Nataraju and Chennagowda (1987) observed that education exerted no influence on the knowledge level of dairy farmers.

Chandrasekaran (1981) reported that education had a significant negative relationship with the training need of small tea growers.

Arumugam (1983) reported positive and significant relationship of education with the training needs of small farmers. Patel (1988)

also observed that education had significant association with training needs of farm women.

Ogunfiditimi (1981), Singh (1983), Balan (1987), Ahmed (1988), Himantharaju (1988) and Mann (1989) noted a significant positive relation between education and extent of adoption of improved agricultural practices.

From these reviews, knowledge, training need and extent of adoption were hypothesised to have positive relation with the level of education of the respondents in the study.

2. Social participation

Kaleel (1978) observed positive and significant influence of social participation on knowledge of paddy growers which was in conformity with the results of Jayakrishnan (1984) and Baadgaonkar (1987). However, Chenniappan (1987) indicated nonsignificant association of social participation with the level of knowledge.

Social participation and training need showed significant positive relation as reported by Chandresekaran (1981).

Arumugam (1983) revealed that social participation had non-significant relationship with the training need of small farmers which was confirmed by Kanakasabapathi (1988).

Bhaskaran and Thampi (1986) reported nonsignificant relation between social participation and extent of adoption of HYV of paddy. Himantharaju (1988) also presented a similar relation between these two variables.

Significant relation between social participation and extent of adoption of farm practices was observed by many researchers like Nair and Patil (1979), Singh and Ray (1985), Prasannan (1987) and Igodan et al. (1988). Based on these reviews, extent of knowledge, training need and extent of adoption of improved vegetable cultivation practices were hypothesised to have positive relation with social participation.

3. Economic motivation

Janakiramaju (1978) observed positive relationship between economic motivation and knowledge about agricultural practices. Jayakrishnan (1984) also reported positive and significant relation with knowledge level of paddy growers. Singh and Ray (1985) also confirmed this finding.

Chandrasekaran (1981) noted that economic motivation was not related to training need of small tea growers. However, Arumugam (1983) revealed that economic motivation had significant relation with the training need of small farmers, which was confirmed by Kanakasabapathi (1988).

Sakthivel (1979) reported nonsignificant association between economic motivation and extent of adoption of improved practices in chilli.

Nair (1969), Rajendran (1978), Viju (1985), Balan (1987) and Vijayan (1989) found positive significant relation between economic motivation and the extent of adoption of improved practices.

In the present study, all the three dependent variables were hypothesised to have a positive relation with economic motivation.

4. Risk preference

Kamarudeen (1981) revealed that risk preference showed positive and significant association with the level of knowledge. A similar finding was reported by Jayakrishnan (1984) between risk preference and knowledge level of paddy growers.

Singh and Singh (1970) observed that there was no significant association between risk preference and adoption behaviour.

Ogunfiditimi (1981) noted that risk preference had negative correlation with the adoption of improved practices in cassava.

Jayakrishnan (1984) showed that there existed a positive and significant relationship between risk peference and adoption of low cost technology.

It was hypothesised, in the present study, that risk preference and all the three dependent variables were positively related.

5. Scientific orientation

Somasundaram and Singh (1978) observed that scientific orientation had positive and significant association with knowledge of adopter small farmers, while it had no significant relationship with knowledge of non-adopter small farmers.

Knowledge of sunflower growers was found to have positive and significant correlation with scientific orientation as reported by Manivannan (1980). Similar pattern of relation was reported by Kamarudeen (1981), Senthil (1983), Krishnamoorthi (1984) and Syamala (1988).

Thangaraju (1979) in the study on adoption of sericulture technology by trained and untrained sericulturists concluded that scientific orientation resulted in high adoption in the case of trained sericulturists, while it did not show any significant influence on the adoption of untrained sericulturists.

Manivannan (1980) reported positive and significant correlation between scientific orientation and extent of adoption of sunflower growers. A similar trend was observed by Aristotle (1981), Kamarudeen

(1981), Jayapalan (1985), Nanjayan (1985), Wilson and Chaturvedi (1985) and Syamala (1988).

Philip (1984) indicated nonsignificant association between extent of adoption of recommend practices and scientific orientation of farmers.

Based on the above reviews, positive relation was assumed in the present study between scientific orientation and knowledge, training need and adoption of improved vegetable cultivation practices.

6. Achievement motivation

Rajanna (1987) observed that there was significant association between level of achievement motivation and training need.

Naik (1988) reported nonsignificant association between achievement motivation and extent of adoption of selected recommended practices in paddy. In the present study, a positive relation was envisaged between achievement motivation and the three dependent variables.

7. Management orientation

Kamarudeen (1981) found that management orientation had positive and significant correlation with level of knowledge of the farmers. This was confirmed by the findings of Patil (1985) and Basavaraja (1987)

Kamarudeen (1981) found positive and significant relation between management orientation and adoption of demonstrated practices. Patil (1985) and Sreekumar (1985) also reported positive and significant relation between these two variables. These findings were in conformity with the results of Basavaraja (1987) and Syamala (1988).

It was hypothesised in the present study, that management orientation and all the dependent variables were positively related.

3.3. Extension communication variables

1. Extension orientation

Extension orientation had positive and significant correlation with knowledge level as observed by Vijayaraghavan and Somasundaram (1979) among marginal farmers, by Manivannan (1980) among sunflower growers and by Kamarudeen (1981) among national demonstration farmers.

Senthil (1983) and Godhandapani (1985) reported positive and significant relation between contact of farmers with extension agency and their knowiedge about the improved agricultural practices.

Baadgaonkar (1987) showed that extension orientation had no significant relation with the level of knowledge of groundnut cultivators.

Patel (1988) indicated that extension contact had significant association with training needs of farm men but nonsignificant association with training needs of farm women.

Karim and Mahbooh (1974) reported that extension orientation was positively related to the adoption of fertilizers.

Baadgaonkar (1987) showed that extension orientation had no significant relation with the extent of adoption of groundnut cultivators.

Sudha (1987), Palvannan (1988) and Syamala (1988) reported positive and significant association of extension orientation with the extent of adoption.

Vijayan (1989) indicated that extension contact was significantly related with the adoption of fertilizer, mulching and plant protection in banana.

From the above reviews, it was postulated that extension orientation will have positive influence on knowledge, training need and extent of adoption by vegetable growers.

2. Information source utilisation

Prakash (1980) showed that information source utilisation had positive and significant relation with the adoption of improved

agricultural practices. Sushama et al. (1981) also revealed a similar finding between information source utilisation and extent of adoption. Wilson and Chaturvedi (1985), Barsoum and Schlitz (1988) and Vijayan (1989) confirmed this finding.

In the present study, information source utilisation was hypothesised to have a positive relation with level of knowledge, training need and extent of adoption of improved practices in vegetables.

3. Personal guidance on scientific farming

Desai (1981) observed a positive relation between extension guidance and adoption of improved cotton practices.

Singh (1981) had reported that personal guidance on better farming was found to have played a crucial role in determining the level of fertilizer use by the farmers and found significant association between personal guidance and adoption.

Balan (1987) observed a significant correlation between personal guidance on scientific farming and level of fertilizer use. Similar relation was found between personal guidance on scientific farming and adoption of selected practices in paddy cultivation by Himantharaju (1988).

In the present study, level of knowledge and training needs of commercial vegetable growers were hypothesised to have a positive

association with personal guidance on scientific farming as in the case of adoption.

4. Constraints in the adoption of improved agricultural practices

Jha and Shaktawat (1972) indicated that the reasons for non-adoption of hybrid bajra were inadequacy of irrigation facilities followed by the perception that hybrid bajra gave less fodder in comparison to local varieties. High cost of seeds and nonavailability in time were also pointed out as constraints in adoption.

Reddy (1972) generalised the reasons for nonadoption of various improved agricultural practices connected with paddy and jowar as unawareness of the practices, unfavourable experience, high cost, materials not available, soils not suitable, lack of technical help, lack of irrigation facilities, not convinced of the merits of the practice, needs more labour, seedlings may not be sufficient and the method is complicated,in that order.

Sharma and Nair (1974) ranked the most important reasons for the nonadoption of HYV paddy as lack of irrigation facilities, high incidence of pest and diseases, lack of conviction about tthe profitability and lack of finance.

Kaleel (1978) observed nonavailability of inputs in time as the most important constraint felt by the paddy growers of Kerala.

Other constraints perceived by the farmers were lack of irrigation facilities, credit facilities, high level of intensive care required by HYV, lack of support price for paddy, lack of adequate marketing facilities and inadequate support from extension personnel.

Norman (1982) identified the problems in vegetable cultivation as the high attack of pest and diseases and high input cost. Farmers also stated that they experienced serious transportation problems in marketing their produce.

Waghmare and Pandit (1982) reported that lack of knowledge resulting from lack of technical guidance about the improved practices in wheat technology was the major constraint in its adoption.

From his investigation Naik (1984) observed that lack of knowledge, nonavailability of inputs, high cost of fertilizer, insufficient labour supply and erratic rainfall were the important reasons for nonadoption and partial adoption of the practices of paddy cultivation.

Palvannan ((1985) found that the major problems in adopting improved practices were inadequate loan facilities, lack of technical guidance and nonexistence of credit institutions in the locality.

Chitnis and Bhilegaonkar (1987) reported technological service and supply constraints as the major constraints causing technological

gap in the process of adoption of dry land technology. The farmers needed adequate and timely supply of production inputs, timely advice and training.

The conceptional frame work developed for the study based on the above review is presented in Fig. 1.

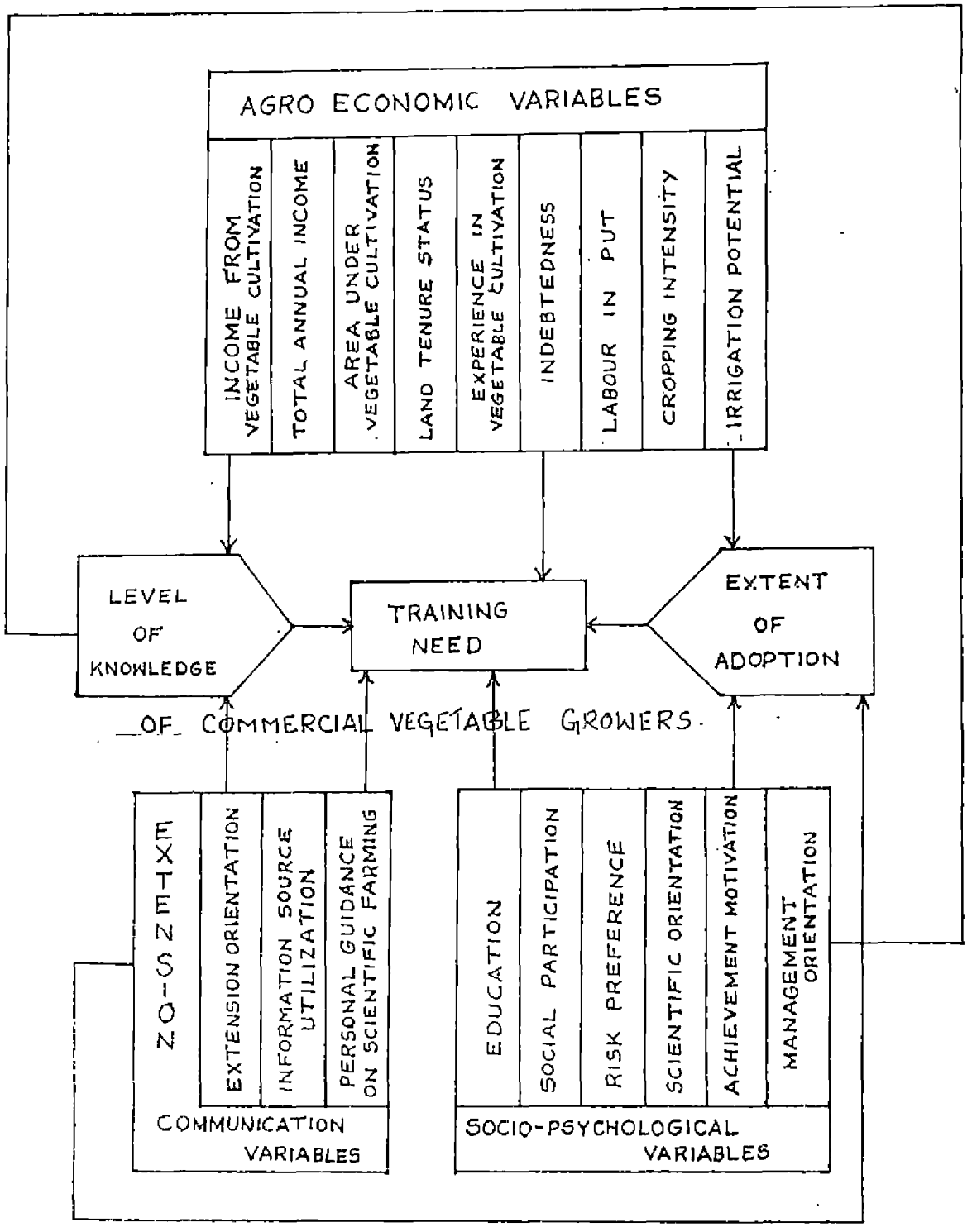

FIG.1. CONCEPTUAL FRAME WORK OF THE STUDY

Methodology

CHAPTER III
METHODOLOGY

This chapter enunciates the methods and procedures employed in this study, which are presented under the following sub-heads.

(i) Location of study

(ii) Selection of sample

(iii) Improved practices in vegetable cultivation selected for the study

(iv) Selection and empirical measurement of variables

(v) Techniques employed in data collection

(vi) Statistical methods used

(i) Location of study

The present study was carried out in Ollukkara E Thrissur District. This Block was purposively selected due to reasons.

(a) The College of Horticulture is located in this Block where substantial researches on vegetables are being carried out. It is likely that the rate of information dissemination and resultant adoption of improved practices in vegetable crops in this Block could be comparatively higher than other areas.

(b) There are potential vegetable farming tracts or pockets within the jurisdiction of this Block where vegetable cultivation is practiced on a commercial basis.

(c) It was convenient for data collection considering the proximity of the area to the researcher.

(i) Selection of Panchayats

The selection of Panchayats was made based on the statistics of vegetable seeds distributed under Minikit Scheme of the Department of Agriculture, Government of Kerala. Compared to other Panchayats, maximum number of vegetable minikits were distributed in Puthur followed by Pananchery (Table 2). Hence these two Panchayats were selected for the study. A map showing the exact location of the study is furnished in Fig. 2.

Table 2. Details of vegetable seeds distributed under the Minikit Scheme in Ollukkara Block (1989-90)*

Sl. No.	Name of Panchayat	Number of Minikits			
		First instal-ment	Second instal-ment	Third instal-ment	Total
1	Pananchery	100	50	100	250
2	Puthur	100	25	150	275
3	Nadathara	100	50	75	225
4	Madakkathara	100	100	-	200
5	Ollukkara	100	98	-	198
6	Vilvattam	100	50	51	201
7	Kolazhi	100	15	25	140

*Source: Office of Assistant Director of Agriculture, Ollukkara Block

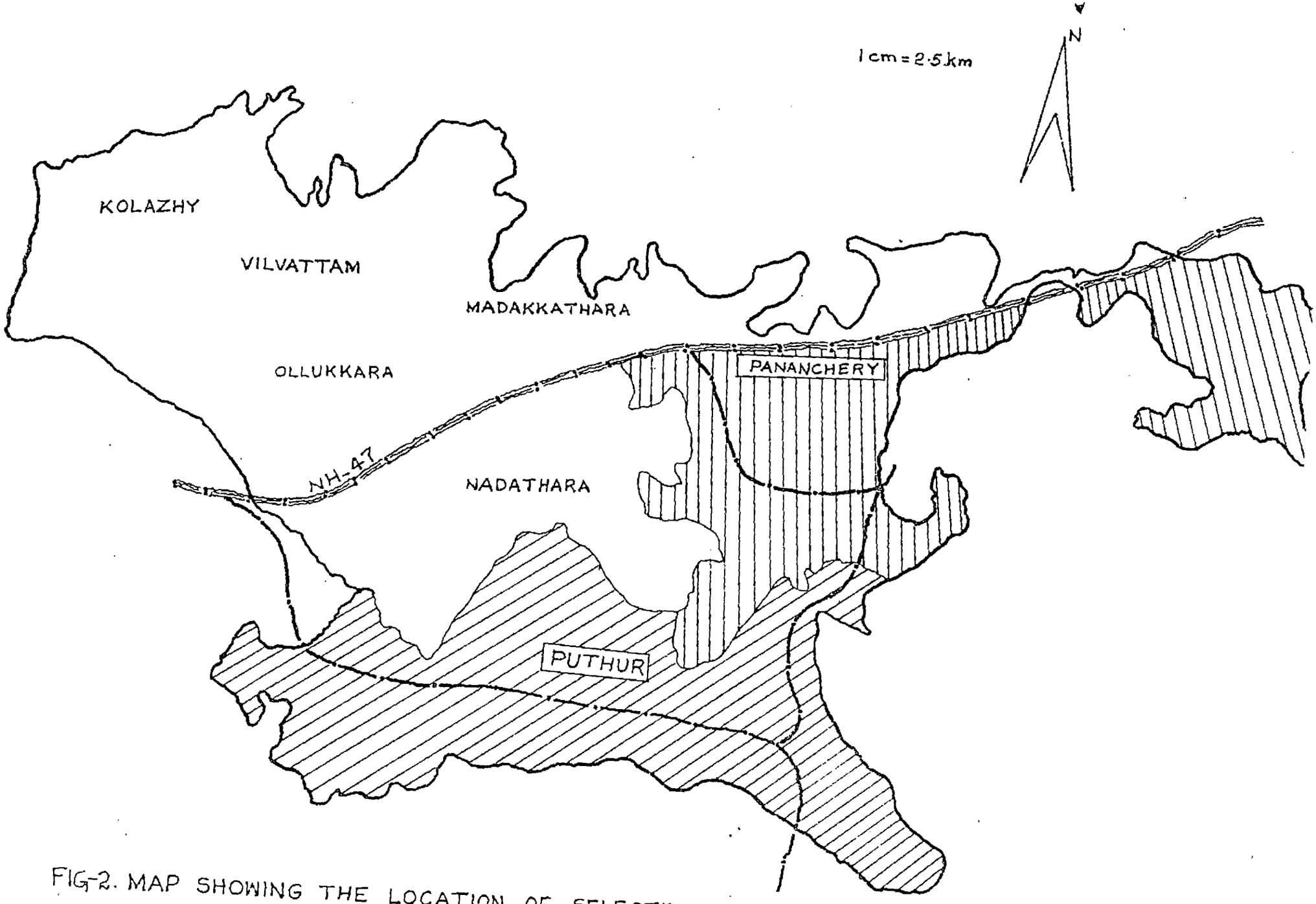

FIG-2. MAP SHOWING THE LOCATION OF SELECTED PANCHAYATS IN OLLUKKARA

(ii) Selection of samples

The study was confined to selected wards identified as vegetable tracts based on discussion with the extension personnel of the Department of Agriculture in the District including the Joint Director of Agriculture, Thrissur. Equal number of respondents were selected at random from each of these selected wards as no reliable data regarding the ward-wise area under vegetables were available from the Panchayats.

In Puthur Panchayat, the vegetable tracts were confined to Mannamangalam, Marottychal, Kayenoor East, Ponnookkara and Vettukadu wards. From each of these wards, twelve respondents were selected at random to form a sample of a total of 60 farmers.

Chuvannamannu, Thanipadam, Kannara and Velaghannoor were the wards identified as potential vegetable tracts in Pananchery Panchayat. From each of the identified wards, ten respondents were selected at random to form a sample of 40 farmers. Thus a total sample of 100 farmers were selected from the two Panchayats.

(iii) Improved practices in vegetable cultivation selected for the study

For the present study vegetables were grouped as cucurbits, solanaceous vegetables, leaf vegetables, bhindi and other vegetables in accordance with the Package of Practices Recommendations of Kerala

Agricultural University (1989), wherein standardised package of practices are recommended for each group. The selection of improved practices in vegetable cultivation was done mainly based on the Package of Practices Recommendations and also discussions with the experts in vegetable production. Accordingly, the following improved practices were selected.

1. Use of high yielding variety
2. Seed rate
3. Spacing
4. Use of chemical fertilizers
5. Intercultural practices
6. Plant protection practices

(iv) Selection and empirical measurement of variables

Based on specific objectives of the study and review of past studies, the following variables were selected.

A. Dependent variables

1. Knowledge of commercial vegetable growers on improved practices of vegetable cultivation
2. Training needs of commercial vegetable growers in vegetable cultivation
3. Extent of adoption of improved agricultural practices in vegetable cultivation

B. Independent variables

The independent variables for the study were grouped as agro-economic, socio-psychological and extension communication variables.

(i) Agro-economic variables

1. Annual income
2. Area under vegetables
3. Land tenure status
4. Experience in vegetable cultivation
5. Indebtedness
6. Labour input in vegetable cultivation
7. Cropping intensity
8. Irrigation potential

(ii) Socio-psychological variables

1. Education
2. Social participation
3. Economic motivation
4. Risk preference
5. Scientific orientation
6. Achievement motivation
7. Management orientation

(iii) Extension - communication variable

1. Extension orientation
2. Information source utilisation
3. Personel guidance on scientific farming

C. Constraints perceived by the farmers in commercial production of vegetables

The above variables were measured following the procedure as detailed below:

A. Dependent variables

1. Knowledge of improved practices of vegetable cultivation

Different researchers had measured knowledge by developing and standardising items which reflect the knowledge.

Cronbach (1949) defined knowledge test as one in which procedures, apparatus and scoring have been so fixed that precisely the same test can be given at different times and places.

Noll (1957) defined a standardised knowledge test as one that has been carefully constructed by experts, according to the acceptable objectives or purposes and procedure for administering, scoring and interpreting scores which are specified in detail so that the results should be comparable and norms and averages for different age and status have been predetermined.

Shankariah and Singh (1967) measured knowledge of respondents on improved methods of vegetable cultivation based on teacher made test as suggested by Anasthasi (1961). Nair (1969) also measured knowledge level of farmers on recommended package of practices of rice using teacher made test with multiple choice questions. The same method was followed by Kamarudeen (1981), Aziz (1988) and Shyamala (1988).

Jaiswal and Dave (1972) computed the knowledge score as follows:

$$\text{Knowledge score} = \frac{\text{Number of correct answers}}{\text{Total raw scores}} \times 100$$

Singh and Singh (1974) developed a knowledge test based on the response of farmers on various aspects of wheat cultivation. The total score of each individual was calculated by the formulae

$$\frac{X_1}{N} \times 100 \quad \text{where}$$

X_1 - Number of correct answers

N - Total number of questions

In the present study, a standardised knowledge test was developed by following the procedures adopted by Khuspe (1970), Lokhande (1973), Reddy (1976), Sadamate (1978), Pillai (1983) and Viju (1988).

The steps followed in developing a knowledge test are presented below:

(i) Collection of items

The content of a knowledge test consists of questions called items. An item pool of questions was prepared after conducting discussions with subject matter specialists and consulting the Package of Practices Recommendations of the Kerala Agricultural University (1989). A thorough scruitiny of the item pool was made and those items supposed to differentiate the well informed farmers from the poorly informed ones and having a certain level of difficulty were selected after editing.

Twenty three items (questions) which covered all aspects of vegetable cultivation were selected to carry out item analysis for developing a standardised knowledge test (Appendix-IA).

Forms of questions

All the 23 items collected for construction of the knowledge test were of objective type. The questions elicited dichotomous responses (either correct/incorrect or Yes/No) involving impersonal and objective assessment.

Item analysis

The initially prepared 23 items were checked and modified

on the basis of pretesting. For pretesting, the items were administered to randomly selected 30 vegetable farmers. The farmers selected from the same study area constituted an altogether different sample from the sample selected for the main study but having identical conditions.

Item analysis yields two kinds of information: item difficulty and item discrimination. The index of item difficulty reveals how difficult an item is, whereas the index of discrimination indicates the extent to which an item discriminates the well informed individuals from the poorly informed ones.

A score of one and zero were given for correct and incorrect answers respectively for the dichotomous questions. The total score for each respondent was calculated by summing up the scores obtained for each item. Thus, there was the possibility of respondents scoring a maximum of 23 for all correct aswers and zero for all wrong answers.

The responses obtained from the 30 respondents were arranged in the descending order of total scores from the highest to the lowest and the respondents were divided into three equal groups. These groups were G_1, G_2 and G_3 with 10 respondents in each group. For item analysis, the middle group namely G_2 was eliminated retaining only the terminal ones with high and low scores. The data pertaining to correct responses for all the items in respect of these two groups

G_1 and G_3 were tabulated and the difficulty and discrimination indices calculated (Appendix-IB).

(i) Calculation of item difficulty index

The index of item difficulty as worked out in this study refers to the percentage of respondents answering one item correctly (P). Coombs (1950) reported that the difficulty of an item varied for different individuals. In the present study, those items having P values ranging from 23.33 to 63.33 were considered for final selection.

(ii) Calculation of discrimination index

The discrimination index of each item, defined as the capacity to discriminate the well informed from the poorly informed respondents were calculated using the formula.

$$E^{1/3} = \frac{S_1 - S_3}{N/3}$$

where, $E^{1/3}$ = Discrimination index

S_1 and S_3 frequencies of correct responses in the groups G_1 and G_3 respectively.

N = Total number of respondents in the item analysis sample

Mehta (1958) emphasised that the $E^{1/3}$ method to estimate item discrimination values was analogous to the phi coefficient as formulated by Perry and Michael (1951). Different researchers indicated different $E^{1/3}$ value ranges for final selection of items, and as such there is no critical range that has been specified. Lokhande (1973), Reddy (1976), Sadamate (1978), Pillai (1983) and Viju (1988) in their studies gave the range as 0.35 to 0.55, 0.17 to 0.70, 0.12 to 0.87, 0.35 to 0.50 and 0.30 to 0.90 respectively. In the present case, the items with $E^{1/3}$ values ranging from 0.20 to 0.80 were considered for the final selection. The selected six items for the final format of the knowledge test are included in the interview schedule (Item II, Appendix-II).

Scoring

The summation of scores for correct answers cover all the items for a particular respondent indicated his level of knowledge in improved practices of vegetable cultivation. The knowledge index was worked out for individual respondents using the following formula.

$$\text{Knowledge index} = \frac{\text{Total score obtained by a respondent}}{\text{Total number of items}} \times 100$$

2. Training needs of commercial vegetable growers

Training need was assessed following different measurement procedures by different investigators as indicated below:

(i) Index of consensus (Cq)

Index of consensus was given for use on normal and ordinal categories. This can be used when training needs were collected on different tasks and activities from trainees and supervisors on the same item and when each respondent makes but one choice only, in which case the consensus index can be worked out for each category of respondents.

The formula for calculating index of consensus is

$$Cq = \frac{f' - C'f}{F(C-1)}$$

Cq - Consensus index

F - mean frequencies of persons preferring each category

C' - Number of categories with frequencies exceeding f

C - Total number of frequency categories

f' - Category frequency larger than f

F - Total frequency

(ii) Training Need Quotient (TNQ)

For assessment of training needs of extension officers, Sharma and Singh (1970) developed a simple ratio scale (training need quotient) which accomodates variations in a number of items. The formula for calculating TNQ is

$$TNQ = \frac{OSij}{MSij} \times 100$$

where,

OSij - sum of observed scores of j^{th} individual for i^{th} item

MSij - Maximum score attributable to the items rated by j^{th} individual

(iii) Training need score

Gill and Sandhu (1981) measured training need using training need score. This measures the gap between knowledge and skills possessed by the farmers and needed by them as per the recommendation in selected subject matter areas. The training need score is measured using the formula

TN Score = 1 - Average of knowledge and skill score

$$\text{Average knowledge and skill score} = \frac{\text{Total knowledge score}}{\text{No. of questions x No. of respondents}}$$

In the present study, the training need in major subject matter areas relating to vegetable crops were assessed using a three point rating scale with points 'much needed', 'some what needed' and 'not at all needed' with corresponding scores of 3, 2 and 1 as adopted by Kanakasabapathi (1988).

The important subject matter areas of vegetable cultivation wherein the training need was assessed was finalised based on the

recommendations of Package of Practices of Kerala Agricultural University, (1989) and discussions with experts. Nursery practices and harvesting and post harvest aspects were also included as subject matter areas as they were reported by experts to have much relevance in vegetable cultivation. The identified subject matter areas are:

1. Improved varieties in vegetable crops
2. Nursery practices
3. Seeds and sowing
4. Manures and manuring
5. Planting and after care
6. Plant protection measures
7. Irrigation
8. Harvesting and post harvest aspects

The training need of vegetable farmers both in knowledge and skill under each subject matter area was measured on the three point continuum. The frequencies of each response categories were multiplied by the score alloted to it.

Training need index (TNI) was calculated for each subject matter area with respect to scores obtained for training need against the maximum possible score. TNI was obtained by dividing the total score obtained by a respondent by the maximum possible score that could be obtained for the different subject matter areas for any respondent. TNI for the eight important subject matter areas of

vegetable production were worked out for each respondent by dividing the actual scores assigned for the different items under each subject matter area by the maximum possible scores that could be assigned for that subject matter area converted into percentage. TNI for each of the respondent was worked out. TNI was calculated for the major subject matter area in cultivation of vegetable crops also from which the important areas in which the commercial vegetable growers required training were identified.

3. Extent of adoption of improved agricultural practices

Many researchers standardised various methods to quantify adoption behaviour of farmers. The approach followed in the present study to operationalise adoption was based on the conclusion derived from a review of the following studies.

Wilkening (1952) developed an index for measuring adoption of improved farm practices. The index of adoption used was the percentage of practices adopted to the total number of practices applicable for a farmer.

Duncan and Kreetlow (1954) used a 25 item index of farm practices adoption which was a modification of the index developed by Wilkening.

Marsh and Coleman (1955) used practice adoption scores computed as the percentage of applicable practices adopted.

Fliegel (1956) constructed an index of adoption of farm practices using correlation of several adoption variables. Factor analysis was used for each of the 11 factors selected. A score of one was given for adoption and zero for non-adoption.

Beal and Rogers (1960) developed an adoption scale for measuring adoption of a practice for which they studied in detail the adoption of two farm practices. The scale thus computed credited an individual with one score for adoption and zero score for non-adoption of the practice.

Chattopadhyay (1963) used adoption quotient for measuring adoption behaviour. This is a ratio scale that measures behaviour on dimensions of applicability, potentiality, extent, time, consistency and differential nature of innovations.

Supe (1969) developed a scale viz. cotton practice adoption scale. He selected 10 practices of cotton and for each practice, total score for complete adoption was six. The practices which were divisible were assigned partial scores for partial adoption.

Singh and Singh (1974) also used an adoption quotient which was a modification of the one developed by Chattopadhyay (1963).

According to this, adoption quotient of each respondent was calculated by using the following formula.

$$AQ = \frac{\Sigma e/p}{N} \times 100$$

where

AQ - Adoption quotient

e - extent of adoption of each practice

p - potential for adoption of each practice

N - Total number of practices selected

Chandrakandan and Knight (1989) measured adoption of farm technology of groundnut cultivators using 'adoption quotient'. Four dimensions were considered for this study which included weightage for individual practices, magnitude of adoption, potentiality for adoption and applicability of individual practices.

The formula used was

$$\text{Adoption Quotient} = \frac{\sum_{i=1}^{m} \left(\frac{e_i}{E_i} + \frac{q_i}{Q_i} \times W_i \right)}{2 \sum_{i=1}^{m} W_i}$$

where,

e_i - Area put under i^{th} practice

E_i - potential area for i^{th} practice

q_i - quantity used for i^{th} practice

Q_i - quantity recommended for i^{th} practice

W_i - weightage assigned to i^{th} practice

m - number of applicable practice

The approach followed in the present study to operationalise adoption was to use the adoption quotient scale given by Singh and Singh (1974) based on the conclusions derived from studies of Chattopadhyay (1963).

The scale was developed on the basis of the composite scores for different practices which were logically consistent. The selection of practices were made in consultation with the experts and the Package of Practices Recommendations of the Kerala Agricultural University (1989). The extent of adoption was worked out for the following six aspects for which standard recommendations were available.

1. Use of improved vegetable varieties
2. Seed rate
3. Spacing
4. Use of chemical fertilizers
5. Intercultural practices and
6. Plant protection measures

B. Independent variables

The independent variables were selected based on an extensive review of literature and discussions with experts. The variables selected were grouped as agro-economic, socio-psychological and extension communication for convenience. The procedure followed in quantification of the independent variables is presented below.

i) Agro-economic variables

a) Annual income

Annual income was operationally defined as the total earning of the respondent from both farm and non farm sources in an year expressed in terms of rupees. The farm sources included income from different crops, dairy, poultry etc. while non farm sources included income from government employment, business and such other vocations. The income from vegetable cultivation obtained in an year was also recorded for all the respondents, which was taken as a separate variable for analysis.

b) Farm size

Farm size was defined as the number of acres of land under vegetable cultivation both owned and cultivated by the respondent including land leased-in or leased out.

c) Land tenure status

This was operationalised as extent of cultivable land in possession of the respondent. If respondent possesses all the land cultivated by him, status of land tenure is considered zero, if he is not in possession of any of the land cultivated by him, his status of land tenureis one.

$$\text{Land tenure status} = 1 - \frac{\text{Extent of cultivable land owned now under possession of respondent in acres}}{\text{Total cultivable land owned by the respondent in acres}}$$

d) Experience in vegetable cultivation

Experience in vegetable cultivation was operationalised as the number of years since a farmer is involved in vegetable cultivation on a commercial basis.

This was quantified by asking the respondent to indicate the number of years since he is practicing commercial vegetable cultivation.

e) Indebtedness

Indebtedness was defined as the total loan (debt) in terms of cash, a farmer owes at the time of investigation to various money lending sources such as private money lenders, co-operatives, banks, merchants, traders etc.

This was assessed based on the amount in rupees, a farmer owes to different money lending sources at the time of investigation as reported by him.

f) Labour input

Ghosh (1975) defined labour as the physical and mental human effort directed towards economic activity or creation of utility.

In this study, labour input was considered as the extent of hired labour, used in the cultivation of vegetables assessed as mandays per acre during the last vegetable season.

g) Cropping intensity

Cropping intensity was defined as the number of crops raised in a unit area by the farmer in an year which was expressed in percentage.

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

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

h) Irrigation potential

Irrigation potential was operationalised as the presence of source of irrigation water and favourable condition for its availability for irrigating the crops raised by the farmer. Though this variable is difficult to be quantified, it was included for the study as assured and effective irrigation is an important factor for commercial vegetable cultivation. The number of irrigations would be meaningless as it would not give the quantity of water applied. Even the quantity of water applied do not reveal the true picture as the timing of irrigation is also important. Also, area irrigated would not yield any significant result. Considering the above limitations and also because it was difficult to extract such data, the following simple procedure was used to quantify this variable.

A score of three was assigned for a farmer if he had source of irrigation providing water throughout the year and a score of two for availability of water only during seasons and a score of one for unassured and irregular availability of water.

ii) Socio-psychological variables

a) Education

Education was operationalised as level of formal schooling a respondent had undergone at the time of investigation.

It was measured by assigning scores for different levels of education as per the scoring system followed in the soci-economic status scale of Trivedi (1963) with slight modifications in the procedure of scoring.

Category	Score
Illiterate	0
Can read only	1
Can read and write	2
Primary School	3
UP School	4
High School	5
PDC or equivalent	6
Degree and above	7

b) Social participation

Social participation was operationally defined as the degree of involvement of respondents in formal and informal social organisations either as member or as office bearer which also includes their degree of participation in organisational activities.

The procedure followed by Kamarudeen (1981) was adopted for measurement of social participation as indicated below:

1. Membership in organisation

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

2. Frequency of attending meetings

Never attending any of the meetings	- 0
Occasionally attending few of the meetings	- 1
Regularly attending all meetings	- 2

The total score for social participation was obtained by summing up the two different response categories.

c) Economic motivation

Economic motivation may be regarded as an indication of degree of willingness of a farmer for investment of his available potential resources in adopting farm innovations. It was operationally defined as the extent to which a farmer was oriented towards profit maximisation and the relative value he placed on monetary gains.

The procedure followed by Balan (1987) was used for measuring economic motivation. The scale consisted of three sets of statements, each set having three short statements with weights 3, 2 and 1 indicating different intensities of motivation from high to low. The forced choice method was followed to overcome familiar problems.

of personal biases and lack of objectivity of self-evaluation. This method forced the respondent to choose from a group of three short statements describing a particular personality characteristic, the one which most accurately described respondent himself and also one which least accurately portrayed himself. After obtaining the most-least choice for each of the three sets of statements, (appended) scoring was done by summing up ratios of weights of most like statements to weights of least like statements.

d) Risk preference

Risk preference was operationalised as the degree to which a farmer is oriented towards risk and uncertainity and portrayed the courage to face problems in farming.

To measure this variable, risk preference scale developed by Supe (1969) was adopted in this study. This scale consisted of six statements of which two were negative. The responses were collected on a five point continuum as shown below:

Responses in the continuum	Scores
Strongly disagree	1
Disagree	3
Undecided	4
Agree	5
Strongly Agree	7

For the negative statements, the scoring pattern was reversed. The total score obtained by summing up the score for each statement yielded risk preference score (appended)

e) Scientific orientation

Scientific orientation was defined as the degree to which a farmer is oriented to the use of scientific methods in relation to various operations connected with crop husbandry.

The method developed by Supe (1969) was used for measuring this variable. Of the six statements in the scale, one was negative. The responses were collected on a five point continuum as shown below:

Points in the continuum	Scores
Strongly disagree	1
Disagree	3
Undecided	4
Agree	5
Strongly agree	7

The scoring pattern was reversed for negative statement. The total score thus obtained by an individual for all the six statements was taken as his score for scientific orientation.

f) Achievement motivation

Mc Clelland (1961) stated that achievement motivation is the desire to do well, not so much for the sake of social recognition or prestige, but to attain an inner feeling of personal accomplishment.

In the present study, achievement motivation was measured using the scale developed by Singh (1974). The scale had six items. Each item in the scale has five alternative responses and the responses to each item in the scale were scored 1 to 5. The scores of the respondents were obtained by adding up the scores corresponding to their response patterns.

g) Management orientation

Management orientation was operationalised as the degree to which a farmer is oriented towards scientific farm management comprising planning, production and marketing functions on his farm enterprise.

For computation of management orientation, Kamarudeen (1981) used the scale developed by Samantha (1977) which was followed in this study. It consisted of 18 statements six each for planning, production and marketing orientation. Under each group, positive and negative statements were mixed retaining at the same time a more or less psychological order of the statements. For positive statements, a score of one was assigned for agreement and zero for

disagreement. For negative statements, the scoring was reversed. The scores were summed up corresponding to the response pattern which gives the management orientation score of a respondent.

iii) Extension communication variables

a) Extension orientation

Extension orietnation referred to the extent of contact of a farmer with different extension agencies and their participation in various extension activities or programmes like meetings, seminars etc. organised by these agencies. This was measured taking into account both extension contact and extension participation.

The extension contact score was obtained by assigning scores 8, 4, 2, 1 and 0 respectively for response, once a week, once a fortnight, once a month, once a year and never for his contact with different extension personnel. The scores were added up for all the extension personnel for arriving at total extension contact score.

Extension participation was measured by summing up the scores obtained by a farmer for his participation in various extension activities. This was quantified by assigning scores 2, 1 and 0 respectively for the responses whenever conducted, sometimes and never. The scores were added up for all the extension activities for arriving at total extension participation score.

The score obtained for extension contact and extension participation were added to obtain the extension orientation score.

b) Information source utilisation

Information source utilisation was operationally defined in terms of the frequency of obtaining information from different sources. The different sources of information for obtaining agricultural technology were listed and were grouped into three categories viz. mass media sources, personal cosmopolite sources and personal localite sources.

The procedure followed by Nair (1969) was adopted in the present study to develop an index of use of information sources. Each respondent was asked to indicate as to how often he got information regarding improved agricultural practices from each of the listed sources. The scoring pattern was as follows:

Frequency of utilisation	Scores
a. Never	0
b. At times needed	1
c. Whenever needed	2

The scores were summed up across each item to form information source utilisation index.

c) Personal guidance on scientific farming

Personal guidance on scientific farming was defined as the advice, help and assistance received by a farmer from different

extension personnel for efficient utilisation of resources and solving farming problems.

Balan (1987) used the scale developed by Singh (1981) with slight modification which was followed in this study. The scale consisted of 12 statements rated on a four point continuum ranging from very much, much, not much and little with scores 4, 3, 2 and 1 respectively. The summation of the scores for different statements gave the total score for a respondent on personal guidance.

C. Constraints in the commercial production of vegetables

Based on review of relevant literature and discussion with experts, constraints faced by the commercial vegetable growers were collected. A list containing the collected constraints was presented to the respondents. They were also asked to add any other constraints which they thought appropriate to be included. The response to each constraint was obtained on a dicohotomous response patter as 'Most important' and 'Least important'. The frequency of response under each category was worked out. The frequency percentage of each constraint perceived as important by the respondents was worked out as follows.

$$\text{Frequency percentage of constraint} = \frac{\text{Frequency obtained for a constraint}}{\text{Total number of respondents}} \times 100$$

The constraints were ranked in order of importance based on the frequency percentage of constraint.

V. Techniques employed in data collection

Personal interview method was used for collecting data from the respondents. Data collection was carried out during April-May 1991 with the aid of a pre-tested and well structured interview schedule. The respondents were individually interviewed and their responses collected.

The final interview schedule is given in Appendix-III.

VI. Statistical methods employed

The data were processed at the Computer Centre of the Kerala Agriultural University, Vellanikkara. The following statistical tests and procedures were applied for analysis and interpretation of the results.

(a) Percentage analysis

Percentage were calculated for making simple comparisons for identification of the constraints perceived by the respondents in vegetable cultivation.

(b) Zero order correlation analysis

This was done to find out the intensity of association between the dependent variable and each of the independent variables.

The formula used was

$$\text{Correlation coefficient, } r = \frac{\Sigma XY - \frac{\Sigma X \, \Sigma Y}{n}}{\sqrt{\Sigma X^2 - \frac{(\Sigma X)^2}{n} \times \Sigma Y^2 - \frac{(\Sigma Y)^2}{n}}}$$

where

X - independent variable

Y - dependent variable

n - number of observations

c) Step-wise Regression Analysis

This was employed to know the relative effect of independent variables in predicting the dependent variables and for elimination of unimportant variables. The best fitting regression equation of dependent variable or independent variables was predicted by applying step-wise regression as suggested by Draper and Smith (1966).

Results and Discussion

CHAPTER IV
RESULTS AND DISCUSSION

The findings of the study and the discussions thereon are presented in this chapter under the following heads:

1. Extent of knowledge of commercial vegetable growers about improved vegetable cultivation practices

2. Training need for commercial vegetable growers on improved vegetable cultivation practices

3. Extent of adoption of improved vegetable cultivation practices

4. Profile analysis of the respondents on selected independent variables

5. Correlation analysis between selected independent and dependent variables

6. Inter correlation among the independent variables

7. Relative importance of the selected agro-economic, socio-psychological and extension communication variables in explaining the dependent variables

8. Constraints perceived by farmers in commercial vegetable production

1. Extent of knowledge of commercial vegetable growers about improved vegetable cultivation practices

The distribution of respondents on their knowledge score on improved vegetable cultivation practices is presented in Table 3 and Fig. 3.

The commercial vegetable growers were categorised as low, medium and high knowledge categories based on the mean and standard deviation. A farmer with knowledge score below 32.28 had low level of knowledge, while one with knowledge score between 32.28 and 77.94 had medium level of knowledge and those having knowledge score about 77.94 had high level of knowledge.

A glance at Table 3 revealed that only 12 per cent of farmers had low level of knowledge about the improved vegetable cultivation practices. A majority of the commercial vegetable growers (67%) had medium level of knowledge, while 21 per cent of the farmers had high level of knowledge.

A medium level of knowledge for the majority of farmer respondents reflects the exposure of these farmers to the improved cultivation practices on vegetables. From the data furnished elsewhere in this chapter, it could be noticed that about 44 per cent of the respondents had more than twelve years of farming experience. As these farmers are engaged in vegetable cultivation on a commercial

Table 3. Distribution of respondents on the extent of knowledge about improved vegetable cultivation practices

Category	Score	Frequency (%)
Low ($\bar{X}$ - S.D.)	Below 32.28	12.00
Medium ($\bar{X}$ ± S.D.)	32.28 - 77.94	67.00
High ($\bar{X}$ + S.D.)	Above 77.94	21.00
Total		100.00

$\bar{X}$ = 55.11 S.D. = 22.83

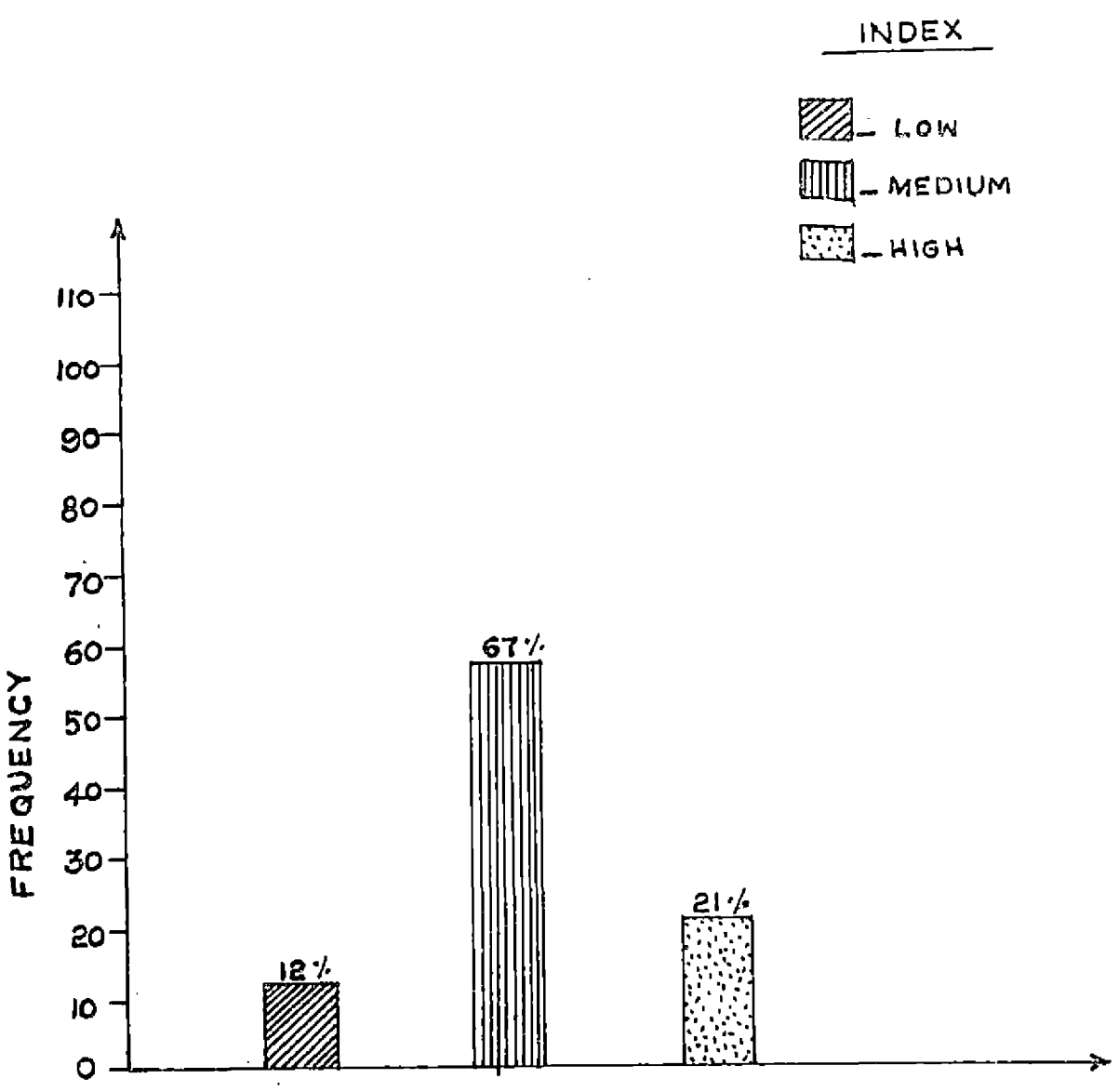

FIG III BAR DIAGRAM SHOWING THE DISTRIBUTION OF RESPONDENTS ON THEIR KNOWLEDGE SCORE ON COMMERCIAL VEGETABLE CULTIVATION

basis for many years, it may not be possible for them to be completely unaware of the innovations in this field.

The present result was in agreement with the findings of Bhilegaonkar (1976), Manivannan (1980), Chandrasekaran (1981) and Arumugam (1983), who indicated that a majority of farmer respondents in their respective studies also possessed medium level of knowledge.

2. **Training need of commercial vegetable growers on improved vegetable cultivation practices**

The training need index calculated for commercial vegetable growers is furnished in Table 4. Based on the values of mean and standard deviation, respondents were grouped into low, medium and high training need categories. Farmers with training need index less than 55.32 were grouped under the low training need category, while those with training need index of more than 69.02 were considered under high training need category. All those farmers having training need index between 55.32 and 69.02 were grouped under medium training need category.

A perusal of the results furnished in Table 4 indicated that majority (70%) of the respondents belonged to medium training need category. A diagramatic representation of the results is given in Fig.4.

Table 4. Distribution of respondents on the training need index

Category	Training need index	Frequency (%)
Low ($\bar{X}$ - S.D.)	Below 55.32	14.00
Medium ($\bar{X}$ ± S.D.)	Between 55.32 - 69.02	70.00
High ($\bar{X}$ + S.D.)	Above 69.02	16.00
Total		100.00

$\bar{X}$ = 62.17 S.D. = 6.85

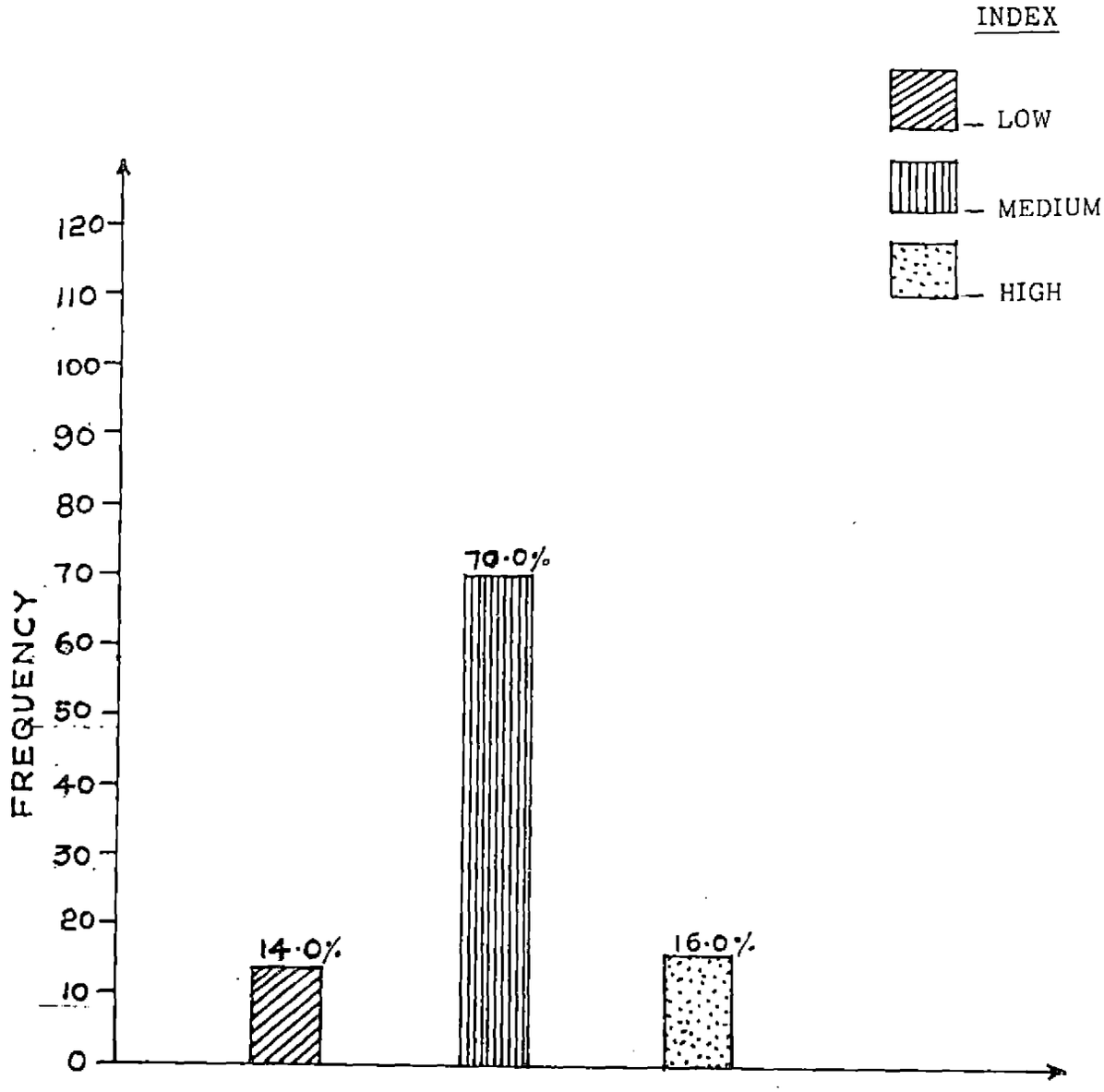

FIG4 BAR DIAGRAM SHOWING THE DISTRIBUTION OF COMMERCIAL VEGETABLE GROWERS BASED ON THEIR TRAINING NEED

Training need is, in fact, an expression of a gap in the knowledge level which is indicated by a negative relation between training need and knowledge level as reported by Savarimuthu (1981). Therefore, the medium level of training need by a majority of the respondents reflected on lack of complete knowledge by the farmers about the improved cultivation practices.

Practicewise training need of commercial vegetable growers

The practice-wise training needs of the respondents in commercial vegetable cultivation, both in knowledge and skill aspects are given in Table 5.

From Table 5, it was clear that the farmers perceived plant protection as the most important area where training was required in relation to both knowledge and skill. Plant protection recorded the highest training need index of 74.48 and 79.32 for knowledge and skill respectively. Manures and manuring was perceived as the second area in the order of importance of the perceived training need with knowledge and skill scores of 63.43 and 69.63 respectively. The third highest training need perception was in the area of harvesting and post harvest aspects with respective knowledge and skill scores of 61.77 and 64.88. The knowledge and skill scores in relation to other practices were nursery practices (59.05 and 65.38); improved varieties in vegetables (58.45 and 54.38); seed and sowing (57.74 and 54.82);

Table 5. Practice-wise training need of vegetable growers

Sl. No.	Practice	Training need index			Rank
		Knowledge	Skill	Mean	
1	Improved varieties	58.45	54.38	56.42	VI
2	Nursery practices	59.05	65.38	62.22	IV
3	Seeds and sowing	57.74	54.82	56.28	VII
4	Manures and manuring	63.43	69.63	66.53	II
5	Planting and after care	55.18	56.15	55.67	VIII
6	Plant protection	74.48	79.32	76.90	I
7	Irrigation	56.33	61.07	58.70	V
8	Harvest and post harvest aspects	61.77	64.88	63.33	III

irrigation (56.33 and 61.07) and planting and after care (55.18 and 56.15) respectively.

The farmer who takes up vegetable cultivation with a commercial orientation naturally expects maximum returns. On one hand, the yield is seriously limited by the high incidence of pests and diseases which results in the loss of crop substantially. On the other side, the toxic limits of insecticide application also pose serious concern to the farmer as many of the vegetables are consumed raw, and the consumers are now more concerned about vegetables in the market treated with pesticides. Thus, plant protection is both a 'push and pull' factor in commercial vegetable cultivation. Hence, the highest perception of training need in plant protection is quite understandable.

The perception of high training need in the area of plant protection is in conformity with the findings of Sastry (1970), Jha (1974), Sinha and Verma (1976), Chandrasekaran (1981), Alexander (1985) and Kankasabapathi (1988). The very definition of training as education for immediate use pinpoints the significance of the present finding. Plant protection aspects warrant highest attention by the farmers as control measures cannot be postponed without incurring loss. Such an exigency of the operation might have also influenced the respondents to rank plant protection as the area demanding the highest training need.

The average yield of vegetables in our State in 1990 as reported by the Directorate of Economics and Statistics is as low as 10 t/ha. One of the reasons attributed to low yield is inefficient use of manures and fertilizers by our farmers. It is likely that those farmers having concern for higher yield might have felt the necessity for efficient use of manures and fertilizers which had resulted in according much importance to the practice in terms of training need perception. Sathyanarayana and Bhaskaran (1971), Patil and Kale (1972), Sinha and Verma (1976), Anantharaman (1977), Mathiazhagan (1978) and Mathiazhagan and Singh (1986) had also indicated manuring as an important area of operation where high training need exists.

Harvesting and post harvest aspects perceived as the third important area, where the farmers expect training, points to the high loss incurred by the vegetable growers due to the perishable nature and bulkiness of the produce. No doubt, an effective training programme offering necessary information about correct stage of harvest of the produce and post harvest preservation techniques could be of real help to the farmers to gain better market prospects for their produce.

Another important area, where training need was reported, was nursery practices. Since the specific nursery practice requirements vary with the different types of vegetables, this was

not perhaps a particularly surprising result. Knowledge and skill-wise training need of the selected practices was outlined in Fig. 5.

3. Extent of adoption of improved vegetable cultivation practices

The data on extent of adoption of improved vegetable cultivation practices by the respondents is presented in Table 6. Based on mean and standard deviation of the adoption quotient values, the respondents were grouped into low, medium and high adopters. Farmers with adoption score less than 51.76 and more than 108.92 were grouped as low and high adopters, respectively. Medium adopters had adoption scores between 51.76 and 108.92. It was clear from the table that majority (82%) of the farmers were medium adopters. Only 8 per cent were low adopters, while another 10 per cent were high adopters. The results are diagramatically represented in Fig. 6.

The market-oriented cultivation necessitated the farmers to adopt improved practices that give better yields. However, adoption of such practices is related necessarily to the level of knowledge of farmers about the practices. The conviction about the relative advantage of practices is also of great relevance for adoption. However, these conditions need not always operate in the case of vegetable growers. The vegetable growers were supplied with certain critical inputs like seeds, fertilizers etc. through various schemes of the State Department of Agriculture and this might have motivated them to adopt those improved practices to some extent. In the light

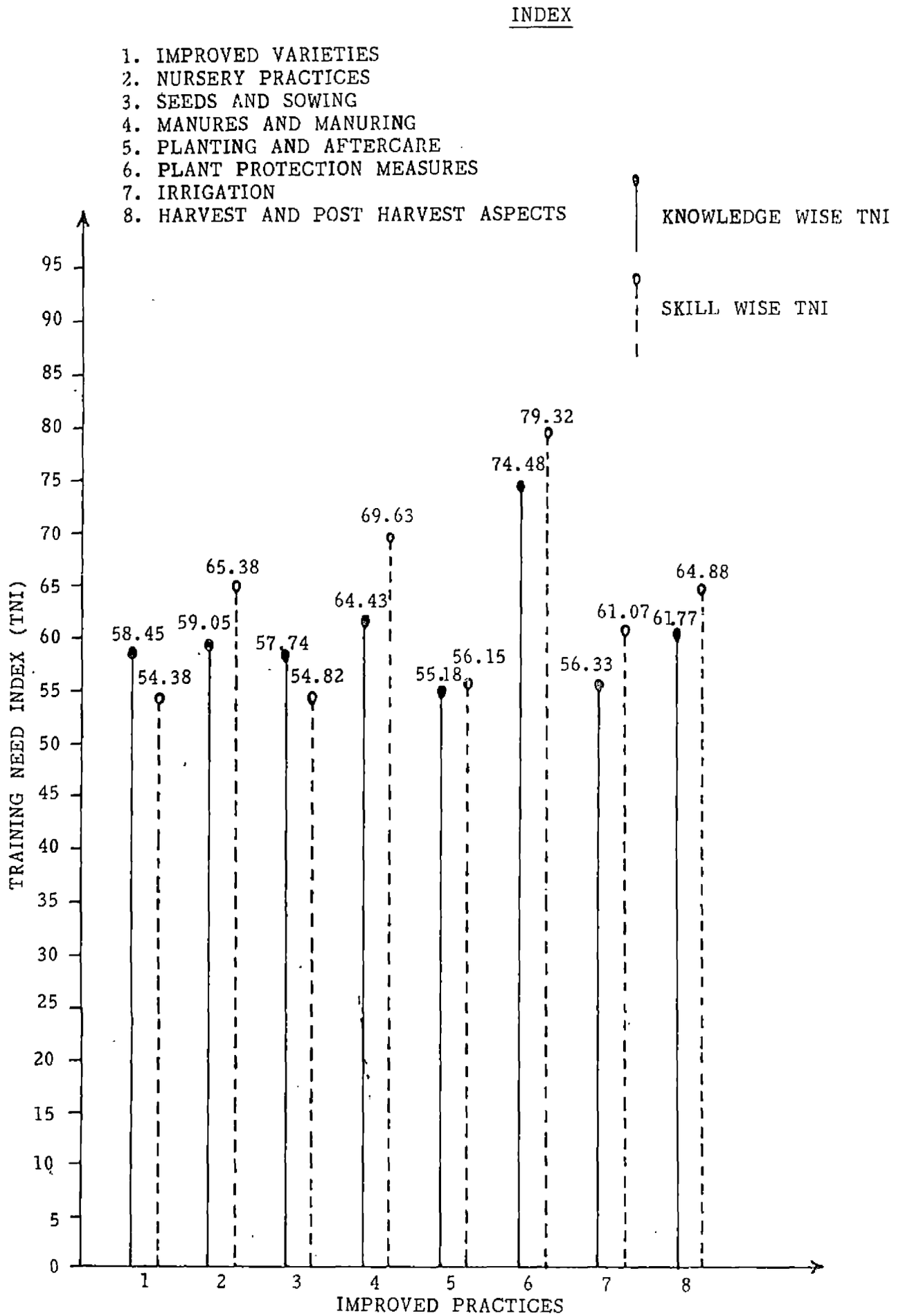

FIG. 5. DIAGRAM SHOWING THE OPERATION WISE TRAINING NEED OF COMMERCIAL VEGETABLE GROWERS

Table 6. Distribution of respondents on the extent of adoption of improved vegetable cultivation practices

Category	Adoption score	Frequency (%)
Low ($\bar{X}$ - S.D.)	Below 51.76	8.00
Medium ($\bar{X}$ ± S.D.)	51.76 to 108.92	82.00
High ($\bar{X}$ + S.D.)	Above 108.92	10.00
Total		100.00

$\bar{X}$ = 80.36 S.D. = 28.56

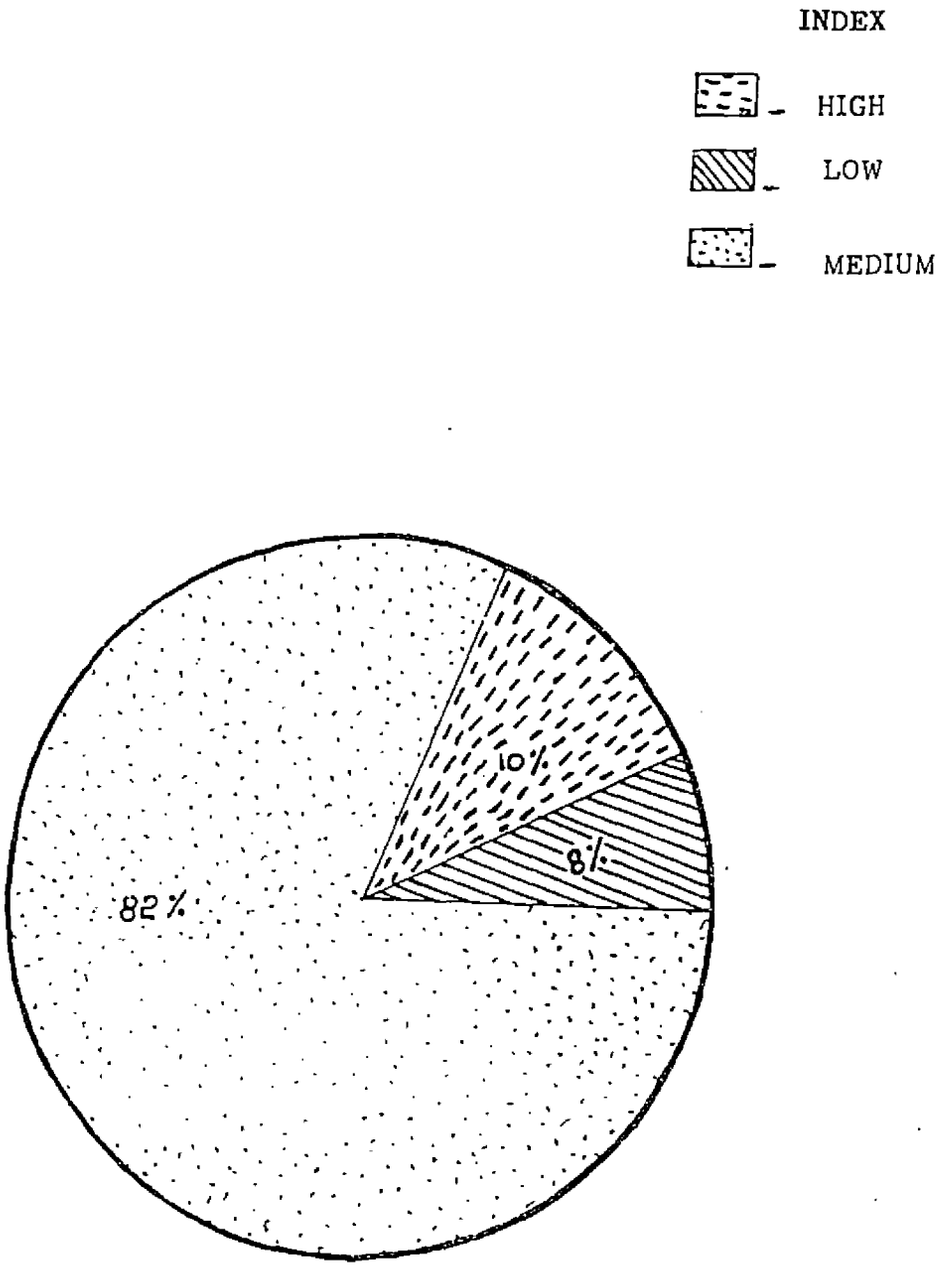

FIG. 6. DIAGRAM SHOWING THE EXTENT OF ADOPTION OF IMPROVED CULTIVATION PRACTICES BY COMMERCIAL VEGETABLE FARMERS

of these facts, the present finding was quite logical, as it was observed that majority of the vegetable farmers had also only medium level of knowledge.

The present result was in line with the findings of Godhandapani (1985), Chenniappan (1987) and Aziz (1988).

Practice-wise adoption of improved vegetable cultivation practices

The extent to which the selected six improved practices viz. adoption of HYVs, seed rate, spacing, fertilizer recommendations, intercultural operations and plant protection measures were adopted by the farmers are presented in Table 7 and diagramatically represented in Fig. 7.

The highest adoption was observed in the case of plant protection measures (120.13), closely followed by fertilizer application (113.14). Intercultural operations and spacing also obtained high A.Q. values of 94.31 and 90.15 respectively. The extent of adoption of recommended seed rate had a low A.Q. of 50.51. The lowest rate of adoption was reported in the case of improved varieties where A.Q. value was only 13.92.

The felt need of a farmer is the most persuasive factor which influences innovation decision process. This fact is seen reflected in the highest adoption of plant protection measures. The high incidence of pests and diseases occuring in vegetable cultivation might have

Table 7. Practice-wise adoption of improved vegetable cultivation practices

Sl.No.	Improved practices	Mean A.Q.
1	Use of high yielding variety	13.92
2	Recommended seed rate	50.51
3	Recommended spacing	90.15
4	Fertilizers	113.14
5	Intercultural operations	94.31
6	Plant protection	120.13

INDEX

1. IMPROVED VARIETIES
2. SEED RATE
3. SPACING
4. FERTILIZER
5. INTERCULTURAL OPERATIONS
6. PLANT PROTECTION MEASURES

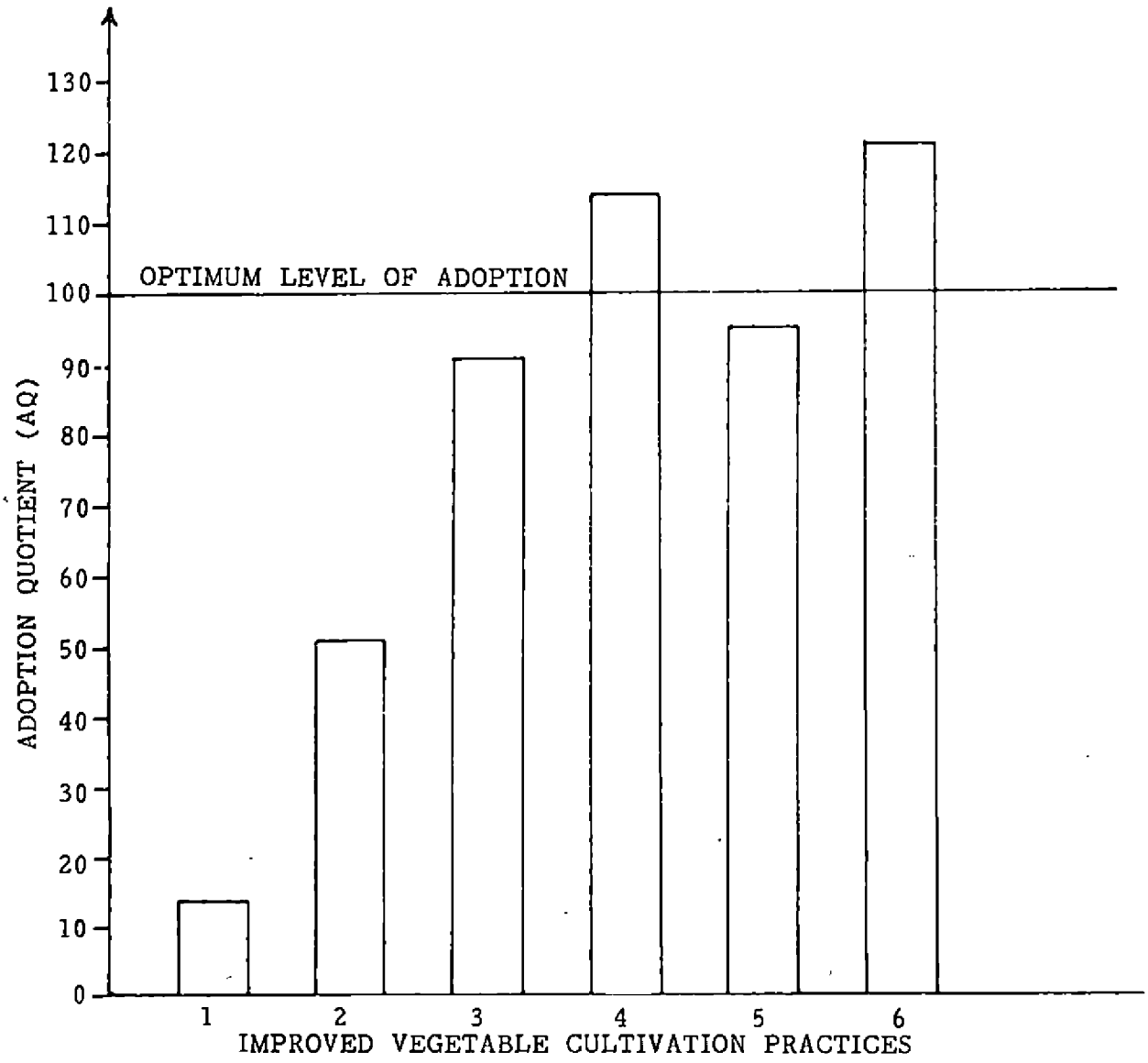

FIG. 7. DIAGRAM SHOWING PRACTICE WISE EXTENT OF ADOPTION OF COMMERCIAL VEGETABLE GROWERS

prompted the farmers to adopt plant protection measures to such an extent that in some cases, even dosages over and above the recommendations were adopted which ultimately resulted in the present finding.

The second highest extent of adoption was observed in fertilizer application, in which case excess adoption over and above the recommendation was observed in some cases. Since the farmers are quite concerned about higher yields as a result of application of fertilizers, probably the profit motive might have urged them to resort to excess application of fertilizers as an attempt to increase yield.

The adoption of intercultural practices viz. weeding, earthing up and irrigation generally neither incur any additional expenses nor require high technical support. The availability of family labour also facilitates the adoption of intercultural operations. Probably, nonavailability of water throughout the season only limits the intercultural operations, as the vegetables are cultivated allround the season by the commercial vegetable farmers.

The low extent of adoption of recommended spacing could be attributed to the tendency of farmers to accomodate as many plants as possible in a unit area with a view to obtain higher yields. The negative aspects of higher plant population in a unit area might not have been considered by farmers either due to ignorance or relatively

higher yields which they anticipate from higher plant density.

However, in the case of practices where availability and worth of inputs were of high consideration, as in the case of recommended seed rate and use of HYVs, the farmers were found to be low in the adoption of these practices.

The adoption of HYV seeds require access to many other inputs such as assured irrigation, plant protection and assured market. It may also involve risks because in the initial stages there is more uncertainty about its success Considering this fact, farmers come forward to adopt the recommended practices only if they are quite convinced about the results. Another major factor could be the lack of availability of HYV seeds which make the farmers use the available seeds at hand. These could be the probable reasons for the relatively low level of adoption of these practices.

4. Profile analysis of the respondents on selected independent variables

It was evident from Table 8 that maximum variation was observed in the case of land tenure status which obtained the highest coefficient of variation (CV) value of 176. The other variables with high CV values were indebtedness, area under vegetable cultivation, experience in vegetable cultivation and extension orientation. The high CV values indicated that there was large variation in the case of these variable in the sample selected for the study.

Table 8. Profile analysis of the respondents on selected independent variables

Sl. No.	Variable	Mean score	Above Mean Frequency (%)	Below Mean Frequency (%)	Coefficient of variation (CV)
1	Income from vegetable cultivation	5530	23.00	77.00	20.80
2	Total annual income	15460	39.00	61.00	25.60
3	Area under vegetables	0.79	34.00	66.00	108.00
4	Land tenure status	0.13	28.00	72.00	176.00
5	Experience in vegetable cultivation	12	44.00	56.00	88.90
6	Indebtedness	6135	29.00	71.00	165.00
7	Labour input	79.26	25.00	75.00	43.03
8	Cropping intensity	184.45	42.00	58.00	39.10
9	Irrigation potential	2.19	48.00	52.00	39.08
10	Education	3.99	64.00	46.00	37.30
11	Social participation	3.23	35.00	65.00	67.10
12	Economic motivation	4.19	43.00	57.00	42.90
13	Risk preference	24.45	59.00	41.00	21.30
14	Scientific orientation	28.50	55.00	45.00	42.00
15	Achievement motivation	19.68	52.00	48.00	12.70
16	Management orientation	11.87	53.00	47.00	19.50
17	Extension orientation	12.25	18.00	82.00	82.30
18	Information source utilisation	14.38	03.00	97.00	60.40
19	Personal guidance on scientific farming	20.36	46.00	54.00	40.80

The low CV values were noted in the case of achievement motivation, risk preference and income from vegetable cultivation. The low CV values reflect that there is relatively less variation in the distribution of these variables in the sample.

5. Correlation analysis between selected independent and dependent variables

5.1. Relationship between knowledge and selected independent variables

The results of correlation analysis showing the relationship between the level of knowledge of commercial vegetable growers and selected independent variables is furnished in Table 9.

Social participation, information source utilisation and training need were found to have positive and significant relation with the level of knowledge of commercial vegetable growers.

The table also revealed that income from vegetable cultivation, total annual income, area under vegetable cultivation, land tenure status, indebtedness, education, extension orientation and personal guidance on scientific farming were positively related to the level of knowledge of commercial vegetable growers, though not significant. Labour input was found to be negatively related with knowledge, which was also not significant. The other variables were found to have very low 'r' values.

Table 9. Correlation between level of knowledge and selected variables

Variable No.	Independent variables	Correlation coefficient (r)
X_1	Income from vegetable cultivation	0.1183
X_2	Total annual income	0.1333
X_3	Area under vegetables	0.1441
X_4	Land tenure status	0.1716
X_5	Experience in vegetable cultivation	-0.0001
X_6	Indebtedness	0.1488
X_7	Labour input	-0.1406
X_8	Cropping intensity	-0.0201
X_9	Irrigation potential	-0.0500
X_{10}	Education	0.1286
X_{11}	Social participation	0.2204
X_{12}	Economic motivation	0.0457
X_{13}	Risk preference	-0.0284
X_{14}	Scientific orientation	0.0557
X_{15}	Achievement motivation	0.0561
X_{16}	Management orientation	-0.0318
X_{17}	Extension orientation	0.1827
X_{18}	Information source utilisation	0.2956**
X_{19}	Personal guidance on scientific farming	0.1212
Y_2	Training need	0.1955*
Y_3	Extent of adoption	0.0214

* Significant at 5% level of significance
**Significant at 1% level of significance

Social participation is quite important in determining the individual cognition, wherein objects, situations and people are evaluated based on collective thinking. Moreover, greater involvement of farmers in various organisations will provide them with opportunity for better exposure to interpersonal channels of communication and innovative ideas which can be related in explaining the significant relation between knowledge and social participation. The finding is in conformity with the results of Kaleel (1978), Jayakrishnan (1984) and Baadgaonkar (1987).

In the present era of technological explosion, it is quite logical that a person who has better access to the different mass media and personal sources of information gain higher level of knowledge and hence the observed significant relation between information source utilisation and knowledge, which is supported by the results of Prakash (1980), Sushama et al. (1981), Wilson and Chaturvedi (1985) and Vijayan (1989).

Often it is the awareness of innovations that develops an eagerness among the farmers to know more about them. If a farmer was totally unaware of an idea, he could not be expected to develop interest and desire to know more about it and hence the observed significant relation between knowledge and training need.

It could be logically concluded that with increased income, the farmers had the resource potential to invest money on cultivation, which motivate them to acquire knowledge about improved vegetable cultivation practices and hence the observed positive relation between income from vegetable cultivation and level of knowledge is quite logical, which draws support from the findings of Godhandapani (1985).

A higher proportion of acreage under vegetable cultivation may necessitate the farmer to acquire more knowledge regarding improved practices in vegetable cultivation. However, this alone might not result in significant changes in the knowledge level of farmers as reflected in the finding. The result was in conformity with the observation of nonsignificant but positive relation between level of knowledge in vegetable cultivation and farm size by Shankariah and Singh (1967).

The observed relation between land tenure status and level of knowledge could be explained on the basis that farmers whether they cultivate in owned land or on leased-in land are primarily motivated by profit. To obtain higher yield and maximise income. it is likely that they attempt to gain more knowledge on improved cultivation practices. The finding draws its support from the results of Pillai (1983).

Many a time, it is the lack of financial resources to put new ideas into practice that alters the cognitive drive of farmers. If finance is assured, it is likely that the farmers will try to acquire more knowledge about scientific farming with a view to adopt the same. Those farmers who are indebted to some financial sources are more likely to pursue innovations in farming to obtain higher yields which could relieve them of their debt, viewed in this angle, the observed relation between knowledge and indebtedness is quite logical, which in conformity with the findings of Viju (1985).

Education in the present study related to the formal schooling of the farmers which necessarily provided them with required orientation to new developments in their field as is reflected in the observed positive trend between education and knowledge. The profile analysis of the respondents revealed that there was not much variation with respect to education and the lack of variability probably had resulted in the nonsignificant relationship between education and level of knowledge.

Contact with extension agents and involvement in extension activities result in exposure of farmers to improved technologies. As Rogers (1983) pointed out, the official change agents are important as a source or channel at the trial and implementation stage in the innovation - decision process. The farmers rely upon these agents

mainly for information on 'how to use' the technologies alone. As such, it is possible that 'what' knowledge and 'why' knowledge may not be obtained from them, for which, the farmer may depend on other sources of information. The nonsignificant relation between knowledge and extension orientation was thus justifiable The finding was in agreement with the results of Baadgaonkar (1987).

Personal guidance on scientific farming normally enhances the knowledge of farmers as indicated by the positive trend. However, it cannot be ensured that guidance is always obtained whenever needed. Moreover, it may not be possible that all the farmers in the sample could obtain uniform pattern of guidance as reflected in Table 8, wherein it was found that 54 per cent of the farmers obtained only below mean values for this variable, which might have resulted in nonsignificant relation between personal guidance and level of knowledge.

Because of the rising opportunity cost of labour, the increasing perennial nature of employment and the fact that labour in vegetable fields is less physically onerous and more technical in nature, the input of family labour ought have been more in vegetable cultivation. However, it was observed that commercial vegetable cultivation depends predominantly on hired labour. As the use of hired labour increases, the extent of use of family labour decreases.

As the personal and direct involvement of the farmer in cultivation gets reduced due to hired labour, the need to gain better knowledge on vegetable cultivation also becomes less as reflected in the negative relation between labour input and knowledge of improved practices.

The paradigm showing the relationship of selected variables with the level of knowledge on commercial vegetable growers is shown in Fig. 8.

5.2. Relationship between training need and selected independent variables

The results of correlation analysis between training need and selected in dependent variables is presented in Table 10.

The table revealed significant but negative relation between training need and extent of adoption of commercial vegetable growers. The results also revealed a positive relation between training need and economic motivation, risk preference, achievement motivation, management orientation, extension orientation and information source utilisation which, however, was not significant. The relation between training need and other variables can be treated as relatively unimportant considering the very low 'r' values.

Training need is, in fact, a reactive behaviour which is expressed in anticipation of a better performance whereas extent of adoption indicated the actual performance level. Once the performance

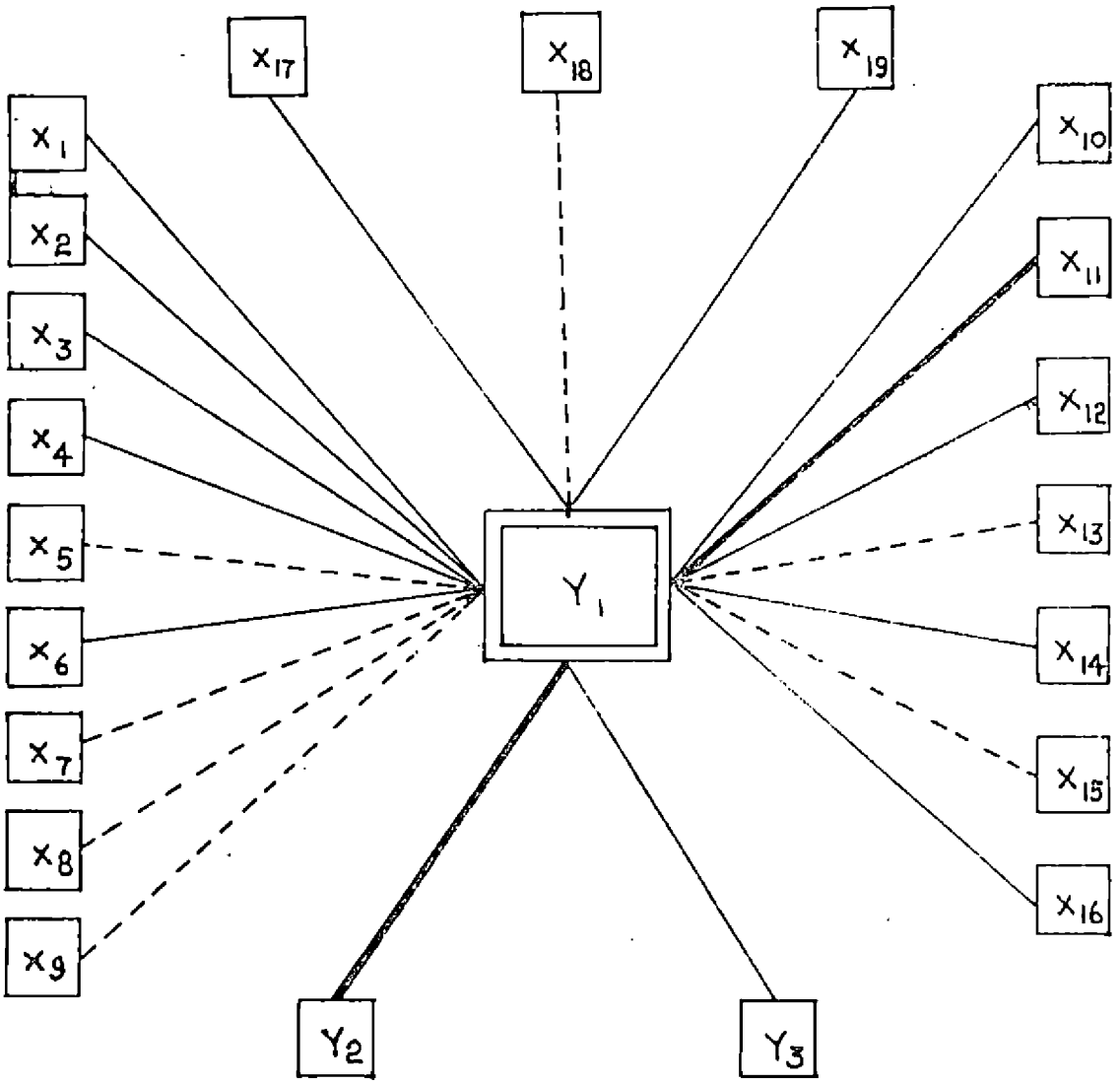

FIG. 8 PARADIGM SHOWING THE RELATIONSHIP OF SELECTED VARIABLES WITH THE LEVEL OF KNOWLEDGE

INDEX

X_1 INCOME FROM VEGETABLE CULTIVATION
X_2 TOTAL ANNUAL INCOME
X_3 AREA UNDER VEGETABLES
X_4 LAND TENURE STATUS
X_5 EXPERIENCE IN VEGETABLE CULTIVATION
X_6 INDEBTEDNESS
X_7 LABOUR INPUT
X_8 CROPPING INTENSITY
X_9 IRRIGATION POTENTIAL
X_{10} EDUCATION
X_{11} SOCIAL PARTICIPATION
X_{12} ECONOMIC MOTIVATION
X_{13} RISK PREFERENCE
X_{14} SCIENTIFIC ORIENTATION
X_{15} ACHIEVEMENT MOTIVATION
X_{16} MANAGEMENT ORIENTATION
X_{17} EXTENSION ORIENTATION
X_{18} INFORMATION SOURCE UTILISATION
X_{19} PERSONAL GUIDANCE ON SCIENTIFIC FARMING
Y_2 TRAINING NEED
Y_3 EXTENT OF ADOPTION
Y_1 LEVEL OF KNOWLEDGE

—— Positive nonsignificant relation
—— Positive significant relation
---- Negative nonsignificant relation

Table 10. Correlation between training need and selected variables

Variable No.	Independent variables	Correlation coefficient (r)
X_1	Income from vegetable cultivation	-0.0115
X_2	Total annual income	0.0610
X_3	Area under vegetables	0.0691
X_4	Land tenure status	0.0241
X_5	Experience in vegetable cultivation	-0.0394
X_6	Indebtedness	-0.0816
X_7	Labour input	-0.0429
X_8	Cropping intensity	-0.0761
X_9	Irrigation potential	0.0833
X_{10}	Education	0.0065
X_{11}	Social participation	0.0425
X_{12}	Economic motivation	0.1177
X_{13}	Risk preference	0.1061
X_{14}	Scientific orientation	0.0777
X_{15}	Achievement motivation	0.1360
X_{16}	Management orientation	0.1521
X_{17}	Extension orientation	0.1155
X_{18}	Information source utilisation	0.1784
X_{19}	Personal guidance on scientific farming	0.0837
Y_1	Knowledge level	0.0115
Y_3	Extent of adoption	-0.2274*

*Significant at 5% level of significance

94

level is high as indicated in a better level of adoption, the perceived training need would be naturally low. This simple logic was seen reflected in the observed negative relation between training need and extent of adoption.

Farmers with high economic motivation exhibit a better concern for innovations as reflected in the observed positive relation between economic motivation and training need. Though the mean economic motivation score of the sample was relatively high, majority (57%) of the respondents indicated values below the mean score (Table 8) which probably could explain the nonsignificant relation.

Uncertainty implies a lack of predictability of the structure of any information which is likely to influence the orientation of a farmer to innovations. Farmers with higher risk preference are prone to show positive attitude to new farming methods as is evident in the positive relation exhibited between risk preference and training need.

Higher levels of achievement motivation creates a desire in the farmers for better performance which motivate them to seek out information on method of scientific cultivation which is expressed in terms of training need. However, the low CV value (12.70) for achievement motivation in the sample as revealed in Table 8 probably explains the nonsignificant association between achievement motivation and training need.

A farmer who exhibits a high level of management orientation could be proficient in planning, production and marketing aspects of commercial cultivation. As such one cannot expect such a farmer to show a high training need on different aspects of vegetable cultivation. It was also observed that the coefficient of variation of management orientation for the sample was relatively low (Table 8) which might be another reason for the observed nonsignificant relation between management orientation and training need.

The extension functionaries mostly concentrate on providing 'how-to-knowledge' of information about the improved practices. The contact of farmers with extension functionaries and their participation in various extension activities will naturally enhance their curiosity to know more about the scientific practice which will be exhibited in a higher perception of training need.

In the present study, the majority of respondents had low level of extension orientation as could be observed from Table 8 and hence probably the observed nonsignificant relation between training need and extension orientation. The result is in agreement with the finding of Patel (1988).

Higher exposure of the farmers to various sources of information enhances their awareness about new developments in scientific cultivation which definitely contributes positively to training need perception of farmers. However, as revealed from Table 8, a large

majority (97%) of farmers had low mean scores on information source utilization and hence the observed nonsignificant association.

The paradigm depicting the observed relation between training need and other variables is shown in Fig. 9.

5.3. Relationship between extent of adoption and selected independent variables

The results of correlation analysis showing the relation between the extent of adoption of improved vegetable cultivation practices and selected variables are presented in Table 11.

Experience in vegetable cultivation, irrigation potential and level of knowledge about commercial vegetable cultivation were found to have positive and significant relation with the extent of adoption, while scientific orientation indicated negative but significant relation.

The table also revealed that there existed a positive relation between extent of adoption of improved practices and cropping intensity, social participation, economic motivation, achievement motivation and extension orientation, which were but nonsignificant.

Labour input, management orientation, income from vegetable cultivation, total annual income and area under vegetable cultivation were found negatively related with extent of adoption, though not significant. The other variables were found to have very low 'r' values.

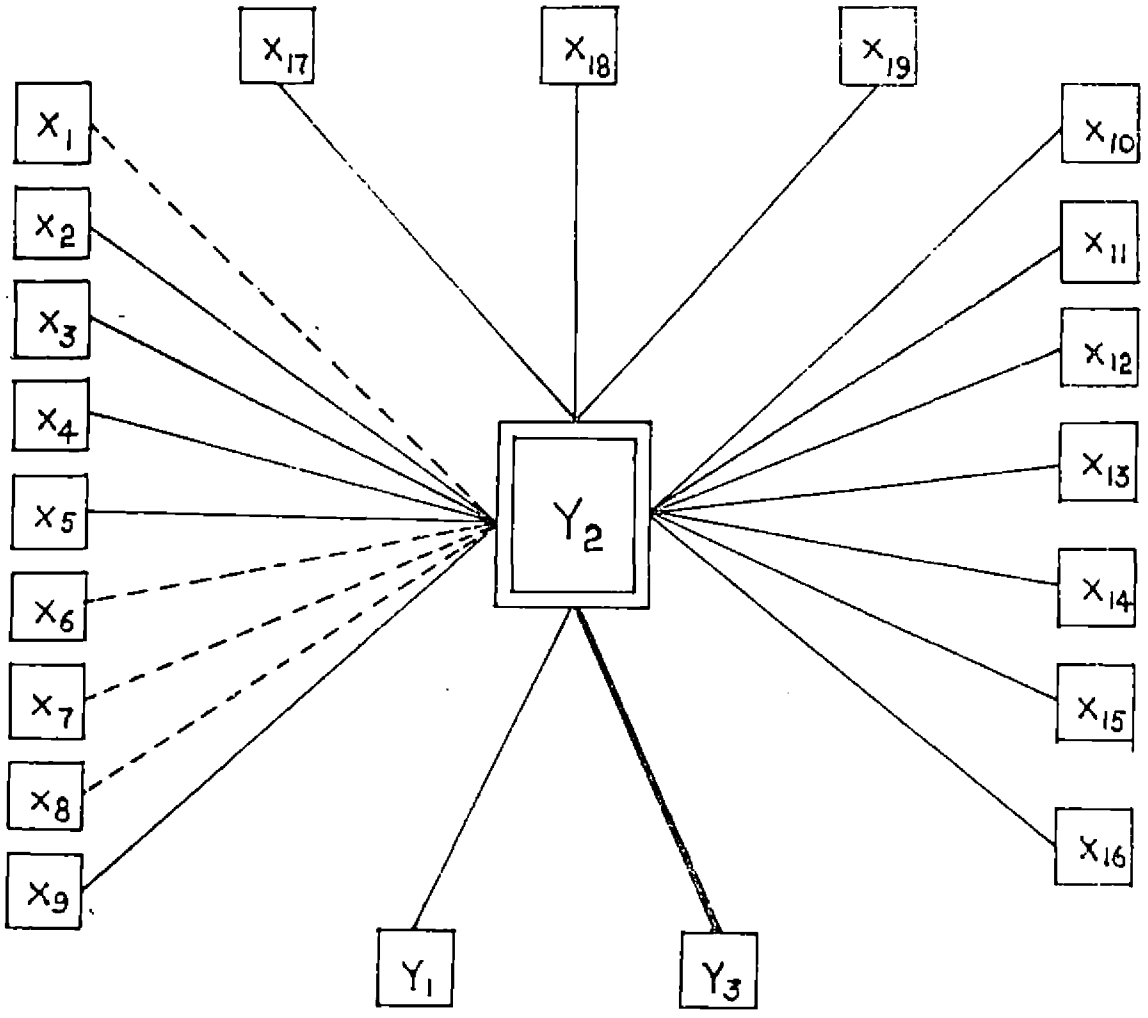

FIG. 9 PARADIGM REVEALING RELATION BETWEEN TRAINING NEED AND SELECTED VARIABLES

INDEX

X_1 INCOME FROM VEGETABLE CULTIVATION
X_2 TOTAL ANNUAL INCOME
X_3 AREA UNDER VEGETABLES
X_4 LAND TENURE STATUS
X_5 EXPERIENCE IN VEGETABLE CULTIVATION
X_6 INDEBTEDNESS
X_7 LABOUR INPUT
X_8 CROPPING INTENSITY
X_9 IRRIGATION POTENTIAL
X_{10} EDUCATION
X_{11} SOCIAL PARTICIPATION
X_{12} ECONOMIC MOTIVATION
X_{13} RISK PREFERENCE
X_{14} SCIENTIFIC ORIENTATION
X_{15} ACHIEVEMENT MOTIVATION
X_{16} MANAGEMENT ORIENTATION
X_{17} EXTENSION ORIENTATION
X_{18} INFORMATION SOURCE UTILISATION
X_{19} PERSONAL GUIDANCE ON SCIENTIFIC FARMING
Y_1 LEVEL OF KNOWLEDGE
Y_2 TRAINING NEED
Y_3 EXTENT OF ADOPTION

—— Positive nonsignificant relation
---- Negative nonsignificant relation
—— Negative significant relation

Table 11. Correlation between extent of adoption and selected variables

Variable No.	Independent variables	Correlation coefficient (r)
X_1	Income from vegetable cultivation	-0.1480
X_2	Total annual income	-0.1574
X_3	Area under vegetables	-0.1477
X_4	Land tenure status	-0.0256
X_5	Experience in vegetable cultivation	0.2557**
X_6	Indebtedness	0.0107
X_7	Labour input	-0.1551
X_8	Cropping intensity	0.1694
X_9	Irrigation potential	0.2629**
X_{10}	Education	0.0062
X_{11}	Social participation	0.1479
X_{12}	Economic motivation	0.1741
X_{13}	Risk preference	0.0419
X_{14}	Scientific orientation	-0.2209*
X_{15}	Achievement motivation	0.1766
X_{16}	Management orientation	-0.1783
X_{17}	Extension orientation	0.1626
X_{18}	Information source utilisation	0.0149
X_{19}	Personal guidance on scientific farming	0.0128
Y_1	Knowledge level	0.2110*
Y_2	Training need	-0.0113

* Significant at 5% level of significance
** Significant at 1% level of significance

The best conclusive evaluation of a new practice could be obtained from one's own direct experience with the same. The profile analysis of the respondents (Table 8) showed that the average farming experience for the sample was of twelve years. The benefits derived from adopting the improved practices might have made the farmers to adopt the practices without discontinuance. Hence the observed significant positive relation between farming experience and extent of adoption is quite natural and reasonable.

Inadequate facilities for irrigation pose an important impediment in the adoption of improved practices. The presence of well developed irrigational facilities had been indicated as a sufficient condition for the adoption of improved practices and hence the observed relation between irrigation potential and extent of adoption. The present finding was confirmed by the results of Nair (1974) and Mann (1989).

A higher level of knowledge on scientific cultivation makes the farmers to take positive decisions on adoption of improved practices as is evident from observed significant relation between adoption and level of knowledge.

The recent advances in the field of vegetable cultivation necessitates either complete withdrawal or modification of some of the earlier recommendations. For instance, the ban on use of certain plant protection chemicals and recommendations of lower levels of

dosages of plant protection chemicals suggest for changes in the package of practice recommendation. Eventhough the recommendations are withdrawn, some of the farmers may continue to use the same. This concept of over adoption given by Rogers and Shoemaker (1971), indicates the tendency of a farmer to continue the use of a practice when it was actually withdrawn. The commercial vegetable growers though might be aware of the changes suggested in the recommendations, continue to adopt earlier recommendations considering the benefits which they had obtained. In measuring extent of adoption, the latest package of practices recommendation was taken as the base. Viewed in this angle, it is probable that scientific orientation and extent of adoption were negatively related.

Intensive cultivation is an indicator of the high economic motive of the farmers which warranted for a higher adoption of improved scientific practices and hence the observed positive trend between cropping intensity and extent of adoption. In the present study, it was observed that some of the respondents practiced vegetable cultivation on a commercial basis in summer fallows of rice in leased-in land. Due to the presence of such farmers also in the sample, it was quite likely that cropping intensity and extent of adoption did not exhibit significant relationship.

Social participation denotes involvement of the farmers in various activities of different organisations, which provide them

with enough exposure to new developments in different fields which in turn serve as a sufficient condition for adoption of improved practices in farming indicating a positive trend between social participation and extent of adoption. It was seen that majority (65%) of the respondents in the study obtained social participation scores below the mean value (Table 8) and hence it was assumed that relation between social participation and extent of adoption was not significant. The present finding was supported by the finding of Bhaskaran and Thampi (1986) and Himantharaju (1988).

A farmer who invests money in farming will take into account the relative advantage that may occur when he adopts the improved agricultural practices. In other words, economic motive predominates in all their endeavours which results in a more cautions adoption of improved practices by them. Viewed in this perspective, the observed positive relationship between economic motivation and extent of adoption is understandable. However, since large number of respondents (57%) in the study were found to be below the mean value of economic motivation, (Table 8), a significant relation might not have resulted between economic motivation and extent of adoption.

Achievement motivation expresses an intrinsic value orientation that demands action for the sake of a sense of fulfilment. However, a significant relation cannot probably be expected when extrinsic motives predominate in the minds of farmers, especially

with enough exposure to new developments in different fields which in turn serve as a sufficient condition for adoption of improved practices in farming indicating a positive trend between social participation and extent of adoption. It was seen that majority (65%) of the respondents in the study obtained social participation scores below the mean value (Table 8) and hence it was assumed that relation between social participation and extent of adoption was not significant. The present finding was supported by the finding of Bhaskaran and Thampi (1986) and Himantharaju (1988).

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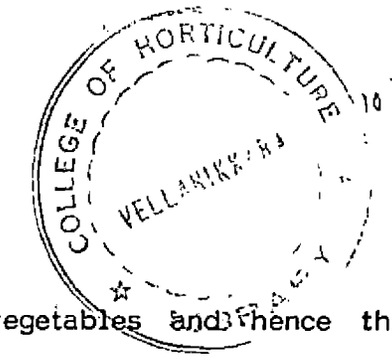

in the case of commercial cultivation of vegetables and hence the observed nonsignificant relation between achievement motivation and extent of adoption. The finding was in agreement with the observations of Naik (1988).

Extension education provides the farmers with functional and purposive information on scientific farming. This serves as a favourable condition resulting in adoption of improved practices as indicated by a positive relation between extension orientation and adoption. The profile analysis of the respondents reveals that a large majority of the respondents had low scores on extension orientation and hence probably the nonsignificant relation between the variables.

Most of the improved practices in vegetable cultivation like use of chemical fertilizers, plant protection chemicals etc. demand higher level of labour use. High labour charges and nonavailability of labour in time might have made the farmers reluctant to engage labour affecting the adoption of these practices. In other words, it could be noted that there was lower adoption for those practices which demand higher use of labour. The observed negative relation between labour input and extent of adoption of commercial vegetable growers is thus justifiable.

A higher level of management orientation implies a better involvement in activities related to planning, production and marketing

aspects of the enterprise. Adoption of improved practices relates only to the production aspects. Planning and marketing aspects have no relevance in measuring adoption, while these two aspects were also considered is measuring management orientation. Hence the observed negative relation between extent of adoption of improved practices and management orientation.

Mostly the farmers adopt improved vegetable cultivation practices for increased income. If they are well placed with sufficient income, there is chance for diversification of enterprises as a result of which they may not be able to pay undivided attention to the cultivation of vegetables. Probably, this might have resulted in low adoption and hence the negative relation between income from vegetable cultivation and adoption. The profile analysis of respondents revealed a very high average annual income and also income from vegetable cultivation for majority of the respondents which supported this observation. Karim and Mahbooh (1974) and Baadgaonkar (1987) also supported the obtained results.

A higher gross acreage under vegetables reflect higher dependence of the farmers on vegetable cultivation as an enterprise. The farmers may raise different vegetables in their fields to ensure higher income from this enterprise. There are possibilities of variations from the general recommendations for each specific type of vegetables. However, this factor was not taken into account in the measurement

of adoption which might have resulted in a negative relation between area under vegetable cultivation and adoption. This result was in agreement with the finding of Mann (1989).

The paradigm revealing the relationship of selected variables with extent of adoption of commercial vegetable growers is indicated in Fig. 10.

6. Intercorrelation among the independent variables

The intercorrelation matrix of the independent variables is presented in Table 12. Based on the matrix, the relative importance of each independent variable in relation to other variables was noted which is given in Table 13.

It was observed from Table 13 that Information source utilisation was related with maximum number (8) of other variables which revealed that it is the most important variable. The next two important variables in the order showing high intercorrelation with other variables were total annual income and irrigation potential.

Economic motivation and experience in vegetable cultivation did not indicate significant correlation with any of the independent variables. Land tenure status and scientific orientation were found related to only one variable. These variables could be considered unimportant when the interrelationship among the variables is considered.

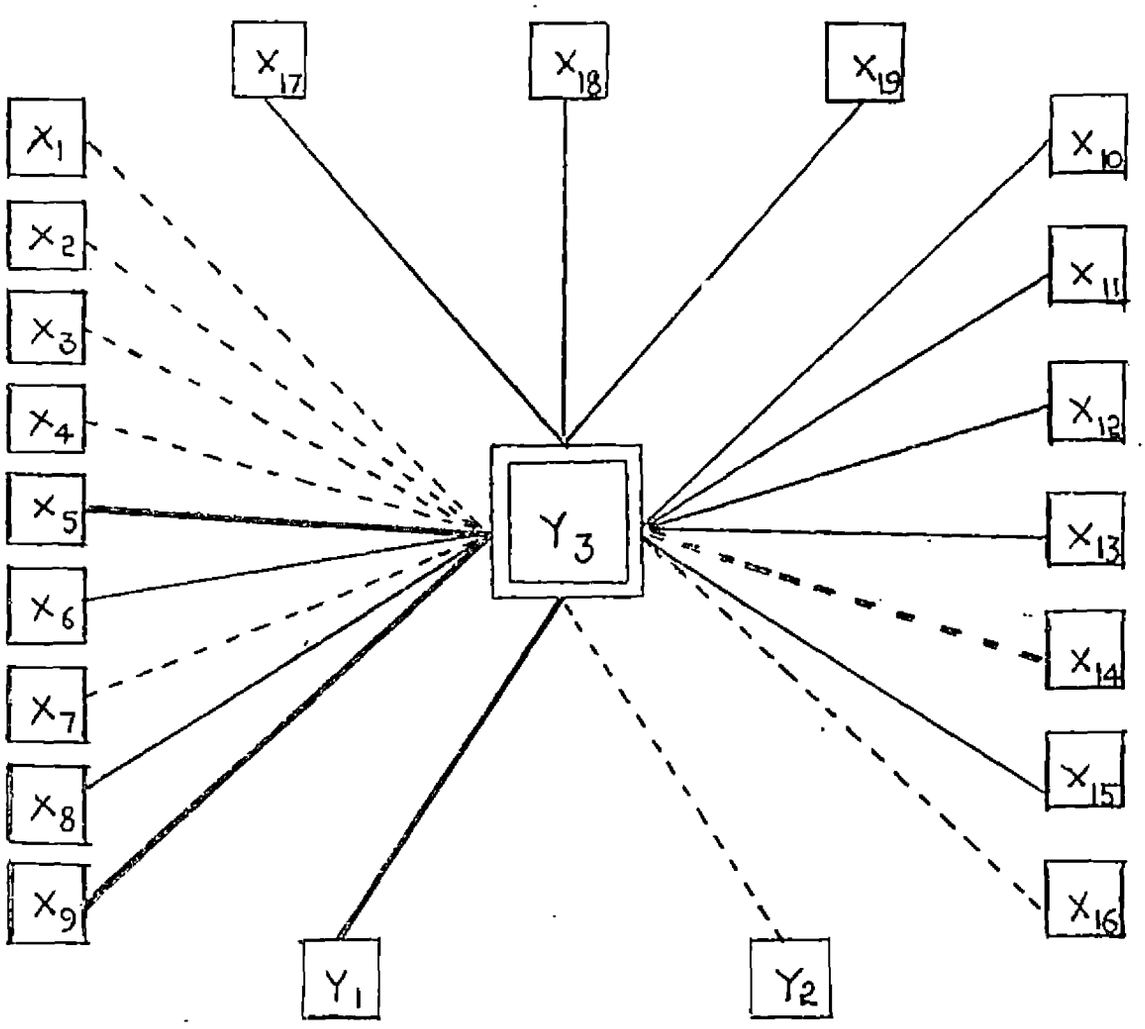

FIG. 10 PARADIGM REVEALING RELATION BETWEEN EXTENT OF ADOPTION AND SELECTED VARIABLES

INDEX

X_1 INCOME FROM VEGETABLE CULTIVATION
X_2 TOTAL ANNUAL INCOME
X_3 AREA UNDER VEGETABLES
X_4 LAND TENURE STATUS
X_5 EXPERIENCE IN VEGETABLE CULTIVATION
X_6 INDEBTEDNESS
X_7 LABOUR INPUT
X_8 CROPPING INTENSITY
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X_{15} ACHIEVEMENT MOTIVATION
X_{16} MANAGEMENT ORIENTATION
X_{17} EXTENSION ORIENTATION
X_{18} INFORMATION SOURCE UTILISATION
X_{19} PERSONAL GUIDANCE ON SCIENTIFIC FARMING

Y_1 KNOWLEDGE LEVEL
Y_2 TRAINING NEED
Y_3 EXTENT OF ADOPTION

---- negative nonsignificant relation
==== negative significant relation
____ positive nonsignificant relation
____ positive significant relation

Table 12. Inter Correlation Matrix of Independent Variables

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}
X_1	1.00	0.533**	0.604**	0.487**	0.0387	0.1291	0.103	-.064	-.229**	0.015	-.015	0.044	-.217*	0.039	-.076	0.045	-.070	0.064	0.079
X_2		1.00	0.368**	0.1350	-.084	0.389**	-.265**	0.026	-.007	0.321**	0.064	0.026	-.168	0.114	-.053	0.018	0.035	0.288**	0.217*
X_3			1.00	0.044	-.057	0.148	-.171	-.115	-.182	0.011	-.022	0.020	-.176	0.068	-.192	0.083	-.065	0.033	0.066
X_4				1.00	-.111	-.082	-.178	-.035	-.142	0.003	-.103	-.052	-.117	-.079	-.068	-.044	-.055	0.105	-.061
X_5					1.00	0.037	0.039	0.038	0.022	-.173	0.145	0.099	0.114	-.082	0.101	0.006	-.0101	0.043	0.0123
X_6						1.00	-.089	0.039	0.1970*	0.032	0.288**	-.066	0.019	0.107	0.053	-.160	0.208*	0.327**	0.327**
X_7							1.00	-.064	-.162	-.369**	-.107	-.048	0.128	0.153	0.062	0.096	-.111	-.230*	-.1064
X_8								1.00	0.3110**	-.055	0.067	-.065	0.119	-.237*	0.085	-.264**	0.206*	-.023	0.112
X_9									1.00	-.054	0.095	-.037	0.145	-.077	0.284**	-.263**	0.211*	0.217*	0.148
X_{10}										1.00	0.1804	-.083	-.189	0.102	0.052	0.100	0.159	0.339**	0.032
X_{11}											1.00	0.023	0.037	0.045	0.170	-.006	0.508**	0.331**	0.362**
X_{12}												1.00	0.088	-.029	-.086	-.032	-.008	0.012	0.044
X_{13}													1.00	-.048	0.252*	-.068	0.014	0.091	0.015
X_{14}														1.00	0.127	0.051	-.086	0.091	-.021
X_{15}															1.00	0.013	0.161	0.137	0.195*
X_{16}																1.00	0.057	-.071	0.091
X_{17}																	1.00	0.397**	0.597**
X_{18}																		1.00	0.3881**
X_{19}																			1.00

* Significant at 5% level of probability
**Significant at 1% level of probability

Table 13. Relative importance of independent variables in relation to other independent variables

	Variable	No. of variables with which significantly related			Rank
		At 1% level	At 5% level	Total	
1	Income from vegetable cultivation	4	1	5	VII
2	Total annual income	6	1	7	II
3	Area under vegetables	2	-	2	XII
4	Land tenure status	1	-	1	XV
5	Experience in vegetable cultivation	-	-	-	-
6	Indebtedness	4	2	6	IV
7	Labour input	2	1	3	XI
8	Cropping intensity	2	2	4	IX
9	Irrigation potential	4	3	7	III
10	Education	3	-	3	X
11	Social participation	4	-	4	VIII
12	Economic motivation	-	-	-	-
13	Risk preference	-	2	2	XIV
14	Scientific orientation	-	1	1	XVI
15	Achievement motivation	1	2	3	XII
16	Management orientation	2	-	2	XIII
17	Extension orientation	3	3	6	VI
18	Information source utilization	6	2	8	I
19	Personal guidence on scientific farming	4	2	6	IV

7. Relative importance of selected independent variables in explaining the dependent variables

Correlation analysis was useful only to find the association between the variables. Besides, an attempt was also made to know the relative importance of the different independent variables in explaining each of the dependent variables viz. level of knowledge, training need and extent of adoption of improved vegetable cultivation practices. The technique of step-wise regression analysis is useful to identify the best set of variables for predicting the dependent variable and elimination of unimportant variables at each step.

A. Step-wise regression analysis of level of knowledge on the selected independent variables

The results of the step-wise regression analysis of knowledge with the selected independent variables are presented in Table 14.

It could be seen from the table that variables included in the final step of the step-wise regression analysis were information source utilization (X_{18}), land tenure status (X_4), social participation (X_{11}) and area under vegetable cultivation (X_3) which explained 14.83 per cent of the variation. The final regression equation with all these four variables included was significant in prediction as indicated by F value (Table 15).

Table 14. Results of step wise regression analysis of level of knowledge with independent variables

Step No.	Variables entering regression		Partial regression 'b'	SE of b	F value	Percentage variation explained
I	X_{18}	Information source utilisation	2.1430	0.6997	9.3797	8.735
II	X_{18}	Information source utilisation	2.0350	0.6994	8.4658	10.737
	X_4	Land tenure status	13.9231	9.4411	2.1749	
III	X_{18}	Information source utilisation	1.6263	0.7394	4.8378	
	X_4	Land tenure status	16.1436	9.4684	2.9070	13.054
	X_{11}	Social participation	1.7225	1.0768	2.5590	
IV	X_{18}	Information source utilisation	1.5882	0.7361	4.6546	
	X_4	Land tenure status	15.6647	9.4265	2.7615	14.829
	X_{11}	Social participation	1.7661	1.0717	2.7153	
	X_3	Area under vegetable	3.5722	2.5381	1.9808	

Table 15. Analysis of variance of the final stepwise regression equation of level of knowledge with independent variables

Source of	df	Total sum of squares of original units	Mean sum of squares of original units	F
Total	99	52612.4382		
Regression	9	8129.0798	1625.8160	3.4356**
Residual	94	44483.3612	473.2272	

**Significant at 1% level of significance

The final regression equation is given below:

$$Y_1 = 30.5257 + 3.5722 *X_3 + 15.665 *X_4 + 1.766 *X_{11} + 1.588 *X_{18}$$

The partial regression coefficient indicated that unit increase in information source utilisation resulted in an increase of 1.588 units of level of knowledge. With a unit increase in status of land tenure, the level of knowledge of commercial vegetable growers increased by 15.665 units. Similarly, an increase of single unit in social participation recorded an increase of 1.766 units in the level of knowledge. With a similar unit increase in area under vegetable cultivation, the change observed in the level of knowledge was 3.572 units.

B. Stepwise regression analysis of training need with selected independent variables

The results of stepwise regression analysis as presented in Table 16 indicated that only two variables viz. information source utilisation and management orientation were significant which together explained 5.91 per cent of variation in training need (Table 17).

These variables indicated significant regression coefficients. The final regression equation given below was significant in predicting the training need (Table 17).

$$Y_2 = 53.185 + 0.4038 *X_{18} + 0.4908 *X_{16}$$

Table 16. Results of stepwise regression analysis of training need with independent variables

Step No.	Variables entering regression	'b' coefficient	SE of b	F value	Percentage variation explained
I	X_{18} Information source utilisation	0.3788	0.2110	3.2226	3.1837
II	X_{18} Information source utilisation	0.4038	0.2096	3.7102	
	X_{16} Management orientation	0.4908	0.2927	2.8115	5.9108

Table 17. Analysis of variance of final step-wise regression equation of training need with independent variables

Source of variation	df	Total sum of squares of original units	Mean sum of squares of original units	F
Total	99	4409197.6108		
Regression	6	95995.2926	15999.2160	4.3228**
Residual	93	344202.3515	3701.1005	

**Significant at 1% level of significance

A unit increase in information source utilisation accounted for a change of 0.4038 units in training need. Similarly, a unit change in management orientation indicated a change of 0.4908 units in training need.

When the farmers are exposed to more number of information sources, their awareness of innovations in the field of agriculture also increase. Continuous and simultaneous use of various information sources create a desire to know more about the relevant information provided, which in turn might have developed into training need.

With increase in management orientation, the farmers will be more concerned with planning, production and marketing aspects of cultivation and so naturally an increase in training need in these areas can be expected.

C. Step-wise regression analysis of extent of adoption with selected independent variables

A clear idea of the variables which significantly influence the extent of adoption of commercial vegetable growers could be obtained from Table 18.

The step-wise regression included five independent variables in the final significant step viz. irrigation potential, experiences in vegetable cultivation, scientific orientation, economic motivation and achievement motivation. These together explained 20.50 per cent of the variation with the F value being significant (Table 19).

Table 18. Results of stepwise regression analysis of adoption with the independent variables

Step No.	Variables entering regression		'b' coefficient	SE of b	F value	Percentage variation explained
I	X_9	Irrigation potential	20.361	7.5481	7.2763	6.912
II	X_9	Irrigation potential	19.932	7.3298	7.3949	13.158
	X_5	Experience in vegetable cultivation	1.562	0.5912	6.9771	
III	X_9	Irrigation potential	18.864	7.2472	6.7751	
	X_5	Experience in vegetable cultivation	1.4701	0.5847	6.3212	16.459
	X_{14}	Scientific orientation	-6.421	3.2961	3.7943	
IV	X_9	Irrigation potential	19.364	7.1855	7.2627	
	X_5	Experience in vegetable cultivation	1.374	0.5821	5.5736	18.872
	X_{14}	Scientific orientation	-6.284	3.2663	3.7017	
	X_{12}	Economic motivation	5.670	3.3739	2.8243	
V	X_9	Irrigation potential	16.3059	7.4825	4.7489	
	X_5	Experience in vegetable cultivation	1.2764	0.5835	4.7846	
	X_{14}	Scientific orientation	-7.0294	3.2945	4.5526	20.501
	X_{12}	Economic motivation	6.0759	3.3702	3.2501	
	X_{15}	Achievement motivation	3.5684	2.5708	1.9267	

Table 19. Analysis of variance of final step-wise regression equation of adoption with independent variables

Source of variation	df	Total sum of squares of original units	Mean sum of squares of original units	F
Total	99	4510.7183		
Regression	3	339.0336	113.0112	2.6006**
Residual	96	4171.6852	43.4551	

**Significant at 1% level of significance

The final regression equation predicting the extent of adoption of improved practices by vegetable growers is given below:

$$Y_3 = -23.369 + 16.306^*X_9 + 1.276^*X_5 - 7.029^*X_{14} + 6.0761^*X_{12} + 3.568^*X_{15}$$

The partial regression coefficient indicated that unit increase in irrigation potential produced an increase of 16.306 units in their level of adoption. Unit increase in experience in vegetable cultivation, economic motivation and achievement motivation produced an increase of 1.276, 6.076 and 3.568 respectively in their level of adoption. However, with unit increase in scientific orientation, the extent of adoption of commercial vegetable growers recorded a decrease of 7.029 units.

The results of regression analysis indicated that the highest change in extent of adoption was recorded with change in irrigation potential. Irrigation potential represents the most conducive factor in the adoption of improved practices and hence increase in irrigation potential can bring about higher extent of adoption. The second influential variable bringing highest change in extent of adoption was economic motivation. Being commercial vegetable growers, their prime motive will be to maximise profit. Hence it is natural that increase in economic motivation can bring corresponding change in their extent of adoption. Though to a lower level, experience in vegetable cultivation and achievement motivation also produced significant changes in extent of adoption.

However, with unit increase in scientific orientation, the extent of adoption indicated a decline. This might be due to the simple reason that, advances in scientific vegetable cultivation advocate for organic farming without the use of inorganic chemicals. Hence with unit increase in scientific orientation, the expected extent of adoption might have shown a corresponding decrease.

8. Constraints perceived by farmers in commercial vegetable production

An attempt was made to identify the constraints perceived as important by the farmers in the commercial vegetable cultivation.

The major coonstraints experienced by the farmer are presented in Table 20. These constraints were ranked based on the severity with which they were felt by farmers as indicated by them.

Increased cost of plant protection chemicals was reported by 98 per cent of the respondents as the most important constraint. Eighty eight per cent of the farmers pointed out 'inadequate market facilities' as the next important constraint 'Poor storage and other post harvest facilities', 'inadequacy of capital', ''high labour charges' and 'water scarcity' were the other constraints in the order of importance as reported by 74, 72, 70 and 59 per cent of the farmers respectively. The ranks obtained by other constraints are shown in the Table 20.

Table 20. Constraints regarding the adoption of improved practices by commercial vegetable growers

(n = 100)

Sl. No.	Constraints	Frequency (%)	Rank
1	Poor storage and other post harvest facilities	84.00	III
2	Lack of knowledge about scientific vegetable cultivation	40.00	IX
3	Uneconomic holding size	41.00	VIII
4	Inadequacy of capital	72.00	IV
5	Non-availability of supply and services	10.00	XIV
6	Inadequate guidance by extension personnel	26.00	XI
7	Non-availability of labour	28.00	X
8	Inadequate market facilities	88.00	II
9	Water scarcity	59.00	VI
10	Low price for the produce	48.00	VII
11	Non-availability of PP equipments	18.00	XIII
12	Non-availability of credit	19.00	XII
13	High labour charges	70.00	V
14	Increased cost of PP chemicals	98.00	I

Incidence of pests and diseases seriously limit vegetable production. The high incidence of pests and diseases prompts for repeated and intensive use of plant protection chemicals in vegetables. This trend was also observed in the high extent of adoption, reported in plant protection measures. This could have prompted them to perceive the high cost of plant protection chemicals as an important constraint.

In the case of commercial cultivation of vegetables, market demand and marketing facilities decide the income of farmers from vegetable cultivation. A majority (88%) of the farmers perceived inadequate marketing facilities as an important constraint experienced by them. It was observed that the maximum sales of vegetables was through local market or through intermediaries which reduced the profit of seller to low level. Organising collective sales of vegetables through regulated markets can overcome this problem.

The perishability and low keeping quality of vegetables warrant for immediate local disposal of the produce even at low prices. The urgency of the need to overcome these problems by the farmers was also reflected in a high training need. A vegetable processing centre set up on collective basis after analysing the demand for processed vegetables would be a workable solution to overcome this constraint.

Majority of improved practices in commercial vegetable cultivation are capital intensive. This was reflected in the constraint

'inadequacy of capital' prceived as important by the farmers. This also reflects on the lack of incentives provided specifically for the improvement of vegetable cultivation. The financial institutions may consider this and offer suitable incentives for encouraging vegetable cultivation on a commercial scale.

'High labour charges' was ranked an important constraint in vegetable production. Most of the operations in vegetable cultivation demand intensive use of labour involving heavy expenditure. A group approach in vegetable cultivation could be tried which can help in considerably reducing the expenditure on labour as has been reported in the case of rice cultivation now being implemented in the State.

From the Table it could also be observed that water scarcity was reported as an important constraint in successful vegetable production. In some areas under the study, it was the nonavailability of water that forced the farmers to limit vegetable cultivation to a single season when water was available, though vegetables are cultivated in other areas throughout the year with great difficulty in irrigating the crop. This fact magnifies the importance of assured irrigation in adopting improved practices in vegetable cultivation. It is suggested that measures may be taken to popularise river bed cultivation of vegetables and improve minor irrigation facilities by way of construction of check dams, ponds etc.

Low price of the produce, which undermine all efforts in successful vegetable production was recorded as an important constraint. It might be attributed to the inherent characteristics of the produce. Organised marketing system like establishment of co-operative vegetable marketing societies will be of much help to overcome this crucial constraint. A better know-how on the correct stage of harvest and infrastructural support in the form of establishing cold storages could also possibly increase the bargaining power of vegetable growers.

The next major constraint was the uneconomic size of holding which is felt by those who cultivate vegetables in their own land. A large number of farmers practice cultivation of vegetables on a commercial scale on leased-in lands. The short duration of the crop favoures the use of leased-in lands for its cultivation. However, cultivation in leased-in lands probably restrict the farmers in adopting improved practices which foster sustainability of the land and soil. Such farmers are more likely to adopt practices which give them immediate returns exploiting land as a resource.

Lack of knowledge about scientific vegetable cultivation was also assigned an important rank in the constraint hiearchy. The lack of organised attempts to provide technical support to the farmers on specific crop enterprise might be the reason for this.

The other constraints, in the order of their importance were, nonavailability of labour, inadequate guidance by extension personal, nonavailability of credit, nonavailability of plant protection equipments and nonavailability of supply and services. However, these were assigned only lower ranks by the farmers.

Summary and Conclusion

CHAPTER V
SUMMARY AND CONCLUSION

Kerala represents a potential cultivation tract for vegetables with its favourable agroclimatic and edaphic conditions. Still, the State cannot meet the requirements for vegetables based on internal production. Kerala procures vegetables from the neighbouring state of Tamil Nadu to meet her requirements. Considering this state of affairs, the Government of Kerala had evolved programmes to intensify vegetable production in the State. There were no research studies undertaken to analyse the nature and extent of adoption of improved practices by the vegetable farmers. Against this back ground, the present study was undertaken with the following specific objectives.

1. To measure the knowledge of the commercial vegetable growers on improved practices of vegetable cultivation.
2. To identify the training needs of the commercial vegetable growers in vegetable cultivation.
3. To study the extent of adoption of improved practices in vegetable cultivation by commercial vegetable growers.
4. To identify the relationship of the level of knowledge, training need and extent of adoption with agro-economic, socio-psychological and extension-communication variables of the farmers.

5. To study the constraints, if any, in the commercial production of vegetables.

The study was conducted during 1991 in the Ollukkara Block of Thrissur district where vegetable cultivation is practised on a commercial scale in certain pockets. Two panchayats namely Puthur and Pananchery were selected for the study. 60 and 40 vegetable farmers respectively were selected at random based on the area under vegetable cultivation from the two selected panchayats to constitute a sample of 100 respondents.

The dependent variables used in this study were level of knowledge on improved practices of vegetable cultivation, training need and extent of adoption of improved practices on vegetable cultivation. Annual income, area under vegetables, land tenure status, experience in vegetable cultivation, indebtedness, labour input, cropping intensity and irrigation potential were the independent variables included under agro-economic variables, whereas education, social participation, economic motivation, risk preference, scientific orientation, achievement motivation and management orientation were included under socio-psychological variables. The extension communication variables included were extension orientation, information source utilisation and personal guidance on scientific farming.

The level of knowledge was measured using a standardised test developed following the procedure adopted by Khuspe (1970) Lokhande (1973) and Viju (1988). Training need was measured following the procedure developed by Kanakasabapathi (1988) and the extent of adoption of improved practice in vegetable cultivation was quantified using the adoption quotient scale suggested by Singh and Singh (1974) which was based on the scale originally developed by Chathopadhyay (1963).

The training need was assessed in relation to the improved varieties in vegetables, nursery practices, seeds and sowing, manures and manuring, planting and after care, plant protection measures, irrigation and harvesting and post-harvest aspects.

The recommended practices selected for measuring the extent of adoption were use of High Yielding varieties, recommended seed rate, recommended spacing, fertilizer recommendation, inter cultural operation and plant protection measures.

The independent variables were quantified using already available scales or following established procedures.

The data were collected by conducting personal interview with the respondents using well structured and pretested schedule. Percentage analysis, zero order correlation and stepwise regression analysis were employed for analysing the data.

The salient findings of the study were:-

1. Majority (67%) of commercial vegetable growers had medium level of knowledge on improved vegetable cultivation practices.

2. Majority (70%) of farmers had medium level of training need perception in improved vegetable cultivation practices. The highest level of training need was perceived in the area of plant protection measures followed by manures and manuring.

3. A large majority (82%) of farmers had medium level of adoption of selected improved practices in vegetable cultivation. Among the practices selected, plant protection measures recorded the highest level of adoption closely followed by fertilizer application.

4. Social participation, information source utilisation and training need recorded significant positive relation with level of knowledge.

5. Extent of adoption had significant relation with training need.

6. Experience in vegetable cultivation, irrigation potential and level of knowledge had significant positive association with extent of adoption of improved vegetable cultivation practices. Extent of adoption and scientific orientation indicated a significant negative relation.

7. The results of stepwise regression analysis indicated that information source utilisation, land tenure status, social participation and area under vegetable cultivation contributed significantly to the level of knowledge.

8. Information source utilisation and management orientation were found to contribute significantly to the training need as revealed in the stepwise regression analysis.

9. The results of stepwise regression analysis indicated that irrigation potential, experience in vegetable cultivation, scientific orientation, economic motivation and achievement motivation contributed significantly to the extent of adoption of commercial vegetable growers.

10. High cost of plant protection chemicals, inadequate markets, storage and post harvest facilities were the important constraints experienced by the commercial vegetable growers.

Implications of the study

The study conclusively proved that plant protection aspects form the most decisive factor in commercial vegetable cultivation as was evident from the training need assessment and higher level of adoption. Therefore, every effort should be made to realign the training programmes in vegetable cultivation highlighting the plant protection aspects. The recent trends in control of pests and diseases with minimum use of pesticides focussing an integrated pest management may be covered in such trainings. The results of constraint analysis also pointed out the need for improvements to be made in the area of plant protection, where at present the practice of higher

use of insecticides incurring high cost to the farmers prevail. The supply and service system have to be geared to meet the requirements of the farmer.

Suggestions for future research

The present study had considered adoption of practices of vegetables in general. But, several differences in cultivation practices do exist among the different specific types of vegetables. In order to make the study more objective, it would be more appropriate if adoption is studied for the different types of vegetables separately.

Many of the variables included in the present study could not explain significant relationship with the dependent variables as observed from correlation and step-wise regression analyses. Hence it is suggested that a more comprehensive study may be undertaken including more new and relevant variables.

The study was confined to two Panchayats and did not cover a cross-section of the vegetable growers in the State. A comprehensive study covering important vegetable tracts in the State representing a cross-section of commercial vegetable cultivators may be undertaken to draw more reliable and valid generalisation.

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* Originals not seen

Appendices

APPENDIX-IA

Items for the development of knowledge test of

Improved Practices in Vegetable Cultivation

Sl.No.	Items	Response
1	Transplanting is generally followed in Solanaceous vegetables	Correct/Incorrect
2	Priya provides good quality of marketable bittergourd	Yes/No
3	Mosaic disease is an important problem in pumpkin cultivation	True/False
4	Give the name of pesticide which is largely used in vegetable crops _____	Correct/Incorrect
5	Planting of vegetables in pits/trenches during summer season helps in conserving moisture	Yes/No
6.	_____ is a recommended variety of cucumber	Correct/Incorrect
7	Little leaf is a common viral disease of chilli	True/False
8	For tomato irrigation should be given in alternate days especially during the fruiting period	Yes/No
9	Shakti is a tomato variety resistant to bacterial wilt	True/False
10	The recommended seed rate for chilli is _____ kg/ha	Correct/Incorrect
11	Rotten fruits seen on brinjal is mainly due to the disease Phomopsis blight	Yes/No

12	Chikurmanis is a fruit vegetable	Correct/Incorrect
13	Kannara local is a recommended variety of Red amaranth	True/False
14	Ambili variety of pumpkin gives small size fruits with good market value	Yes/No
15	Foliar spray of 1% urea after each harvest give higher yield in Amaranth	True/False
16	Recommended seed rate for Bitter gourd is _____	Correct/Incorrect
17	High use of PP chemicals is recommended in leafy vegetables	True/False
18	Fruit flies are the most common pests of bitter gourd	True/False
19	Pusa Sawani is a recommended variety of Bhindi	True/False
20	The Vector of yellow vein mosaic in cucurbits is _____	Correct/Incorrect
21	Give the name of a fungicide used for soil drenching in vegetable nursery	Correct/Incorrect
22	Application of PP chemicals during flowering period increase yield in vegetables	True/False
23	Raising seedling in polybags is a new method in successful curcurbit cultivation	True/False

APPENDIX-IB

Difficulty Indices and Discrimination Indices of the items of Knowledge Test

Sl.No. of of Items	Frequencies of correct answers given by each group of respondents (N = 10 for each G_1	G_3	Total frequencies of correct answers N = 30	Difficulty Index (P)	Discrimination Index ($E^{1/3}$)
1	10	9	19	63.33	0.10
2	5	1	6	20.00	0.40
*3	10	5	15	50.00	0.50
*4	10	5	15	46.66	0.50
5	10	9	19	63.33	0.10
6	0	0	0	0	0
*7	10	4	14	46.66	0.60
8	10	10	20	66.66	0
9	0	0	0	0	0
10	0	0	0	0	0
*11	9	1	10	33.33	0.80
12	10	10	20	66.66	0
13	0	0	0	0	0
14	3	0	3	10.00	0.30
15	3	1	4	13.33	0.20
16	0	0	0	0	0
17	3	3	6	20.00	0
18	10	9	19	63.33	0.10
19	0	0	0	0	0
*20	6	1	7	23.33	0.50
21	3	2	5	16.60	0.10
22	2	1	3	10.00	0.10
*23	9	1	10	33.33	0.80

* Items selected for the test

APPENDIX-II

INTERVIEW SCHEDULE

Respondent No. Panchayat:

1. a) Name of the respondent

   b) Address

2. A. Annual Income:

   a) From Agricultural sources

   b) From other source (specify)

   Total income

   B. Income from vegetable cultivation

3. Farm size

	Area (acre)	Area under vegetable (acre)
1. Owned land		
a. Wet land		
b. Garden land		
2. Leased in Land		
a. Wet land		
b. Garden land		
Total		

4. Indebtedness:

1. Have you borrowed to meet cultivation expenses: Yes/No

If yes, indicate the sources

a) Private individuals

b) Co-operative Society

c) Commercial Banks

c) Private Banks

e) Others (Specify)

(ii) When did you borrow? (specify the period)

(iii) Amount of loan taken

(iv) Period of repayment

(v) a) Amount repaid

b) Amount outstanding

5. Labour input

Operation	Family labour		Hired labour		Total	
	M	F	M	F	M	F
1. Preparation of land						
2. Sowing/planting						
3. Manuring and fertilizer application						
4. Weeding and intercultural operation						
5. Application of PP chemicals						
6. Harvesting						

6. Cropping Intensity

How many crops do you raise in an year? give details

a) Wet land	(b) Dry land
1. Single/Double/Trible cropped	1. Single/Double/More than 2 crops or crop combination
2. Specify (crop sequence)	2. Specify (crop sequence)

7. Irrigation potential

A. Source of Irrigation	Period of water availability			Area irrigated (ha)	Crop irrigated
	Throughout the year	Only during seasons	Irregular availability		
1. Tank					
2. Well					
3. Canal					
4. River					
5. Others (specify)					

B. Method of Irrigation followed:

1) Channel irrigation

2) Sprinkler irrigation

3) Drip irrigation

4) Pot irrigation

8. Availability of farm inputs

Items	Availability of inputs					
	Adequacy			Periodicity		
	Adequate	Moderate	Inadequate	Always	Seasonal	Occasional
1. Seeds						
2. Fertilizers						
3. PP chemicals						
4. Equipments and tools						

9. i) Farming experience

   a) Your experience in farming (years)

   b) Since how many years you are growing vegetables in your land?

   c) Since when you are growing vegetables for commercial purpose?

  ii) Socio-psychological variables

      1. Education

         1. Illiterate
         2. Can read only
         3. Can read and write
         4. Primary school
         5. UP school
         6. High school
         7. PDC or equivalent
         8. Graduate and above

2. Social participation

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

Organisation	Member	Office bearer
i) Panchayat		
ii) Co-operative Society		
iii) Radio Rural Forum		
iv) Young farmers club		
v) Vegetable growers association		
vi) Others (specify)		

b. If you are a member, how frequently you attend ~~its~~ its meeting and other activities

i) Regularly attend

ii) Occasionally attend

iii) Never attend

3. Economic motivation

Below are given 3 sets of statements. From each set select 2 statements, one 'most like' and other 'least like'

I. a) All I want from my farm is to make just a reasonable living for the family

b) In addition to making reasonable amount of profit the enjoyment in farming life is also important for me

c) I would invest in farming to the maximum to gain large profits

II. a) I would not hesitate to borrow any amount of money in order to run the farm properly

b) Instead of growing new cash crops which cost more money I follow routine farming practices

c) It is not only monetary profit but also the enjoyment of work done which gives me satisfaction for my hard work in the farming

III. 1. I hate to borrow money on principles even when it is necessary for properly running the farm

2. My main aim is maximising monetary profit in farming by growing cash crops in comparison to growing of crops which are simply consumed by my family

3. I avoid excessive borrowing of money for farm investment

4. Risk preference

Please give your degree of agreement for the following statements

1. A farmer should resort to multiple cropping to avoid greater risk involved in growing a single crop
SA/A/UD/DA/SDA

2. A farmer should rather take more of a chance in making a big profit than to be content with a similar but less risky profits.
SA/A/UD/DA/SDA

3. A farmer who is willing to take greater risks than the average farmer, usually does better financially.
SA/A/UD/DA/SDA

4. It is good for a farmer to take risks when he knows his chance of success is fairly high.
SA/A/UD/DA/SDA

5. It is better for a farmer not to try new farming unless most others have used them with success.
   SA/A/UD/DA/SDA

6. Trying an entirely new practice in farming by a farmer involves risks but it is worth it.
   SA/A/UD/DA/SDA

5. Scientific orientation

Please give your agreement/disagreement with the following statements

1. New method of farming give better results to a farmer than old methods.

2. The way of farming by traditional method is still the best way to farm

3. Even a farmer with lot of farm experience should use new methods of farming

4. A good farmer experiments with new ideas in farming.

5. Though it takes time for a farmer to learn new methods in farming it is worth the effort.

6. The traditional methods of farming have to be changed in order to raise the standard of living of a farmer.

6. Achievement motivation

Give your opinion about the following statements

1. Success bring relief or further determination and not just pleasant feelings — SA/A/UD/DA/SDA

2. How true it is to say that your efforts are directed towards avoiding failure? — Quite/Not very/Unsure
   untrue/ true /
   Fairly / Quite /
   true true

3. How often do you seek opportunity to excel? — Hardly ever / Seldom / About half the time / Frequently / Nearly always

4. Would you hesitate to undertake something that might lead to your failure? — Hardly ever / Seldom / About half the time / Frequenty / Nearly always

5. In how many spheres do you think you will succeed in doing as well as you can? — Most / Many / Some / Few / Very few

6. How many situations do you avoid in which you may be exposed to evaluation — Most / Many / Some / Few / Very few

7. Management orientation

Give your agreement/diagreement

	Agree / Disagree
1. Each year one should think of a fresh about the crop to be cultivated in each type of land	
2. Its not necessary to make prior decision about the variety of crop to be cultivated	
3. The amount of seeds, fertilizers, PP chemicals need for raising a crop should be assessed before cultivation	
4. It is now necessary to think ahead of the cost involved in raising a crop	
5. One need not consult any agrl. expert for planning	
6. It is possible to increase the yield through farm production	

2. Production orientation — Agree / Disagree

1. Timely planting of a crop ensures good yield
2. One should use as much fertilizers as he likes
3. Determining fertilizer dose by soil testing save time
4. For timely weed control one should even use suitable herbicides
5. Seed rate should be given as recommendd by the specialists
6. With low water rates one should use as much irrigation water as possible

3. Marketing orientation — Agree / Disagree

1. Market use is not so useful to a farmer
2. A farmer can get good price by grading his produce
3. Processing facilities can help a farmer to get better price for his produce
4. One should sell his produce to the nearest market irrespective of price
5. One should purchase his inputs from the shop where his relatives purchase
6. One should grow those crops which have more market demand

iii) Extension Communication

1. Extension orientation

Ext. orientation

(a) Extension contact

Category of Extension personnel	Once a week	Once a fortnight	Once a month	Once a year	Never
1. Agricultural Officer					
2. Agricultural Assistant					
3. B D O					
4. Gramsevek					
5. Other extension agencies (specify)					

(b) Extension participation

Sl. No.	Activities	Whenever conducted	Sometimes	Never
1	Meeting			
2	Seminars			
3	Exhibitions			
4	Film show			
5	Farmers day			
6	Demonstration			
7	Field day			
8	Others (specify)			

2. Information source utilisation:

How often do you use the following information sources?

Sl. No.	Sources	Whenever needed	At times needed	Never
1	Mass media sources			
	T.V.			
	Radio			
	Film			
	Newspapers			
	Farm publications			
	Agrl. Exhibition			
2	Personal cosmopolite sources			
	Research Scientist			
	Agrl. Officers			
	Agrl. Assistants			
	Others (specify)			
3	Personal localite sources			
	Neighbours			
	Friends			
	Family members			
	Relatives			

8. Personal guidance in better farming?

Indicate your responses to the following statements in the appropriate column

	Very much	Much	Not much	Little
1. The extent to which you discussed your farming problems with the extn. personnel during last 2 years				
2. The extent to which the extension personnel visited your crop in the last 2 years				
3. The assistance you received in testing your soil				
4. The help you have received in determining the most suitable cropping pattern for your farm				
5. The advice you have received for proper use of fertilizers to different crops of your farm				
6. The advice you have received for efficient water use in your farm				
7. The assistance you have received in identifying the insect pests of your crop plant and prescribing control measures for them				
8. The assistance you have received in identifying the disease of your crops and prescribing control measures				
9. The advice you have got about proper storage of your farm produce				
10. The advice you have received in getting the additional return in the use of new inputs				

II

Knowledge of improved practices in vegetable cultivation

Give your responses for the following statements

Sl.No.	Items	Response
1	Mosaic disease is an important problem in pumpkin cultivation	True / False
2	Give the name of a pesticide which is largely used in vegetable crops _____	Correct/Incorrect
3	Little leaf is a common viral disease of chilli	True / False
4	Rotten fruits seen on brinjal is mainly due to the disease phomopsis blight	Yes / No
5	The vector of yellow vein mosaic in curcurbits is _____	Correct/Incorrect
6	Raising seedlings in poly bags is a new method in successful curcurbit cultivation	Correct/Incorrect

III

Training need assessment of commercial vegetable growers

Please give the perception of your training need in the following subject matter areas related to the cultivation of vegetable crops

I. Improved varieties of crops	Knowledge			Skill		
	Much needed (3)	Some what need-ed (2)	Not need-ed (1)	Much need-ed (3)	Some what need-ed (2)	Not need-ed (1)
1. The benefits of using HYV and improved vegetable seeds for sowing						

	(3)	(2)	(1)	(3)	(2)	(1)
2. The best suited variety for each type of vegetable crop for the locality						
3. The adaptability and improvements of the varieties you use for cultivation in terms of resistance to pest and disease, market quality etc.						
4. Newly evolved varieties of different vegetable crops						
II Nursery practices						
1. The benefits of raising a nursery over direct field planting in certain vegetable crops						
2. The particulars and peculiarities of site where nursery has to be raised						
3. Nursery management practices like soil drenching etc.						
4. Improved practices like polybag raising for direct sown vegetable crops						
5. The correct method and time of transplanting from the nursery to mainfield						
III Seeds and seed sowing						
1. The correct seed rate to be followed in different vegetable crops						

	(3)	(2)	(1)	(3)	(2)	(1)
2. The method of sowing to be practiced with respect to different vegetables						
3. Best season for different types of vegetables						
4. The correct spacing to be followed in different vegetables						
5. Characteristics of good quality seeds						
6. Maintaining the purity of seeds from generation to generation						
IV Manures and manuring						
1. The correct dose of fertilizers to be applied for different vegetable						
2. Methods of application of fertilizers under different soil conditions						
3. The stages of crop growth in which fertilizer application is essential						
4. Calculating unit cost of fertilizer application is essential						
5. Taking soil sample for sending for analysis						
6. Foliar application of urea						

	(3)	(2)	(1)	(3)	(2)	(1)
V Planting and after care						
1. The method of planting to be followed according to the season of cultivation						
2. The correct stages of the crop at which intercultivations are needed						
3. Method of preparation of pandal and providing stakes for the crop						
4. Identification of local needs found in vegetable fields						
5. Chemicals which are usually recommended for vegetable crops and its correct recommendation						
VI Plant protection measures						
1. Identification of common pests and diseases found in vegetable						
2. Common pesticides and dosages recommended for the control of vegetable pests						
3. Correct stages of the crop in which PP measures are to be undertaken						

	(3)	(2)	(1)	(3)	(2)	(1)
4. The method of application of PP chemicals						
5. Safe insecticides for pest control						
6. Use of PP equipments						
VII Irrigation						
1. The critical stages of irrigation for the crop						
2. Methods of irrigation depending on the type of vegetable crop						
3. Water requirements of different vegetable crops						
4. Repair and maintenance of farm implements						
5. Economics of using farm implements						
VIII Harvesting and post harvest aspects:						
1. Correct stage of harvest for different vegetable crops which allows maximum market price						
2. Processing and storage of farm produce						
3. Grading standards of vegetable produce						

IV

Adoption of Improved Practices

A. Variety

1. Do you use improved varieties ~~of~~ vegetables for cultivation Yes/No

If 'Yes', give the following details:

Type of vegetable	Variety used	Area	When did you use it first	Do you continue to use	If no, when you you discon-tinued	Reasons for dis-continu-ence if any
1	2	3	4	5	6	7
1. Curcurbitaceous						
1. Bittergourd						
2. Pumpkin						
3. Ashgourd						
4. Cucumber						
2. Solanaceous						
1. Brinjal						
2. Chilli						
3. Tomato						
3. Leafy vegetables						
Amaranthus						
4. Bhindi						
5. Other vegetables						

2. Seed Rate

What is the normal seed rate followed by you generally for the following crops

Type of vegetable	Varieties used		Seed rate followed	Source of seed
	Improved	Local		
Cucurbitaceous				
Solanaceous				
Leafy vegetables				
Bhindi				

3. What is the spacing followed:

Type of vegetable	Spacing followed
1.	
2.	
3.	
4.	
5.	
6.	
7.	

4. Do you use chemical fertilizers for your crop? Yes/No

If yes, give the following details

Type of vegetable	Name of fertilizer used	Qty.	Time of application			Since when adopted	If discontinued since when	Reasons for discontnuance
			Applied full as basal dose	Applied full as top dressing	Applied at different growth phases			

5. Do you follow timely intercultural operations? Yes/No

If yes, specify the operation.

Type of operation	Type of vegetable	Time of operation
1. Weeding		
2. Earthing up		
3. Mulching		
4. Pandal raising and staking		
5. Irrigation		

6. Do you adopt timely PP measures Yes/No

If yes, specify the followings:

A. Type of vegetable	Disease noticed	Control measures undertaken		If Chemical		
		Mechanical	Chemical	Qty.	Time of application	Mode of application

B. Type of vegetable	Pests noticed	Control measures undertaken		If chemical		
		Mechanical	Chemical	Qty.	Time of application	Mode of application

V

Constraints in adoption of recommended practices

Which one of the following constraints would you identify as the most important and least important in adoption of recommended practices

	Most imp.	Lease imp.
1. Poor storage and other post harvest facilities		
2. Lack of knowledge about scientific vegetable cultivation		
3. Uneconomic holding size		

4. Inadequacy of capital

5. Non-availability of supply and services

6. Inadequate supervision and guidance by officers

7. Non availability of labour

8. Inadequate market facilities

9. Water scarcity

10. Low price for the produce

11. Non availability of OP equipments

12. Non availability of credit

13. High labour charges

14. Increased cost of PP chemicals

15. Others (specify)

ADOPTION OF IMPROVED AGRICULTURAL PRACTICES BY COMMERCIAL VEGETABLE GROWERS OF OLLUKKARA BLOCK IN TRICHUR DISTRICT

By

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ABSTRACT OF THE THESIS

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ABSTRACT

With a view to study the existing scenario of commercial vegetable cultivation, the present investigation was undertaken in two selected Panchayats in Ollukkara Block in Thrissur. The study was conducted in relation to knowledge of farmers about improved vegetable cultivation practices, their training need in commercial cultivation of vegetable and extent of adoption of recommended vegetable cultivation practices.

The study was conducted on 100 randomly selected vegetable growers. The data were collected using pre-tested and well structured interview schedule. Correlation and step-wise regression analyses were employed for analysis of data.

The study revealed that majority of farmers were medium in their level of knowledge, training need and extent of adoption. Highest training need was perceived in plant protection. Higher adoption was also observed in plant protection measures.

The results of step-wise regression analysis indicated information source utilisation as the most important variable explaining maximum variation in the level of knowledge and training need. In the case of adoption of improved practices, irrigation potential was the most decisive variable as revealed by the step-wise regression analysis.

The results of constraint analysis pointed out high cost of plant protection chemicals as the most felt constraint in the commercial cultivation of vegetables. The other important constraints as perceived by the farmers were inadequate market and storage and post harvest facilities.