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**EFFECTIVENESS OF TRAINING INTERVENTIONS OF KRISHI
VIGYAN KENDRA (KVK), THRISSUR IN ADOPTION OF COOL
SEASON VEGETABLES**

By

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(2014 - 11 - 222)

THESIS

*Submitted in partial fulfillment of the
requirement for the degree of*

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Department of Agricultural Extension

COLLEGE OF HORTICULTURE

VELLANIKKARA, THRISSUR - 680 656

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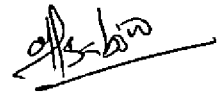
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I, Sabira M. P. (2014 - 11 - 222) hereby declare that this thesis entitled **'Effectiveness of training interventions of Krishi Vigyan Kendra (KVK), Thrissur in adoption of cool season vegetables'** is a bonafide record of research work done by me during the course of research and that it has not been previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

Place: Vellanikkara

Date: 07 Sep. 2016


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Certified that this thesis, entitled 'Effectiveness of training interventions of Krishi Vigyan Kendra (KVK), Thrissur in adoption of cool season vegetables' is a bonafide record of research work done independently by Ms. Sabira M. P. (2014 - 11 - 222) under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship, or associateship to her.

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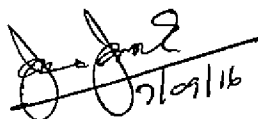
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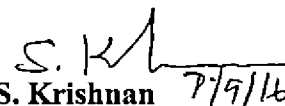
We, the undersigned members of the advisory committee of Ms. Sabira M.P. (2014 - 11- 222), a candidate for the degree of Master of Science in Agriculture with major field in Agricultural Extension agree that the thesis entitled 'Effectiveness of training interventions of Krishi Vigyan Kendra (KVK), Thrissur in adoption of cool season vegetables' may be submitted by Ms. Sabira M.P. in partial fulfillment of the requirements for the degree.



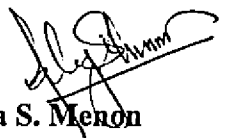
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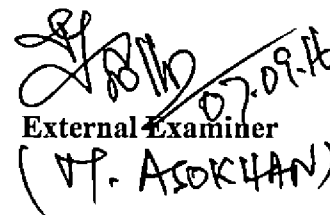
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Sabira M.P.



*Dedicated to My
Family and my
companion*

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LIST OF ABBREVIATIONS USED

Sl. No.	Abbreviations		Terms
1.	ATMA	-	Agricultural Technology Management Agency
2.	CSV	-	Cool Season Vegetable
3.	df	-	Degrees of Freedom
4.	FGD	-	Focussed Group Discussion
5.	FLD	-	Front Line Demonstration
6.	IARI	-	Indian Agricultural Research Institute
7.	ICAR	-	Indian Council of Agricultural Research
8.	KAU		Kerala Agricultural University
9.	KVK	-	Krishi Vigyan Kendra
10.	MLR	-	Multinomial Logistic Regression
11.	NGO	-	Non Governmental Organisation
12.	NRI	-	Non Residential Indian
13.	NS	-	Not Significant
14.	OFT	-	On Farm Test
15.	POP	-	Package of Practices
16.	PP	-	Plant Protection
17.	SD	-	Standard Deviation
18.	Sig.	-	Significant
19.	SMS	-	Subject Matter Specialist
20.	TNAU	-	Tamil Nadu Agricultural University
21	VFPCK	-	Vegetable and Fruit Promotion Council Keralam
22.	ρ	-	Rho value (Spearman's' correlation)

Introduction

I. Introduction

'Allah, the angels, the inhabitants of heaven and earth, even the ants in its hole and even the fish in the sea send blessings upon the one who teaches the people good.' - Prophet Muhammad (pbuh).

Agriculture as an organized activity of the human kind was developed about 10,000 years ago; has undergone significant developments since the time of the earliest cultivation. As we know, agriculture is not natural; it is a human invention, born out of the pressing need of ancient human societies to find easier sources of food. In fact, systematic human settlement owes its origin to agriculture as humans settled down at suitable places to raise crops and to harvest the yield. Agriculture thus became the basis of modern civilization (David, 1987).

Today's world agriculture is facing several challenges. Major challenges include declining food production and rising food prices creating a threat to food security, energy crisis, and climate change. These changing scenarios have led to new challenges and opportunities for agriculture and natural resource management. Climate change due to global warming is bound to worsen the growing conditions for crops, which will further affect crop productivity. All these changes in agriculture, while disturbing people everywhere, have particularly high risks and consequences for about 1100 million people who live on very poor earnings (Alex, 2015).

In the last 60 years, Indian agriculture has experienced a great leap. During 1947, agriculture sector in India was having a responsibility to feed 350 million people and now it has the responsibility of 1.2 billion people to feed. With the help of its multi-prolonged strategies and technologies such as green revolution, blue revolution and white revolution, India has achieved this feat.

Attracting and retaining youth in agriculture will be one of the biggest challenges for Indian agriculture in the years to come. Unless agriculture becomes both economically rewarding and, intellectually stimulating it would be very hard to attract or retain rural youth in farming.

Indian Council of Agricultural Research (ICAR)

The Indian Council of Agricultural Research (ICAR) is an autonomous organisation supported by the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers' Welfare, Government of India. It was established on 16 July 1929 as a registered society, under the Societies Registration Act 1860, in pursuance of the report of the Royal Commission on Agriculture. The ICAR has its headquarters at New Delhi.

Research and education in agriculture including horticulture, fisheries and animal sciences in the entire country is coordinated, guided and managed by ICAR. ICAR is one of the largest national agricultural systems in the world. It is the apex body that coordinates the works of 101 institutes and 71 agricultural universities spread across the country.

The ICAR, through its research and technology development, had a pioneering role in ushering green revolution and subsequent developments in agriculture in our country, that has enabled our farmers to increase the production of food grains by 5 times, horticultural crops by 9.5 times, milk 7.8 times, eggs 39 times and fish by 12.5 times since 1951 to 2014, creating a visible impact on the national food and nutritional security. It had a significant role in bringing excellence in higher education in agriculture.

Krishi Vigyan Kendra (KVK)

During 1960s, a lot of technologies were generated to boost up the production. However, it was observed that most of the technologies were not reaching the needy farmers due to the high cost of technology and reduced interest of extension workers. Hence the technology transfer was incomplete and ineffective. Hence, ICAR has developed Krishi Vigyan Kendras with a noble vision of effective and quick transfer of technology generated through dedicated efforts of the scientists in research field to the farmers of our country; in various states as per the recommendation of Mohan Sinha Mehta Committee. Opening of first Krishi Vigyan Kendra was one of the important milestones of ICAR. KVK, Puducherry is the first KVK established under ICAR in 1974. The most important activities of Agricultural Extension Division are assessment, refinement, demonstration and dissemination of technologies through a network of Krishi Vigyan Kendras (KVK).

Mandate and Activities of KVKs:

The mandate of KVK is the assessment and demonstration of technology for capacity development and its application. To execute the mandate successfully, the following activities are envisaged for each KVK.

- On farm testing in order to understand the location specificity of agricultural technologies under various farming systems.
- Frontline demonstrations to create production potential of various practices on the farmers' fields.
- To update the knowledge and skills of farmers and extension personnel on modern agricultural technologies through capacity development.

- To proceed as knowledge and resource centre of agricultural technologies in improving the agricultural economy of the district for supporting initiatives of public, private and voluntary sector.
- Work as a helping hand by providing farm advisories through use of ICT and mass media on different subjects of interest to farmers.

Major objectives of the Krishi Vigyan Kendra:

- i. Transfer of newly generated technology to the farming community through various extension activities such as demonstrations, trainings, on farm testing, farmers' field schools, *etc.*
- ii. To recognize farmers' needs and the barriers that resist farmers in achieving those needs. Prioritize those problems according to their importance.
- iii. Collection of feedback from the farming communities and extension agencies and communicate those feedback to the scientists for modifications in technologies.
- iv. To impart trainings, demonstrations and on farm tests to farmers on newly emerging technologies in agriculture and allied sectors.
- v. Preparation of various extension models to verify in the farmers field with farmers participation which ultimately enhances farmers confidence.
- vi. To communicate new and important information from the scientific community to various extension agencies and non government organisations for better and wider circulation in their locality to improve economic conditions.

From the perspective of changing trend in agriculture, to address the newer challenges in the areas of climate change, secondary agriculture, conservation agriculture, market led extension and agri-business, the mandated activities of KVKs are being changed from time to time.

ICAR has handful of salient achievements in agricultural extension such as establishment of a network of 645 KVKs in rural districts of the country, through which more than one million farmers and extension personnel have been empowered with need based knowledge and skills annually; awareness on improved agricultural technologies has been created among more than five million people and other stake holders through different extension programmes. In addition, KVK produces technological products (seed, planting material, bio-agents, livestock) of good quality and makes it available to farmers, organize frontline extension activities, recognize and document selected farm innovations and merge with ongoing schemes and programmes within the mandate of KVK.

Kerala Agricultural University (KAU)

As per the recommendations of the second education commission (1964-66) headed by Kothari, the Kerala Agricultural University (KAU) was established on 24 February 1971 as per the KAU Act (Act 33, 1971 of the Kerala State Legislative Assembly), and started functioning from 1 February 1972. KAU is excellent in performing its mandate of providing agricultural education, research and extension for sustainable agriculture development and livelihood security of farming community. Kerala Agricultural University was trifurcated into Kerala Veterinary and Animal Sciences University (KVASU), Kerala University of Fisheries and Ocean Studies (KUFOS) and Kerala Agricultural University (KAU) in 2011. Now KAU is well poised to address the challenges ahead through institutions established at various parts of the state which include:

- ❖ Six colleges under the faculties of Agriculture, Agrl. Engineering and Forestry
- ❖ Six Regional Agricultural Research Stations
- ❖ Seven Krishi Vigyan Kendras
- ❖ Fifteen Research Stations
- ❖ Sixteen Research and Extension Units.

These institutions provide human resources, skills and technology required for sustainable development of agriculture, including crop production, agricultural engineering, forestry, co-operation, home science and other allied disciplines by integrating education, research and extension.

The University creates strategy on synergizing multi-disciplinary education and reinforcement of problem-specific research pertinent to the state and help developing innovative extension systems for sustainable management of natural resources, sustainable production in agricultural and ultimately improving rural livelihoods.

KAU's Excellency in agricultural education, research and extension for sustainable agricultural development and livelihood security of the farming community can be seen through the recognition that this institute has achieved so far. It has released 308 crop varieties and a number of farm machineries. During the years, KAU has achieved Sardar Patel award for the best state agricultural university in India. KAU has won the ICAR best performance award for academic performance for five years in row from 2007 to 2012. KVK, Kannur was selected as the best KVK at the national level during the year 2009. KVKs of Palakkad and Malappuram have bagged the best KVKs award at the zonal level.

Krishi Vigyan Kendra (KVK), Thrissur

Krishi Vigyan Kendra (KVK) Thrissur, established in 2004 under Kerala Agricultural University with full financial support of ICAR, has adopted innovative

approaches to reach the unreached to recognize constraints and opportunities, test technologies and innovations, seek feedback and help in adaption and adoption of agricultural technologies. The major thrust areas identified for formulating the activities of Kendra are technology spread, women empowerment, production of inputs, entrepreneurial development, promotion of eco-friendly technologies and resource conservation.

Mandates

1. Conducting on farm testing to identify the location specificity of agricultural technologies under various farming systems.
2. Organising Front Line Demonstrations (FLD) to establish production potential of various crops and enterprises in the farmer's fields.
3. Organising need based training for farmers to update their knowledge and skills on modern agriculture technologies related to technology assessment, refinement and demonstration, and training of extension personnel to orient them in the frontier areas of technology development.
4. Creating awareness about improved agricultural technologies among various clienteles through appropriate extension programmes.
5. Production of quality seeds, planting materials livestock breeds, animal products, bio - products etc. as per the demand and supply the same to different clientele.

Other than the mandatory objectives, the Kendra conducts several other successful programmes also. The extensive production of quality vegetable seeds and planting materials in farm utilizing ICAR revolving fund has brought accolades from far and wide. Almost seven tonnes of vegetable seeds and planting materials, worth one crore rupees, have been produced under the scheme.

The scientists posted in the KVK, Thrissur include: (i) Subject Matter Specialist (SMS) in horticulture for imparting demonstration and training on horticultural crops such as vegetables, fruits and flowers. (ii) SMS (Plant Protection) looking after training and demonstration on management of various pests and diseases in different crops; train and advise on different types of pesticides, their method and time of application. (iii) SMS (Crop Production) to take care and look after the experiment on field crops as well as to provide training and advice on various field crops. (iv) SMS (Animal Science) looking after overall growth and management of animal resource of that particular area. (v) SMS (Agricultural Engineering) demonstrating the use and application of different agricultural implements for various farming operations in the field and to conduct various trainings and OFT. (vi) SMS (Home Science) provide attention in the improvement of attitude and skill of the farmers especially women and provide advice and training on kitchen gardening, preparation of nutritional food and different handicrafts.

Cool Season Vegetables (CSV)

In Kerala, the demand for cool season vegetable is solely met by the neighbouring states. With the advent of heat tolerant varieties, which were screened at Kerala Agricultural University (KAU), cultivation of Cole crops like cabbage, cauliflower, carrot, beetroot and onion became possible in Kerala.

The Kendra conducts several OFT, FLD, and trainings to hasten the transfer of farm technology. The trainings imparted by Kendra on cool season vegetables in the recent past have created convincing reflections in the community. Performance assessment of onion variety, Agri found dark red, under different methods of planting is in progress in KVK. Popularization of organic cultivation of cabbage and cauliflower was the intention of KVK's Farmers' Field School (FFS). FFS on popularization of cole crops was already completed at Madakkathara gram panchayat.

Cabbage, cauliflower carrot, beetroot and onion were the major crops cultivated by the group.

According to the Annual report (2012) of KVK, Thrissur; it has succeeded to a great extent in popularizing the cool season vegetables. The first step for popularizing the cool season vegetables was taken in 2008 by conducting FLD followed by trainings in urban and peri-urban areas of the district. The programme was whole heartedly welcomed and taken up by people from all walks of life. Housewives and women self help groups have actively participated and made it as a successful venture. The programme was so successful that media turned its attention to the demonstration plots across the district.

During 2010, KVK has conducted FFS at Nadathara panchayat to spread the scientific technology of cool season vegetable cultivation. The Kudumbasree members imbibed the knowledge passed to them through the weekly visits of KVK staff and today they are able to produce quality cool season vegetables in Thrissur District. They are also getting additional earning by preparation of seedlings of cool season vegetables.

Due to timely interventions of Krishi Vigyan Kendra, Thrissur, cultivation of cool season vegetables has become very popular in the district and adjoining districts. The crops became so popular among the common man that the demand for the seedlings could not be met by suppliers such as KAU, KVK and Vegetable and Fruit Promotion Council Keralam (VFPC).

Farmers of Mathilakom block of Thrissur district, which is a coastal and unconventional area for cool season vegetable cultivation, have successfully battled the odds to embrace the production of beetroot, carrot, cabbage, cauliflower with increasing success. However, no empirical study has been conducted so far to assess the effectiveness of KVK training interventions in introduction and diffusion of cool

season vegetables in the plains of the district, which has implications on testing the acceptance of technology as well as on the strategy of dissemination.

Cultivation of cool season vegetables like cabbage cauliflower, carrot, beetroot and onion has become a familiar sight during the months of November to February. The heat tolerant varieties screened at the Agricultural Research Station (ARS), Mannuthy of KAU, was taken to the homesteads by KVK and the steep rise in demand for planting materials of cole crops in the district is an indicator of the impact created.

Importance of training

Human Resource Development is a critical and constant requirement for agriculture and sustainable development. Training is an important tool for developing human resource. Training needs, context, methodologies and approaches change according to the change in development phases, strategies adopted and clientele. A substantial training effort is needed to upgrade technical know-how of human resources from grass root level to policy making level.

Training is an indispensable instrument for human resource development. The aim of the training is to reach the trainee his or her maximum potential by way of increasing knowledge, improving skills, changing attitude and improving him or her to perform job perfectly. Through training activities, capacity and efficiency of human being in performing any specific work can be enhanced.

Training is the process where the participants get trained by the trainers by stimulating them. Starting point becomes the focus of a training programme, at the end hoping with the difference. The difference lies in what people have learned and what they have applied in practice. That difference in terms of more effectual behaviour is the measurement of the training effectiveness.

Pennaboliswamy *et al.* (2010) narrated that Krishi Vigyan Kendra (KVK) is an innovative institution established mainly to impart vocational skill training to the farmers and field level extension workers.

KVK Thrissur has brought out lots of success stories through the timely intervention by providing trainings. One of the important success stories was Harithasree and Udayasree gardeners training. Udayasree is a group of 10 women trained in landscaping and nursery technique, while Harithasree is specialized in vegetable cultivation and seed production. The contribution of Harithasree in producing quality vegetable seeds of cucurbits, cowpea, bhindi, brinjal, amaranths *etc.* have helped significantly in maintaining a steady supply of the same to the needy farmers of Thrissur and surrounding districts.

Training Interventions and impacts of KVK Thrissur

The following are the training areas and training interventions of KVK, Thrissur on cool season vegetables.

1. Commercial cultivation of vegetables
2. Cultivation of cool season vegetables
3. Value addition in vegetables
4. Protected cultivation of vegetables
5. Pest and diseases management in vegetables
6. Seed production in vegetables
7. Kitchen gardening
8. Organic farming

Since inception, KVK has imparted training in various aspects of vegetable production including off season cultivation in rain shelters. A total of 46 trainings in vegetables were conducted imparting skills to around 1200 farmers in the district. Farmers from Ernakulum and Idukki districts also come here for training, farm visit and seed purchase.

Need for the study

KVK, Thrissur is conducting training on cultivation of cool season vegetables for farmers of Thrissur district since 2008. Though KVK Thrissur has operational mandate of the entire district, the interventions related to cool season vegetables were mainly done in Mathilakom block, as the agro-ecological conditions are contrasting to conventional cool season vegetables growing areas. This block is in the coastal belt of the district, with mainly sandy, loam soils and relatively high humidity and warm temperature. Though on farm tests, front line demonstrations and trainings were extended to other blocks as well, this location was selected purposively for the study due to the above mentioned reasons and the felt need by the KVK to have a scientific study on cool season vegetables in this block. The block has seven panchayats mainly with coconut based homestead farming system.

Popular printed media have celebrated the success of Kendra's interventions in adoption of cool season vegetables. The Hindu (17.04.2014) has reported the success under the headline "Onion farming takes root in Thrissur district", Times of India (05.09.2015) has reported the success of KVK scientists in onion cultivation in Kerala like "Onions can now be grown in Kerala, says KAU researchers". Cool season vegetables such as cauliflower, cabbage, carrot, beetroot and onion share a major part of keralite's diet. But Kerala, being a consumer state, has to depend on neighbouring states for these vegetables.

Under these circumstances, KVK has undertaken trainings, demonstrations and farmer field schools on NS-60 & basant varieties of cauliflower, NS-160, NS-183 & NS-43 varieties of cabbage, madhur variety of beetroot, super kuroda & shin kuroda varieties of carrot and agri found dark red & arka kalyani varieties of onion were done in various locations of Thrissur district.

Though the intervention of Kendra in adoption of cool season vegetables is a success, no comprehensive study has been conducted so far to assess the effectiveness of these trainings on cultivation of cool season vegetables, extent of adoption of cool season vegetables, factors affecting the determinants of adoption and the constraints faced by the farmers. The knowledge about the effectiveness of training interventions of KVK, Thrissur in adoption of cool season vegetables will be beneficial for future performance of KVK. Hence, an attempt was made to conduct an analysis of training programmes, farmer field schools with main emphasis on effectiveness of training interventions of KVK, Thrissur in adoption of cool season vegetables.

Objectives of the study

The specific objectives of the present study were:

1. To assess the effectiveness of KVK training interventions influencing the adoption of cool season vegetables
2. To assess the extent of adoption of cool season vegetables in coastal areas of Thrissur District
3. To identify the determinants of adoption of the technology of CSV cultivation
4. To elucidate the constraints of farmers in adopting cool season vegetables

Scope of the study

The study will evaluate the performance of Krishi Vigyan Kendra, Thrissur in influencing the social system through training interventions of cool season vegetables. The study will provide an overall assessment of degree of success that KVK, Thrissur had achieved from the effort given for creating a convincing reflection in the community. Apart from that, the study will bring to light the supporting parameters as well as the constraints of farmers, while adoption process was taking place. This will be an empirical study to assess the effectiveness of KVK training interventions in introduction and diffusion of cool season vegetables in the plains of the district, which has implications on testing the acceptance of technology as well as on the strategy of dissemination. The study will also try to find out the factors that determine the adoption of technologies and socio - economic parameters that influence the extent of adoption of cool season vegetables.

The study will serve as a guide to the change agent to identify the components that can be systematically distorted to transform low adopters to high level that will ultimately enhance the extent of adoption. This humble work will provide an idea about the current position of KVK, Thrissur in transfer of technology in case of introducing cool season vegetables in Thrissur district and the factors to be considered for improving the methods of interventions that will enhance the efficiency of KVK, Thrissur to perform better as an extension system.

Limitations of the study

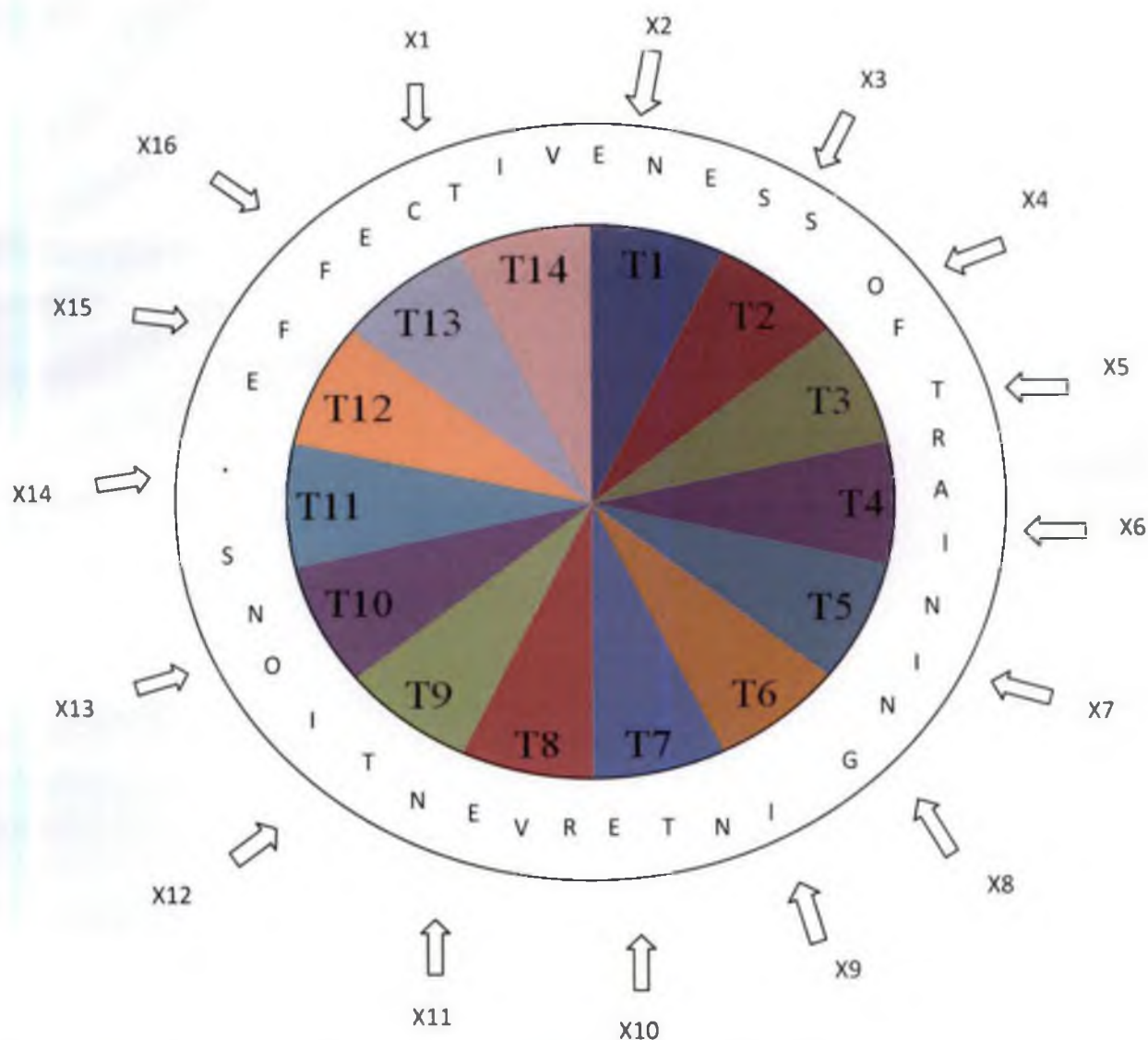
The researcher faced all limitations, being a single investigator. One of the obvious limitations was the resources and time available at the disposal of student researcher. The study was conducted on four objectives, extent of adoption of cool season vegetable cultivation technologies, effectiveness of training interventions, determinants of adoption, and constraints faced by respondents. The findings of the

study could not be generalized for the whole district or for other coastal areas. Since the study was completely based on the expressed opinions of respondents, it may not be free from personal bias and prejudices. However, maximum effort was made to avoid the bias and carry out research in an objective manner. Despite these limitations, research was conducted very carefully to make study as objective and systematic as possible.

Organisation of the Thesis

The thesis has been presented in five chapters. The first chapter is an introductory one that highlights the objectives, scope, importance and limitations of the study. The second chapter gives an outlook of the literature reviewed in line with the objectives. The third chapter describes the methodology followed out in carrying this research work. The fourth chapter deals with the results and discussion of the study. The fifth chapter includes summary, implications, conclusions of the study and suggestions for future research. References, appendices, abstract follow these chapters.

Figure 1.1 CONCEPTUAL FRAME WORK OF THE STUDY



Factors effecting adoption of cool season vegetables

X1 - Age, X2 - Gender, X3 - Educational status, X4 - Occupational status, X5 - Economic status, X6 - Marital status, X7 - Family size, X8 - Experience in cool season vegetable cultivation, X9 - Social participation, X10 - Availability of inputs, X11 - Risk orientation, X12 - Innovative proneness, X13 - Extension Agency Contact, X14 - Economic Motivation, X15 - Cosmopolitaness, X16 - Production facilities

Cool season vegetable practices to be adopted

T1 - Season, T2 - Site selection, T3 - Planting methods, T4 - Irrigation, T5 - Manure & fertilizer application, T6 - Weeding, T7- Plant Protection measures, T8 - Soil test, T9 - Blanching, T10 - Harvesting index, T11 - Post Harvest operations, T12 - Harvesting methods, T13 - Storage, T14 - Drying in onion

Review of Literature

II. Review of literature

In order to clarify and focus on research question, a detailed search through a range of resources such as books, thesis, journals, abstracts and microfiche, the internet and electronic journals is very necessary. According to Kumar (1996), one of the initial crucial responsibilities of the researcher is to find and review the existing literature related to the research problem. Burton (2000) opined that for a social researcher, 'information search and information management skills are the basic building blocks of all research problems'. Literature review helps the researcher to understand the area in a broad sense and to identify various theoretical approaches that has previously been applied. As the research study is relatively new area, the relevant literature available is not plenty. However efforts have been taken to collect the appropriate ones. In this chapter, a systematic review of literature has been carried out according to the objectives of the study.

The objectives of the present study are:

1. To assess the effectiveness of KVK training interventions influencing the adoption of cool season vegetables
2. To assess the extent of adoption of cool season vegetables in coastal areas of Thrissur District
3. To identify the determinants of adoption of the CSV cultivation practices
4. To elucidate the constraints of farmers in adopting cool season vegetables

Accordingly, the review of literature was done under the following sub heads:

- 2.1 Profile of the respondents
- 2.2 Effectiveness of training interventions with special reference to KVK trainings
- 2.3 Extent of adoption
- 2.4 Determinants of adoption
- 2.5 Constraints of farmers

2.1.Profile of the respondents

2.1.1 Age

According to Sanjeev (1987), age was measured as the number of years an individual has completed, since his/ her birth, at the time of the study. Then respondents were classified into young, middle and old as follows:

Young – less than 30 years

Middle – 30 to 50 years

Old – more than 50 years

Sindhu (2002) used different category in her study. The respondents were categorised as below 20 years, 21-30, 31-40, 41-50, 51-60 and above 60 years respectively.

Sunil and Manjula (2009) reported that the age of the respondents had no role in deciding the adoption of vermicompost technology.

Meena and Bhati (2010) reported that farmers trained by KVK belonged to middle and young aged group, which showed that agricultural operations were mostly carried out by young and middle aged farmers.

Chavai *et al* (2015) revealed that majority (43.64 %) adopters of post harvest technology in turmeric belonged to age group of 36 to 45 years which is categorised as middle aged respondents.

2.1.2 Gender

According to Biswas *et al.* (2014), male respondents had high level of awareness and adoption of improved practices compared to female respondents.

2.1.3 Educational status

Kadam (2008) and Chavai *et al.* (2015) reported that with improvement in education of the respondents, the adoption level of technologies also increased.

Sunil and Manjula (2009) reported that high education level of respondents had acted as a catalyst to gain more knowledge which in turn influenced the adoption. Higher education of the respondents enabled them to get exposed to print media and had acquired information resulting in more adoption.

According to Enitan (2010), less formal education had implication for technology adoption.

According to Meena and Bhati (2010), the education level of 75 per cent of the respondents was primary and secondary level schooling and educated farmers had better understanding about recent technologies in agriculture and the education level of respondents had supported KVK in imparting training effectively.

According to Pandey *et al.* (2011), most of the respondents had high school followed by graduation level of education and these respondents had adopted different technologies satisfactorily well.

Rathi (2015) found out that education of the respondents had positive and significant correlation with adoption of indigenous knowledge of livestock management.

2.1.4 Marital status

Marriage is one of the important social institutions. In India, it has undergone many changes. The perceptions and attitude of the respondents can also change or differ according to the marital status of the persons, as there is a chance that marriage might make the persons more responsible and matured in acquiring knowledge of technologies during training sessions and also during adoption of innovations.

The studies of Yahiya (1995) and Odebode (1997) revealed that majority of the women (79.15 % and 80.32 % respectively) involved in agricultural activities were married.

2.1.5 Occupation

Meena and Bhati (2010) noted in their study that majority of the trainees (85.00 %) had dairy as subsidiary occupation along with farming (100 %).

In the study of Goswami *et al.* (2012), most of the adopters of tomato production technology were skilled labourers with farming as the main occupation.

According to Kumar *et al.* (2013), majority (95.50 %) of the respondents had agriculture as primary occupation. Negligible percentages (4.50 %) of respondents were having subsidiary occupation.

Biswas *et al.* (2014) reported that cultivation was the main occupation of majority of the selected trainees of KVK followed by independent occupation, labour, and business in the study area to maintain their livelihood security.

2.1.6 Risk orientation

According to the results of Walke (2008), Tayade (2010) and Chavai *et al.* (2015), majority of the technology adopters were medium (66.36 %) risk takers during farming and processing, and risk orientation had positive and significant relation with adoption.

In the study of Sunil and Manjula (2009), it was observed that risk orientation had no correlation with level of adoption.

Goswami *et al.* (2012) reported that most of the respondents who had adopted the innovative technology were medium (55.00 %) risk takers.

According to Kumar *et al.* (2013), majority of the adopters of chick pea cultivation technology had medium (64.44 %) risk orientation followed by low and high (24.44 and 11.12 % respectively) levels of risk orientation.

Raghava and Rao (2013) reported that the risk orientation nature of respondents helped to face the risk involved in practising new technology irrespective of its consequences and helped them to gain knowledge of the technology which ultimately resulted in positive and significant correlation.

2.1.7 Economic motivation

As per the findings of Kumar *et al.* (2013), in case of economic motivation majority of the respondents (51.11%) had high level, while 25.22 per cent had medium level and 23.33 per cent had low level of economic motivation.

2.1.8 Social participation

Fayas (2003) measured social participation of respondents in two sections: involvement in organisations and frequency of attending. The respondents were asked if he/she is a member or official bearer of any organization. They were also asked to indicate the frequency of participation.

The study of Kumar *et al.* (2013) revealed that the majority of the respondents (64.44%) had low level, followed by medium (24.44%) and high levels (11.11%) of social participation.

According to the study of Raghava and Rao (2013), there is no significant relation of social participation to adoption of technologies.

Chavai *et al.* (2015) reported that majority of the adopters (79.09 %) were having medium level of social participation and there was positive and significant relation with adoption of technology.

2.1.9 Farm size

Meena and Bhati (2010), when studying the impact of KVK training in adoption of improved technology in cotton, found out that majority of trainees belonged to marginal and small category.

As per the observations of Rathod *et al.* (2011) and Biswas *et al.* (2014), maximum number of respondents had land up to one hectare followed by up to two hectares land (small farmers) and no land (landless farmers).

Kumar *et al.* (2013) reported that in case of farm size majority (60.00 %) of the farmers belonged to medium category followed by big and small farmers.

From the result of Chavai *et al.* (2015), we could observe that majority (54.55 %) of the adopters of technology turmeric cultivation were having farm size of

1.01 to 2 hectares. Since the farm size and adoption had positive and significant correlation with increase in farm size extent of adoption was also increasing.

2.1.10 Annual income

Sunil and Manjula (2009) did not find any correlation between adoption and annual income of the respondents, but in case of study conducted by Chavai *et al.* (2015), annual income of respondents had positive and significant relation with adoption of technologies and majority of adopters had medium level of annual income. Greater number of selected farmers (44.44 %) belonged to low income group and only 13.89 per cent belonged to high income group and 41.67 per cent had medium level of annual income in case of adoption of improved agricultural practices trained by KVK.

According to Opera (2010) annual income had positively contributed to the respondent's use of agricultural information which ultimately resulted in increased

Kumar *et al.* (2013) stated that annual income of the farmers had positive and significant relation with adoption and majority had high followed by medium level of annual income.

2.1.11 Extension agency contact

Extension agencies act as change agents for bringing favourable behaviour and attitude change in farmers. Rogers (2003) defined change agent as an individual who is able to influence clients' innovation decision in a direction deemed desirable by a change agency.

Orebiyi *et al.* (2004) observed that the co-efficient of extension contact was significant and positively signed indicating that more extension contact of the farmers, higher will be their likelihood of adoption of their innovation. It is expected because the level of interaction and rapport between the extension agent and farmers

will be high and more frequent thereby creating a favourable environment for information dissemination between both parties.

Parimaladevi (2004) developed a scale for measurement of extension agency contact. It was measured on six point continuum with scores as follows: two or more times a week (score - 6), once in a week (score - 5), once in fortnight (score - 4), once in a month (score - 3), rarely (score - 2), never (score - 1).

According to Deshmukh (2007) and Kumar *et al.* (2013), majority of the respondents had low level of extension contact followed by medium and high extension contacts. The reason for this might be due to the unawareness of respondents about the information sources for accessing information about agricultural technologies.

Monge and Halgin (2008) opined that extension agents are external actors of an organisational origin. Extension agents are those who are approached by farmers to get support and advise in order to adopt specific innovations.

2.1.12 Availability of inputs

According to the study of Fred and Joseph (1972), conducted on nature of marketing farm input supplies, seasonal needs of the farmers should be considered while supplying the inputs and constraints such as under supply and no supply had to be overcome as it will affect the farmer's activities.

Food and Agriculture Organization (2007) reported that extension agents can assist farmers in getting necessary inputs by helping farmers to calculate their input needs, identify where to buy inputs, organise group transport and obtain credit.

Pan *et al.* (2015) opined that input availability has a significant role in adoption of modern agricultural technologies. Inputs, most of the time, are expensive. It includes hybrid seeds, chemical fertilizers and chemicals, implements, etc. During

training programmes by extension agents for diffusion of technologies, these inputs are highly recommended since they play a very significant role in adoption of technologies.

2.1.13 Innovative proneness

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

According to Hall (2003), innovation is a continuous process of upgrading new knowledge or new combination of existing knowledge that is new to the local area.

According to Rogers (2003), an innovation is an idea, practice or object that is perceived as new by individual or other units of adoption.

Allan (2004) measured innovativeness by classifying the respondents into low and high according to the responses given by them to the query as to when would they prefer to adopt an improved practice. It was coded as yes with score of one and no with score of zero. The same procedure was followed by Mulwafu (2012) with modification in statement according to the location of the study.

Sunil and Manjula (2009) found out that innovativeness of the respondents was significantly and positively correlated with adoption process. Majority (45.25%) was having medium level of innovativeness followed by high and low levels.

Raghava and Rao (2013) concluded that the innovativeness of the respondents helped them to gain more awareness about scientific farming orientation and ultimately brought positive influence in adoption of technologies.

2.1.14 Production facilities

Nijkampf (1986) argued that expansion and improvement of the transport and the infrastructure is considered as a necessary pre condition for increase in production and productivity. The supply of infrastructure should match with demand.

Minten (1999) in his study concluded that hard infrastructure as production facility is an important determinant of the price level of produces but adding of soft infrastructure would be more beneficial when price variability and food security is concerned in rural areas.

According to Venkatachalam (2003), the agriculture production facilities include all of the basic services, facilities, equipment, and institutions needed for the agricultural activities. He also opined that among all kind of facilities, agriculture production facility plays an important role especially in case of developing countries where large percentage of poor section of the society depends on agriculture.

2.1.15 Cosmopolitaness

Rogers (1995) stated that “cosmopolitaness” has been invoked as a dimension reflecting people’s outlook of life. Cosmopolitaness is linked to social categories such as education. It is largely portrayed as an independent variable associated with diffusion of innovations.

Jaffres *et al.* (2002) opined that cosmopolitaness is related with media use. Cosmopolites read more books, magazines and news papers from outside the community than localites. Cosmopolites also preferred radio news casts focusing on public affairs while localites were more likely to enjoy news with personal anecdotes.

Rathi (2015) found out that cosmopolitaness of the respondents had significant and positive relation with adoption of technology.

2.2 Effectiveness of training interventions with special reference to KVK trainings

Sanjeev (1987) narrated that the efforts towards imparting training to farmers from public sectors, private institutions and voluntary organisations is not a new phenomenon. But studies on the effectiveness of all those training programmes are important. Analysis of various training programmes in India by second education commission, headed by Kothari revealed certain reasons for failure of conventional training efforts. These reasons included poor methods of training, poor subject matter or weak academic approach, training programme not being related to immediate needs, absence of facilities, stress on quantity than quality.

According to Lynton and Pareek (1990), training largely consists of well organized opportunities for participants / trainees / farmers to acquire necessary understanding and skill.

According to Murthy and Rao (1990), for different types of courses, preferences of trainees are also differed. Trainees of fruit production preferred lecture, discussion and slide show, while ornamental horticulture trainees prefer outstation study trips also.

As per the findings of Varma and Vellula (1991); as far as development of rural women is concerned, lack of capital is a great concern.

Puzari (1992) reported that majority of the village level extension workers prefers teaching methods such as lecture, field practicals, group discussion and field visits, *etc* for conduction effective training programmes.

According to Wentling (1992), learning objective, the content, the trainees, and the practical requirements are the main factors to be considered while selecting a training method.

Agrawal *et al.* (1993) while collecting the information about the utility of the subjects dealt in the workshop measured it with the help of three point scales. viz. very useful, useful, and not useful. The indices were worked out by computing the total utility score of each subject area and were ranked.

The assessment of knowledge, attitude and practice after training of farmers on a given particular improved technology is one of the tools for information on the effectiveness of training (Adhikarya, 1996).

Hegde (1999) opined that enhancing capabilities of farm women to use improved technique will not only increase the production, but also will reduce women's strain and time spent on farming activities. For creating awareness, motivating and educating the farmers, women and rural youth to adopt and manage the new agricultural technologies in the field, a variety of extension programmes are implemented.

Khadar (1999) and Ojha (2001) stated that documentations of successful involvement of women in increasing food production and extending such knowledge to larger section of the community can further boost the food production in the country.

Kumar and Dutt (2000) measured the course content of the training by collecting responses of trainees in terms of utility, coverage and presentation and time period, each on a three point continuum.

Veerasekaran and Suresh (2000) emphasized the importance of rural women in the development of our country. According to him, rural women must be trained on agro-based enterprises and on farm and off farm employment, because women are the key to the prosperity of healthy home, town and country.

Bhagyalakshmi (2001) defines empowerment as “a process of change from self-assertion, and participation and involvement in projects in a functional sense, to the control over decision, regarding all aspects of one’s life and livelihood”.

Aravind and Rakesh (2001) reported some successful ventures through KVK training programmes. The training on vermicomposting, poultry production and vegetable cultivation in homestead conditions and nursery entrepreneurship ultimately increased farmers’ earning. KVK’s intervention in avoiding environmental hazards caused by dumping of tonnes of indecomposable coir pith waste from the coir industry in Ashtamudi area of Kollam district was successful. A series of training on coir pith composting was offered to the marginalized rural women from the area. Mushroom cultivation was another successful intervention.

According to Chouhan *et al.* (2002), during training sessions, if presentation of visuals plus discussion followed by printed material plus discussion, group meetings plus discussion and lecture plus discussion is employed, maximum knowledge of farmers can be increased.

Anup (2003) measured the preference for method of training by asking the respondents to rate the various methods of training on a three point continuum ranging from most preferred to least preferred.

Kumar (2003) measured the method of training preferred by the trainees by asking them to indicate the methods of training, which they considered suitable for each of the six major subject matter areas. Subsequently, training methods were ranked based on the frequencies with which they were reported.

The extension programmes such as training played an important role factors for making India a food surplus country (Samanta and Gowda, 2003).

Parimaladevi (2004) said that if curriculum is considered as the heart of the training programme, Training methods could be the arteries and veins of the training system through which training message reaches the trainees, and the trainers receive concurrent feedback from the trainees. The effectiveness of training depends on the choice of appropriate methods of training which ultimately depends on the subject matter, knowledge level of trainees, time availability, and interest of organizers and trainers and also on the facilities available.

Halakatti *et al.* (2007) reported that re-orientation of the syllabus /training according to the need expressed by the clientele would increase the effectiveness.

Dubey *et al.* (2008) stated that training programmes organized by KVKs are helping to ameliorate the poor socio-economic conditions of the farmers, farm women as well as rural youths in rural India by raising the level of employment, farm productivity and ultimately their income with application of agricultural innovation generated at research station.

Thorat *et al.* (2010) opined that to increase the extent of adoption of onion variety phule samarth in Dhule district of Maharashtra, technical knowledge and skill should be provided to farmers through extension programmes such as training, method and result demonstrations, group discussions and field visits. Mass media like radio, television and extension literature can also be utilized effectively in this context.

Pandey *et al.* (2011) has conducted an impact evaluation study of training imparted by KVK, Pratapgarh on adoption of various agricultural technologies. The result showed that most of the respondents adopted seed treatment practices followed by zero tillage technology, bio fertilizer use practice. And according to the study, over all adoption trend of majority of respondents was more than average and there was a raise in knowledge level of resonance. Most of the trainees had high adoption

level followed by low adoption level while in case of non trainees; most of them had medium level of adoption.

According to the study conducted by Goswami *et al.* (2012) the training programmes conducted by KVK, Ranchi has a great effect on adoption of hybrid tomato practices among tribal farmers. Particularly practices such as fertilizer application, seed selection, seed treatment, diseases and pest production aspects. The study revealed some constraints faced by the farmers; availability of inputs, credits, irrigation facilities, and cost of inputs.

Reddy *et al.* (2012) identified that training effectiveness as sum of four indicators such as knowledge gain, relevancy in course content, utility of topics and skill improvement. His study indicated that training had high relevance on most of the contents, knowledge gain was substantial, but skill improvement showed low level with over all training programme effectiveness index of 69.38 per cent.

Sagar *et al.* (2012) for measuring the usefulness of the course content, the topics and practicals conducted during training were rated as perceived by the trainees on a three point continuum as most useful, useful and least useful. Individual and overall usefulness of the course content was studied using frequencies and percentages.

The study conducted by Kumar *et al.* (2013) on knowledge and extent of adoption of improved practices of chick pea through KVK interventions revealed that the demonstrations, trainings and method demonstration, *etc.* have helped to enhance the extent of adoption of technology among the chickpea farmers. The interventions and extension activities of KVK have created awareness on improved technologies, especially on IPM practices. The study also showed that 53 per cent of the farmers had low adoption rate, which also possess medium level of knowledge. Lack of soil

testing facilities, non-availability of bio pesticides and fungicides was some constraints regarding to the adoption of integrated pest management in that area.

Raghava and Rao (2013) conducted a study at Guntur district of Andhra Pradesh on impact of front line demonstrations on groundnut production technology. The result revealed that the training attained, risk orientation, information seeking behaviour and economic motivation of beneficiaries have exhibited positive and also shown significant increase in knowledge and adoption of groundnut production technology of beneficiaries. The average pod yield obtained by the beneficiaries of front line demonstration of KVK was very high and the success is attributed to the improved variety and the technology demonstrated through front line demonstrations.

Santhi *et al.* (2013) stated that the training imparted at KVK helped them for developing standard of living, pattern of decision making, method of resource allocation which in turn result in empowerment. The study was conducted on three major employment generating areas viz. fruits and vegetables preservation, preparation of products at home and mushroom cultivation.

Shah *et al.* (2013) has conducted study to assess the effectiveness of Front Line Demonstration by KVK, Navsari district, Gujarat for dispersion of new sweet corn cultivar Cv. Sugar 75 in the tribal areas of Navsari district. The result of the study shows that FLD and training programmes had a positive impact in dispersion of the technology. Use of improved variety, scientific cultivation practices and plant protection measures has lead to higher productivity of sweet corn. And also best management practices increased cob and straw yield in sweet corn.

An assessment study conducted by Biswas *et al.* (2014) on the ex-trainees of KVK in awareness generation and adoption of improved of improved agricultural practices showed that the training given by KVK was very efficient in awareness

creation on various improved farming practices. The sustainable technologies adopted by the trainees includes drum seeder, SRI, jute seed drill, zero tillage, IPM practices, broiler farming, dairy farming through AI, composite fish culture, *etc.* which caused remarkable changes in yield and income level of trainees.

The results of research conducted by Senthilkumar *et al.* (2014) on assessment of effectiveness of training programmes of KVK revealed that the respondents showed satisfaction with output of training, teaching quality and physical facilities provided during the training. However, the trainee's perception on the coverage of topic was assessed as not sufficient. Hence KVK's do require some re-orientations in their trainings for transfer of technologies among the target groups effectively. These re-orientations can include field visit to motivate the farmers for adoption of new technology.

According to Shankara *et al.* (2014) trainings and education are provided by KVK with a view to increase the level of knowledge, and skill and to bring attitudinal changes and for testing in order to transfer recommended improved farming practices to make a bridging of the gap between production and productivity. It also increases self employment opportunities among the farming community. He also observed that the trainings of KVK can bring 100 per cent changes in the knowledge and skill of the trainees.

Bar (2015) opined that training programmes of KVKs on diversified farming, use of farm implements, vocational and income generating activities, conservation of soil and moisture along with access to credit for increase in production, productivity and regular income is to be strengthened for the development of tribal farmers.

2.3 Extent of adoption

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

Chattopadhyaya (1963) used adoption quotient for measuring adoption behaviour. This is a ratio scale that measures a farmer's behaviour on dimension and applicability, Potentiality, time, consistency and differential nature of innovation.

Mundra and Bentham (1967) studied the extent of adoption of selected improved practices using the following indices.

$$\text{Acceptance index} = \frac{\text{No. of people adopted new practices}}{\text{Total No. of respondents}} \times 100$$

$$\text{Area index} = \frac{\text{Area covered under new practices}}{\text{Total area under particular crop}} \times 100$$

$$\text{Extent of adoption} = \frac{\text{No. of respondents adopted the practice}}{\text{Total No. of respondents}} \times 100$$

Supe (1969) developed the cotton practices adoption scale. He selected ten 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.

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 high yielding variety of paddy were medium adopters. The adoption of practices was far below the recommended levels.

Singh and Singh (1974) used the adoption quotient method of Chattopadhyay (1963) with slight modification. The formula used was as follows:

$$\text{Adoption quotient} = 1 + \frac{\sum e/p}{N} \times 100$$

Where,

e	=	Extent of adoption of each selected practices
p	=	Potentiality of adoption of each practices
N	=	Number of respondents

Sunderswamy and Duraiswamy (1975) developed 'adoption quotient' to measure the adoption. Thirteen practices were taken and farmers were classified as low adopters (A.Q. 10-40%), Medium adopters (A.Q. 40 -80%), and high adopters (A.Q. 80-100%).

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

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

Chenniappan (1987) opined that adoption process is a mental process though which an individual passes from first hearing of an innovation to its final adoption is a decision to continue the full use of innovation and his study revealed that extent of adoption of improved practices of irrigated cotton was medium.

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

Chandrakandan and Knight (1989) measured adoption of farm technology of groundnut cultivars using adoption quotient. Four dimensions were considered for the study which included weightage for individual practices, magnitude of adoption, potentiality for adoption and applicability of individual practices. The formula used was given below:

$$\text{Adoption Quotient} = \sum \frac{e_i}{E_i} + \frac{q_i}{Q_i} \times W_i / 2 \sum W_i$$

where,

e_i	=	Potential area for i^{th} practice
E_i	=	Area put under 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

Thapa *et al.* (2012) conducted a study at Horticultural Research Station, Mondouri, in West Bengal during rabi season 2007-2008 with an objective to evaluate the production technology and popularization of high value Cole vegetable crops. They concluded that there is ample scope to grow these crops due to prevailing suitable agro climatic condition of the state as well as the gaining importance of these high value Cole crops as potential vegetable for export.

As per the Annual report of Krishi Vigyan Kendra, Thrissur, (2012) a women group from Madakkathara panchayat , who were provided with FFS on cool season vegetables in 2011, earn a net profit of Rs. 18000.00 within a short span of 80-90 days from 0.1 ha area. They were trained in cultivation of carrot and beetroot in addition to the already popular cabbage and cauliflower.

The measure, how far a particular technology is adopted by an individual correctly without distortion of message is referred as extent of adoption. An ex-post-facto research conducted to know the extent of adoption recommended cauliflower production technology by the cauliflower growers observed that majority of the respondents (55 %) were having adoption of technology at medium level. Out of six improved technologies, majority of the respondents had high level of adoption on preparatory tillage, seed and sowing, intercultural operations, fertilizer use, irrigation technology and plant protection measures (Sasane *et al*, 2012).

Mandavkar and Talathi (2013) have conducted assessment on adoption level of oilseed production technology and observed 60 per cent of medium adopters. Small farmer's category has low level of adoption as compared to medium and big farmer's category. In case of variety and seed rate full adoption has been assessed and it may be due to simplicity of technology. Non-availability of labour, high cost of inputs and untimely technical guidance are assumed to be the reasons for partial adoption of agronomic practices. Complexity of use in seed treatment and plant protection may be the reason for its non-adoption. It is found that social participation, education, farming experience, annual income, extension contact, scientific orientation and extension participation of demonstrator farmers has a significant association with adoption of oilseed technology by the respondents.

Parmar *et al*. (2013) opined that transfer of technology centres like KVKs can be effectively utilized for reaching to farmers through proven technologies such as FLD. Yield potential of oilseeds can be increased to a great extent through FLDs.

These will substantially increase the income as well as the livelihood of the farming community.

Rachna *et al.* (2013) has conducted an evaluation study of Krishi Vigyan Kendra, Patiala on imparting trainings in mushroom cultivation to the farmers, rural women and youth to assess the gain in knowledge of the participants, extent of adoption of the enterprise and also suggestions from the ex-trainees of the mushroom to enhance the mushroom farming. Among various aspects of mushroom cultivation, in compost preparation maximum knowledge gain has been observed. Lower score was seen in case of pest and disease management followed by cultivation methods. The characteristics of the trainees such as education level, farming experience and extension media contact had positive influence on the knowledge gain of the participants. As per perceptions of trainees, availability of quality spawn, insurance of crop and reducing the cost of inputs were three major suggestions for successful development of mushroom entrepreneurship in Punjab.

Asiwal *et al.* (2014) found out that FLD and training of KVK has high and positive effect on enhancing adoption of all the technologies of groundnut production in the study area. FLD and training are effective technology for changing the knowledge, extent of adoption, which ultimately resulted in higher production and productivity with additional net profitability.

Jadhav and Aski (2014) conducted study on extent of adoption red gram production technology, which revealed that 41 per cent of trained and 37 per cent of untrained belonged to medium level of adoption category. Practices such as, time and method of sowing was adopted by cent percent of trainees. That is the practices which are easy to adopt and required less skill were adopted by more number of

respondents. While those practices, which required more knowledge and skills were adopted by less number of respondents.

Tendale *et al.* (2014) found out that Front Line Demonstrations and trainings in Integrated Nutrient Management of brinjal conducted by KVK has amplifies the level of knowledge and level of adoption of tribal farmers. And also increase in yield of brinjal in the field of respondents has motivated other farmers to adopt the technology.

Singh and Singh (2014) opined that the yield potential of the cabbage can be increased to a great extent by conducting front line demonstrations. The results of FLD convincingly brought out that yield of cabbage could be increased by 29 to 35 percentage KVKs are very effective in conducting FLDs.

1.4 Determinants of adoption

Wilkening (1952) has defined adoption of innovation as a process consisting of learning, deciding and acting over a period of time.

Copp *et al.* (1958) postulated adoption of technology as “activity of farmer taking place over a period of time. They perceived adoption of farm practices as a package of related events flowing through time which is not instantaneous”.

Ramsey *et al.* (1959) opined that adoption behaviour involve two components (1) cognitive which includes obtaining knowledge and critical evaluation of practices in terms of individual situations, and (2) behaviour which involves the actual use of the practice.

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

According to Rogers (1983), adoption process is process that occurs in human mind through which an individual passes from first hearing about an innovation to its final adoption.

According to Kiresur *et al.* (1999), the determinants or significant factors the resulted in adoption of the modern techniques of sorghum cultivation include the seasonal factor, quantity of sorghum grains required for family consumption, social participation index, size of operational holding and net returns per hectare of sorghum crop. And result showed that modern technologies were superior to the traditional technologies in terms of grain yield, fodder yield and net returns per hectare.

Joshi *et al.* (2013) studied seven popular varieties of onion for their suitability under semi arid conditions of Andhra Pradesh during kharif seasons of 2010 and 2011. The analysis of variance revealed that agri found dark red, N-53 and agri found white produced bigger size bulbs leading to high bulb yield.

The results of the research conducted by Anik and Salam (2015) showed that farmers were getting a higher return by cultivation of improved variety of onion than the traditional varieties, even though the latter required less capital than the former. The main factor that contributed to the adoption of high yielding variety of onion was quality of extension service and access to credit.

1.4 Constraints of farmers in adoption of technologies

According to Singh *et al.* (2007), the most important constraints reported by respondents of training included ineffective training methods; training content was not matching with the current problem and distance of training venue from the village.

According to David *et al.* (2008), respondents of training of KVKs has provided suggestions for improving the training programmes of KVKs which include sufficient facilities for practical instruments and teaching material, organizing training when farmers are not busy in their farming, adequate availability of residential facilities, increase in transportation facilities and providing of incentives to the trainees during training programme.

According to Bila *et al.* (2009), black rot disease of cabbage is a very important constraint of farmers. And most of the farmers are unaware about the role of seed and seedling infection as source of primary inoculums in disease development. Pesticide price unfavourable and continuous cultivation of cabbage was other important reasons.

According to Subhadra *et al.* (2009), the most important constraints of farmers operating mixed farming in Kerala were non-availability of sufficient land at reasonable price, low productivity, transportation problem and lack of marketing facilities.

According to Thorat *et al.* (2010), lack of large seeds of onion variety Phule Samarth was the main constraint faced by farmers of Dhule district of Maharashtra. Other constraints include high cost of synthetic chemicals such as fertilizers and fungicides, and non-remunerative price in market.

A study conducted by Iniobong *et al.* (2012) in Nigeria on constraints faced by the women farmers in adoption of agricultural technologies showed that, even though women farmers are aware of 61.9 per cent of introduced technologies only 33.3 per cent were fully adopted. And the main constraints for non-adoption of

technologies were high cost of inputs, low income level of women farmers, lack of regular contact with extension agents.

Beena and Singh (2013) revealed that lack of transport facilities, inadequate infrastructure facilities, reduced practical training are perceived as the main constraints faced by the respondents of training in KVKs.

A study conducted by Singh *et al.* (2013) found out the constraints in adoption of mustard production technology, in which first and second positions were occupied by economical constraints, educational constraints, technical constraints and intrapersonal constraints were found third and fourth position among respondents.

Sharma and Singh (2013) concluded their study like “for spice crop such as onion, cumin and chilli most important input related constraint was supply of inferior quality seeds. Second important one was seed is not available in required quantity. And also includes constraints such as untimely availability of chemicals and fertilizers.

Singh *et al.* (2013) conducted a study on KVKs in Uttar Pradesh and they reveal that “non-availability of required inputs, inadequate demonstration facilities, lack of coordination with other agencies, lack of practical exercise in training programme and inadequate boarding and lodging facilities were the most important constraints faced by the respondents of KVK training programmes.

Arora *et al.* (2014) referred that in Haryana, pests and diseases of Rabi onion can be managed by correct usage of POP thereby increasing their income. And KVKs have to conduct more farmers training at farmer’s fields and KVK campus regarding recommended package of practice to fill the extension gap.

Behara *et al.* (2014) found out that the main constraints of farming community for poor adoption of technologies provided by Krishi Vigyan Kendra are

lack of storage and marketing facilities of farm produce followed by unavailability of improved farm implements, illiteracy of farmers and water scarcity.

The major constraints faced by cabbage and cauliflower farmers, identified by Hoq *et al.* (2014) include storage facilities and lack of market information and dominance of intermediaries.

Patoliya *et al.* (2014) stated that the benefit of technology is said to be actually adopted only when farmers in their local situation effectively utilize the technologies. Many constraints act as barrier for these achievements and create adoption gaps such as low yield of crop, these constraints needed to be tackled effectively for development of technologies and improving the level of adoption.

Behara and Das (2015) expressed their opinion about constraints like “constraints are some draw backs or inefficiency in any kind of research.” In case of vegetable cultivation many constraints can be identified those includes risk due to climatic hazard, input supply, disease and pest management, marketing and irrigation facility, poor transporting facility, *etc.*

Dhayal *et al.* (2015) opined that Experts and subject matter specialists in Krishi Vigyan Kendras have to conduct field visits more frequently (as a package) in farmer’s field to reduce the constraints of farmers and to ensure the adoption level of various technologies.

Deshmukh *et al.* (2015) opined that in case of tribal farmers, lack of information of innovation and lack of timely availability of information and inefficient knowledge about the innovation are the major constraints the block them from adoption of new technologies.

Dhurwey *et al.* (2015) in their research on constraints in production and marketing of cool season vegetables, found out constraints such as scarcity of labours, high infestation of insects; pests and diseases, lack of technical knowledge, lack of adequate training facility to farmers, lack of soil testing, facilities and lack of information regarding crop cultivation. Constraints in marketing were lack of facilities regarding standardization, grading, storing, lack of post harvest management and lack of regulated and co-operative market.

According to Gondukar *et al.* (2015) vegetable growers faces many constraints such as lack of knowledge of scientific vegetable production heavy incidents of pest and disease, high cost of inputs like fertilizers, plant protection chemicals, fluctuation in vegetable prices, lack of marketing facilities, non - availability of labour during harvesting of vegetables. All these factors contribute to low production. Hence training and demonstration programmes on improved production as well as are harvesting technology are must to make farmers economically independent.

Singh (2015) opined that there exist a gap between the potential yield of carrot and demonstration yield of carrot. The reason for the gap is due to soil fertility and weather conditions. By conduction Front Line Demonstrations of proven technologies yield potential of carrot can be increased up to a great extent. Hence there will be substantial increase of income and improvement in livelihood of the farming community.

Methodology

III. Methodology

This chapter deals with the research methods and procedures followed in the study. It consists of the following sections.

3.1 Hypotheses under the study

3.2 Research design

3.3 Locale of the study area

3.4 Sampling methodology

3.5 Selection, Operationalisation and measurement of variables

3.6 Methods of data collection

3.7 Statistical tools used

3.1. Hypotheses under the study

Null Hypothesis 1: Training interventions of Krishi Vigyan Kendra, Thrissur in adoption of cool season vegetables were not effective in the coastal areas of Thrissur District.

Alternative hypothesis 1: Training interventions of Krishi Vigyan Kendra, Thrissur in adoption of cool season vegetables were effective in the coastal areas of Thrissur District.

Null Hypothesis 2: Krishi Vigyan Kendra, Thrissur has not played any role in adoption of cool season vegetables in the coastal areas of Thrissur District.

Alternative hypothesis 2: Krishi Vigyan Kendra, Thrissur has played a very significant role in adoption of cool season vegetables in the coastal areas of Thrissur District.

3.2. Research design

According to Ray and Mondal (2011), in ex-post-facto research, the investigator has no direct control over the independent variables whose manifestation occurs first (as already occurred) and then their effects become obvious. It is a kind of research in which the investigator makes an attempt to recognise an effect which has previously occurred to its probable causes. The effect becomes the dependent variable and the probable causes, the independent variables.

Kerlinger (2014) defined ex-post-facto research as empirical inquiry done systematically in which the scientist does not have direct influence of independent variables as their manifestations have already occurred or because they are inherently not manipulable. Inferences about associations among variables are identified, without direct investigation, from concomitant variation of independent variables and dependent variables.

3.3. Locale of the study area

Among the seven panchayats of Mathilakom block in Thrissur district, two panchayats namely Mathilakom panchayat and Perinjanam panchayat were selected for the study. The interventions of KVK, Thrissur related to cool season vegetables were mainly done in Mathilakom block, as the agro ecological conditions are contrasting to conventional cool season vegetables growing areas. This block is in the coastal belt of the district, with mainly sandy, loam soils and relatively high humidity and warm temperature.

The on farm trials, front line demonstrations and trainings were extended to other blocks as well, but this location was selected for the study due to these mentioned reasons. The block has seven panchayats mainly with coconut based homestead farming system.

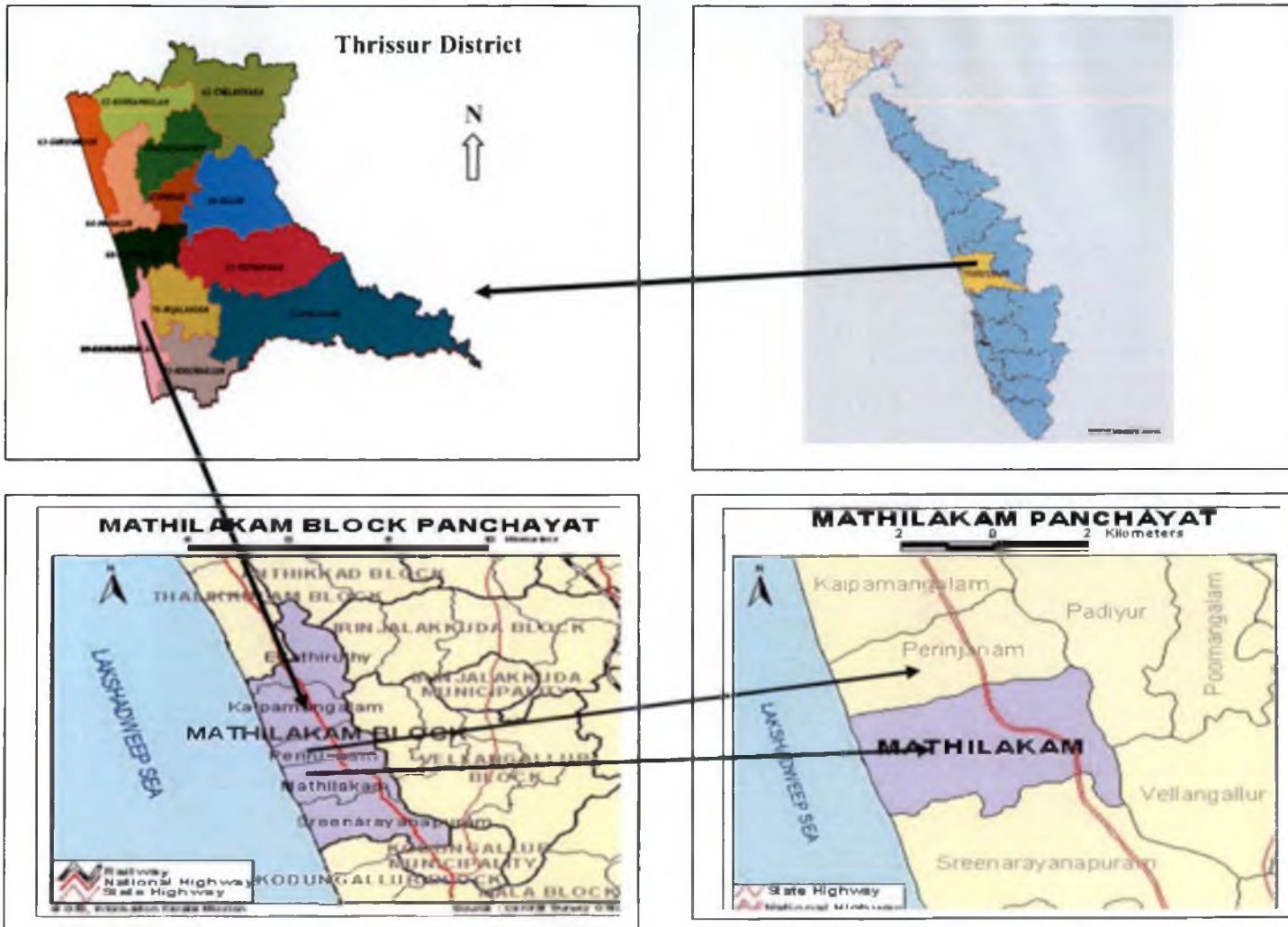


Fig. 3.1. Map showing the study area

3.3.1 Cropping pattern in the study area

Mathilakom block is situated in the coastal belts of Thrissur district with mainly sandy, loam soils and relatively high humidity and warm temperature. The agro ecological conditions are contrasting to conventional cool season vegetables growing areas. Farmers in the research location are following homestead farming with mixed farming system. Major crops cultivated by the farmers of Mathilakom and Perinjanam Panchayats are coconut (*Cocos nucifera*) along with other crops such as spices, fruit crops, vegetables and flower crops like jasmine mainly raised as inter crops. Animals (cow, goat, rabbit), poultry and fish are also grown in farms of some progressive farmers.

Coconut harvesting is done within 45 days interval in a year. Among the spices; nutmeg (*Myristica fragrans*), allspice and camboge (*Garcinia gummigutta*) are popular in most of the homesteads. Pepper (*Piper nigrum*) cultivation is also observed. December to May is the peak period of harvest in nutmeg even though fruits are available throughout the year. In camboge, harvesting is done during January to July.

Banana (*Musa spp.*) and mango (*Mangifera indica*) are the major fruit crops grown. Other fruit crops such as guava (*Psidium guajava*), sapota (*Manilkara zapota*) and papaya (*Carica papaya*) are also cultivated in certain homesteads. Banana is planted during the months of August – September and bunches are harvested during June - July. Harvesting in mango is done during the months of April-June in a year.

Vegetables are an essential part of their cropping system. Major vegetables cultivated include cucurbits, amaranth (*Amaranthus spp.*), okra (*Abelmoschus esculentus*), brinjal (*Solanum melongena*), tomato (*Lycopersicon esculentum*), chilli (*Capsicum annum*), drumstick (*Moringa olifera*), cowpea (*Vigna unguiculata*), beans. Recently cool season vegetables such as cabbage (*Brassica oleracea var. capitata*), cauliflower (*Brassica oleracea var. botrytis*) and onion (*Allium cepa L.*)

have become a dominating vegetable crop in most of the homesteads. The season for cultivation of most of the vegetables is January - March and September - December. In case of cool season vegetables, September to February is the principal season.

3.3.2 Source of planting material and other inputs for cool season vegetable cultivation

Heat tolerant varieties of CSV screened in agricultural research station, Mannuthy of KAU was brought to the homesteads of Thrissur by KVK, Thrissur. Seedling production units established by self help groups, under the guidance of KVK, Thrissur was the primary source of quality seedlings for cabbage and cauliflower. Seeds required for seedling production was obtained from popular seed production companies such as Namdhari seed Pvt. Ltd. Various varieties of seeds used by respondents of the study area were NS160, NS183 and NS43 varieties of cabbage; NS60 and basant varieties of cauliflower; super kuroda and shin kuroda varieties of carrot and madhur variety of beetroot. Agri found dark red was the popular variety of onion planting material in the study location.

Seedlings, input materials such as grow bags; fertilizers and plant protection inputs such as *Pseudomonas*, *Beauveria*, etc. were provided free of cost by krishi bhavans to the self help groups under various agricultural schemes. During the initial stages of popularization of cole crops KVK, Thrissur has interfered with various seedling supplying institutes to ensure the timely supply of quality seedlings to the study area. Onion seedlings were supplied by KVK in time. Other necessary articles required for seedling production such as protrays, soil less media (coco peat, vermiculate and perlite) and liquid fertilizer such as Haisol blue, etc. were available in the local markets. Through the strategy of group formation with the support of KVK, the farmers were empowered to purchase the inputs required for the cultivation of CSV.

Formation of Thanal SHG and Agri club, Mathilakom were successful examples of established vegetable seedling production units. Members of the seedling units were trained by KVK, Thrissur. Now the units not only meet the demand of seedlings of cole crops in the study area, but ensure supply of seedlings to the nearby panchayats and taluks also. In a season an average production and supply of seedlings were 50,000 numbers which gives the clear evidence that the CSV are very much popular in various parts of the Thrissur district.

3.4. Sampling methodology

Maximum number of interventions with front line demonstrations and trainings were conducted on cool season vegetables by KVK in Perinjanam and Mathilakom panchayats of Mathilakom block. Sampling frame was the list of all those who have attended KVK trainings on cool season vegetables during 2008. The list of 200 farmers from Mathilakom (150 No.) and Perinjanam (50 No.) panchayats who had attended training programme of cultivation practices of cole crops at KVK, Thrissur was taken as the sampling frame.

The sample size consisted of 120 randomly selected respondents who have undergone the training programmes of cultivation of cool season vegetables provided by Krishi Vigyan Kendra, Thrissur. The number of participant respondents for both panchayats were decided using Probability Proportional to Size (PPS). Accordingly, as mentioned above, a total number of 120 respondents were selected (90 from Mathilakom and 30 from Perinjanam panchayats). Simple random sampling method ensured equal chance for being selected to every element of the population.

3.5. Selection, operationalisation and measurement of variables

The variables suited for the study and the objectives were selected through judges' rating method after an explorative analysis of available literature and

consultation with experts of agricultural extension in Kerala Agricultural University (KAU), Tamil Nadu Agricultural University (TNAU), and Indian Agricultural Research Institute (IARI). For judges' rating, Google form was created with multiple choice options, where judges were requested to select one choice from the options most relevant, relevant, less relevant and not relevant. Option was also given for providing their additional opinions. The form was e-mailed to each judge separately. Finally, three dependent variables and 15 independent variables were selected according to the rating of 30 judges, from KAU, TNAU and IARI.

3.5.1 Selection of variables

The following were the dependent and the independent variables selected for the study, based on the judges' opinion.

3.5.1.1 Dependent variables

1. Effectiveness of training intervention
2. Extent of adoption
3. Constraints faced by the respondents

3.5.1.2 Independent variables

3.5.1.2.1 Personal variables

Sl. No.	Variables	Sl. No.	Variables
1.	Age	5.	Marital status
2.	Educational status	6.	Family size
3.	Occupational status	7.	Experience in CSV cultivation
4.	Economic status		

3.5.1.2.2 Socio - Economic and Psychological variables

Sl. No.	Variables	Sl. No.	Variables
1.	Social participation	5.	Contact with extension agents
2.	Availability of inputs	6.	Economic motivation
3.	Risk orientation	7.	Cosmopolitaness
4.	Innovative proneness	8.	Production facility

3.5.2 Variables and their empirical measurement

Dependent variables

Variable	Empirical measurement
Effectiveness of training interventions	Scale developed by Kumar and Dutt (2000) was adopted with appropriate modification
Extent of adoption	Scale developed by Sunil and Manjula (2009) was adopted modified for the study
Constraints faced by the respondents	Scoring procedure was developed for this study through judges' opinion using Garrett ranking method.

Independent variables

Variable	Empirical measurement
Age	Procedure followed by Sanjeev (1987) with slight modification
Educational status	Procedure followed by Trivedi (1963)
Marital status	Developed for the study
Family size	Developed for the study

Variable	Empirical measurement
Occupational status	Procedure followed by Trivedi (1963) with slight modification
Experience in CSV cultivation	Developed for the study
Economic status	<i>Farm size</i> - Procedure followed by Venkataramaiah (1983) <i>House type</i> - Procedure followed by Surendran (1982) <i>Annual income</i> - Procedure followed by Ramamurthy (1973)
Social participation	Procedure followed by Fayas (2003) with modification
Contact with extension agents	Procedure followed by Parimaladevi (2004)
Availability of inputs	Developed for the study
Economic motivation	Procedure followed by Supe (1969)
Risk orientation	Procedure followed by Supe (1969)
Cosmopolitaness	Procedure followed by Desai (1989) and modified for the study
Innovative proneness	Developed for the study
Production facilities	Developed for the study

I. Dependent variables

3.5.2.1 Effectiveness of training interventions

Training effectiveness is the applicability of knowledge gained by the trainees in their performance. Training design and development, training environment, training delivery, training implementation and training evaluation act as the key elements which determine the training programme effectiveness (Kunche *et al*, 2011).

In the present study, effectiveness of training interventions of KVK Thrissur on cool season vegetables was measured by calculating the effectiveness index of different components of cole crop cultivation practices included in the training programmes of KVK, Thrissur. Two aspects were considered for measuring effectiveness viz. the extent of coverage of the content in training programmes and the utility of the contents by respondents. The contents of the training interventions were collected from Krishi Vigyan Kendra, Thrissur as secondary data. There were eight contents / components of the training intervention viz., timeliness and duration of training, soil test, planting methods, seed and seedling production, manure & fertilizer application, plant protection inputs, weed control and harvest & post harvest operations.

A. Adequacy of training content

For measuring the adequacy or extent of coverage of training contents, two options were provided: Adequate with a score of 2 and Inadequate with a score of 1. Frequency and percentage were used as statistical tools for measurement using SPSS.

B. Utility of training contents

In this study, the scale used by Kumar and Dutt (2000) was adopted for measuring the utility of content of training interventions of KVK, Thrissur.

For measuring the utility of each content / component, the respondents were asked to respond on a three point continuum as very useful, useful, and not useful; and the scores assigned were 3, 2 and 1 respectively. The data collected were analysed based on effectiveness index using the following formula:

$$\text{Effectiveness index} = \frac{\text{Total score obtained}}{\text{Maximum possible score}} \times 100$$

Overall effectiveness was found out from the effectiveness index of each training contents. Maximum and minimum possible scores ranged from 40 to 16. Based on the mean and SD values, the effectiveness was categorized into 'very effective', 'effective' and 'less effective'.

Table 3.1: Scoring procedure adopted for measuring the training components' effectiveness

Components of training	Extent of coverage		Utility		
	Adequate (2)	Inadequate (1)	Very useful (3)	Useful (2)	Not useful (1)
Timeliness of training					
Soil testing					
Transplanting, sowing					
Seed and seedling production					
Fertilizer and its application					
Plant protection inputs					
Weed control					
Harvest and post harvest operations					

Note: Figures in parenthesis indicate the score

3.5.1.2 Extent of adoption of individual practices

In a social system, diffusion of any innovation takes place only by adoption of that innovation by individuals or groups. Adoption is a process composed of learning, deciding and acting over a period of time. The identified stages of adoption process are awareness, collection of information, conviction, trial and adoption.

The approach followed in the present study to operationalise the extent of adoption was based on the conclusion derived from a review of the various past studies. The adoption of each cultivation practices of cool season vegetable was measured on a three point continuum with scores as given below:

Category	Score	Description
Fully adopted	3	Technology was adopted in its totality
Partially adopted	2	All aspects of the technology was not adopted
Discontinued	1	Technology was discontinued after adoption

The scale of measurement was adopted from Sunil and Manjula (2009) with modification. Composite scores for different practices which were logically consistent were developed. The selection of practices was made in consultation with the experts and the package of practices recommendation of crops (2011) of Kerala Agricultural University. The extent of adoption was worked out for the 14 technologies for which standard recommendations were available. The aspects included: season for cultivation of cool season vegetables, site selection, soil preparation, planting method, manure and fertilizers application, irrigation methods, weed control, blanching (cauliflower), plant protection measures, harvesting maturity, harvesting methods, Post harvest handling methods, storage, and drying of onion.

The maximum score that the respondents could obtain was 42 and minimum was 14. Depending upon the total score obtained by each of the respondents, they were grouped into 'low', 'medium' and 'high' adopter category using mean and Standard Deviation (SD) as a measure of check, and the frequency for over all adoption of technology was expressed in percentage.

Category	Score
Low	(Mean - SD)
Medium	(Mean \pm SD)
High	(Mean + SD)

Table 3.2: Scoring procedure for the extent of adoption of individual practices

Sl. No.	Cultivation practices trained by KVK	FA (3)	PA (2)	DA (1)
1	Season for cultivation of CSV (September to February)			
2	Site selection			
3	Soil preparation			
4	Planting method			
5	Manure and fertilizers application			
6	Irrigation method			
7	Weed control methods			
8	Blanching (cauliflower)			
9	Plant protection measures			
10	Post harvest handling methods			
11	Harvesting maturity			
12	Harvesting methods			
13	Storage methods			
14	Drying of onion			

F A- Full Adoption, PA- Partial Adoption, DA- Discontinued adoption

Note: Figures in parenthesis indicate the score

3.5.1.3 Constraints faced by the respondents

Based on the FGD with the key informants, review of literature and expert opinion; a list of ten constraints experienced by the farmers in the adoption of cool season vegetables was prepared. The respondents were asked to rank the constraints in the order of their importance as perceived by them. A score of one was given for the constraints ranked first, two for the second, three for the third, four for the fourth, five for the fifth, six for the sixth, seven for the seventh, eight for the eighth, nine for the ninth and ten for the tenth. The constraint – wise total scores were worked out by summing up the scores assigned by each respondent to each constraint.

Table 3.3: List of constraints faced by the respondents

Sl. No.	Constraints	Rank
1	Availability of seedlings are very poor	
2	Pest and diseases of the crop is out of control even after application of recommended methods	
3	Planting material and suitable pesticides was not available in time	
4	Cost of production is high compared to other vegetables	
5	Land area not enough for cultivation of CSV	
6	Access for market of inputs for CSV is very poor	
7	Technical supports are not available when needed	
8	Required quantity of organic manure is not available	
9	Weather condition and soil is not favourable	
10	Training programmes of KVK do not cover all aspects regarding cultivation of CSV	

Garrett ranking method was used for ranking the constraints according to the intensity of constraint. The following formula was used for converting the scores to ranks.

$$\text{Percentage position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

where,

R_{ij} = Rank given by the j^{th} respondent to the i^{th} constraint

N_j = Total rank given by all respondents

II. Independent variables

3.5.2 Personal variables

3.5.2.1 Age

Age was conceptualised as the chronological age of the respondents in completed years at the time of investigation and it was measured as the number of years, the respondent has completed at the time of the investigation since his / her birth.

Frequency and percentage analysis were used to interpret the result by adopting the scale followed by Sanjeev (1987). The respondents were then classified into young, middle and old as follows:

Category	Range
Young	less than 30 years
Middle	31 to 50 years
Old	more than 50 years

3.5.2.2 Education

Education was operationally defined as the number of formal years of education, an individual received. The score was assigned as per the scale followed by Trivedi (1963) with slight modifications to suit the Kerala conditions. Frequency and percentage analysis were done to interpret the results.

Level of education	Score
Illiterate	0
Can read and write only	1
Primary education	2
High school education	3
Higher secondary education	4
College education and above	5

3.5.2.3 Marital status

Marriage is one of the crucial social institutions. According to the change in marriage status, the perceptions and attitude of the respondents can also change because marriage might make the persons more responsible and matured in acquiring knowledge of technologies during training sessions and also during adoption of technologies.

The marital status of respondents was measured by coding the status as;

Marital status	Score
Single	1
Married	2
Divorcee	3
Widow (er)	4

Frequency and percentage was used for analysing the data.

3.5.2.1.4 Family size

Family size was operationally defined as the number of members in the family of respondents at the time of study.

The scale was developed for the study on a four point continuum. The family size was divided into categories such as small, medium, large and very large. Frequency and percentage were used for data analysis.

Number of members	Category	Score
Up to 2	Small	1
3 to 4	Medium	2
5 to 6	Large	3
> 6	Very large	4

3.5.2.1.5 Occupation

In the present study, it was operationally defined as the profession or employment of the respondent which formed the major source of income. The categorization of occupation of the respondent followed in this study is as follows:

Category	Score
Monthly paid employee	1
Retired employee	2
Non Residential Indian (NRI)	3
Farmer	4
Business	5

3.5.2.1.6 Experience in CSV cultivation

In this study, experience meant the respondents' past experience in terms of year on cultivation of cool season vegetables. KVK, Thrissur had started the training interventions related to cool season vegetable cultivation during the year 2008. Hence the experience in years was categorized and scored as follows.

Category	Score
Below 1 year	1
1 to 4 years	2
5 to 8 years	3
Above 8 years	4

The experience of the respondents was categorized into low, medium and high using mean and standard deviation as a measure of check.

3.5.2.1.7 Economic status

Economic status can be stated as a person's position within a hierarchical social structure. Economic status depends on a combination of variables which includes annual income, occupation, wealth, place of residence and farm size.

The main components selected for measuring the economic status were

- a. *Farm size*
- b. *Annual income*
- c. *House type*

a. *Farm size*

Farm size or land holding referred to the area in acres owned by the respondents at the time of interview. In the present study, farm size was measured by

adopting the method of Venkataramaiah (1983) with necessary modification suitable to the locality of the study. The scoring followed in this study for measuring land holding is as follows. Frequency and percentages were used for analysis of data.

Farm size	Score
Less than one acre	1
One to five acres	2
More than 5 acres	3

b. Annual income

Annual income can be operationally defined as the total earnings for one year including income from agriculture and non-agriculture sources. The total gross income of the respondent earned during a year through agriculture and other occupations was obtained by asking the respondents to write their annual income for one year in the column provided in the questionnaire.

According to Ramamurthy (1973), annual income was the total of main income and subsidiary income. He has categorised and scored the annual income as follows:

Annual income	Category	Score
Up to Rs. 5000/- per annum	Low	1
From Rs. 5001/- to Rs. 10000/-	Medium	2
More than Rs. 10000/-	High	3

In the present study, the score given by Ramamurthy (1973) was followed in measuring annual income; mainly the reason being most of the respondents were marginal farmers, possessing an average area of less than one acre. The frequencies and percentages were calculated under each category and the respondents were

categorised into three categories as low, medium and high based on mean and standard deviation as the measure of check.

c. House type

A house is a shelter that functions as a home. It ranges from simple dwellings to rudimentary huts, to improvised shacks, to complex fixed structures made up of wood, brick, concrete or other materials with plumbing, ventilation and electric system. House may be single storied or double storied or more than that. Type of house can represent the economic status of a person.

In the present study, the procedure followed by Surendran (1982) was taken with modification according to the present situation as follows:

Category	Score	Category	Score
Tiled	1	Terraced	2
Electrified	3	Plastered	4
Double storied	5	No house	0

3.5.2.2 Socio - Economic and Psychological variables

3.5.2.2.1 Social participation

Social participation was operationally defined as the nature of participation of respondent in various activities of social organisations.

Fayas (2003) measured social participation of respondents in two sections: involvement in organisations and frequency of attending the meetings and other activities of organisation. The scale was modified for this study. The respondents were asked if he/she was a member or official bearer of any organisation. They were

also asked to indicate the frequency of participation. Membership of the respondents in organisation was measured by giving scores as:

Category	Score
Member in one organisation	1
Member in two or more organisation	2
Office bearer	3

Frequency of participation was measured by giving scores as: attend all meetings (score - 2), attend some meetings (score - 1), never attend the meetings (score - 0). Based on the total score obtained, the respondents were classified into three categories, keeping the mean and SD as check.

Table 3.4: Scoring procedure adopted for social participation

Sl. No.	Name of the organization	Status		Frequency of participation		
		Member	Office bearer	Attended all meetings	Attended some meetings	Never attended meetings
1.	Panchayat					
2.	Cooperative societies					
3.	Agri. development advisory committee					
4.	Discussion groups					
5.	Farmer clubs					
6.	Kudumbasree units					

3.5.2.2.2 Contact with extension agents

Contact with extension agents was operationally defined as the frequency of contact of respondents with various extension personnel such as agricultural officers, agricultural assistants, ATMA staff, Subject Matter Specialist (SMS) of Krishi Vigyan Kendra and University scientists.

The scale used by Parimaladevi (2004) was adopted with modifications suitable to present study. In this study, contact with extension agents was measured on six point continuum with scores as follows:

Frequency of contact	Score	Frequency of contact	Score
Two or more times a week	6	Once in a week	5
Once in fortnight	4	Once in a month	3
Rarely	2	Never	1

Table 3.5: Scoring procedure adopted for contact with extension agents

Sl. No.	Name of extension agent / agency	Frequency of contact					
		Two or more times a week	Once in a week	Once in a fortnight	Once in a month	Rarely	Never
1.	ATMA staff						
2.	Agric. assistance						
3.	Agricultural Officers						
4.	KVK scientists						
5.	University scientists						

Frequency and percentage were used for analysis of data. The maximum possible score to be obtained was 30 and minimum was zero. Based on the total score

obtained, the respondents were classified into three categories, keeping the mean and SD as check.

3.5.2.2.3 Availability of inputs

It is the degree of availability of necessary inputs required for the cultivation of cool season vegetables.

A list of inputs required by the respondents for cultivation of cool season vegetable was prepared based on various technologies recommended by Package of Practices of Kerala Agricultural University and in consultation with SMS of KVK, Thrissur. Three options were given to respondents for selection.

The options were rated as: available in time (3), somewhat available in time (2), not available in time (1). The maximum possible score to be obtained was 21 and minimum was zero. Based on the total score obtained, an availability index was calculated using the formula:

$$\text{Availability index} = \frac{\text{Total score obtained}}{\text{Maximum possible score}} \times 100$$

Table 3.6: Scoring procedure adopted for availability of inputs

Sl. No.	Name of inputs	Available in time	Somewhat available in time	Not available in time
1.	Seedlings / seeds			
2.	Manures			
3.	Fertilizers			
4.	PP inputs			
5.	Labour			
6.	Credit			
7.	Implements			

Based on the availability index, the overall input availability was calculated and categorised as available in time, somewhat available in time and not available in time keeping the mean and SD as check. Frequency and percentage was used for analysing the availability of each input.

3.5.2.2.4 Economic motivation

The economic motivation scale developed by Supe (1969) was used for this study. The scale consisted of five positive statements. After obtaining the response from respondents, the responses for each of the five sets of statement were measured giving scores ranging from 5 to 1 as Strongly agree (5), Agree (4), Undecided (3), Disagree (2) and Strongly Disagree (1). The scoring was done by summing up the scores of the weights of the statements. Thus the score ranged from 5 to 25. The respondents were then categorized into low, medium and high based on mean and standard deviation as a measure of check. Higher score of the respondents revealed more economic motivation of the respondents.

Table 3.7: Scoring procedure adopted for economic motivation

Sl. No.	Statement	SA	A	U	DA	SDA
1.	A farmer should work towards larger yields and economic profits					
2.	The most successful farmer is the one who makes the most profit					
3.	A farmer should try any new farming idea which may help him to earn more money					
4.	A farmer should grow vegetables for home consumption to avoid dependence rather than buying from market.					
5.	A farmer should aim at profit making also from farming enterprise.					

SA-Strongly Agree, A-Agree, U-Undecided, DA-Disagree, SDA-Strongly disagree

3.5.2.2.5 Risk orientation

In this study, the scale developed by Supe (1969) was used to measure the risk orientation of the respondents. The scale consisted of six statements. The responses were collected on a five point continuum as shown below:

Points in the continuum	Score	Points in the continuum	Score
Strongly agree (SA)	7	Agree (A)	5
Undecided (U)	4	Disagree (DA)	3
Strongly disagree (SDA)	1		

The scoring pattern was reversed for negative statements. The total score thus obtained by the individual was taken as his score for risk orientation.

Table 3.8: Scoring procedure adopted for risk orientation

Sl. No.	Statement	SA	A	U	DA	SDA
1.	Trying entirely a new crop involves high risk, but it is worthy.					
2.	It is good for a farmer to take risk when there is a possibility that the change will give a high level of success.					
3.	A farmer who is willing to take greater risk than the average farmer usually does better.					
4.	Even though cool season vegetables and onion are not traditionally practised, it is worth trying to get profit and satisfaction.					
5.	Even though there are chances for adversities due to climate change, it is better to grow all CSVs especially for home consumption.					

SA-Strongly Agree, A-Agree, U-Undecided, DA-Disagree, SDA-Strongly disagree

3.5.2.2.6 Cosmopolitaness

Cosmopolitaness was defined as the degree to which a respondent is oriented to his/her immediate outside social system. A cosmopolite respondent is likely to be a changed individual in that he is motivated to look beyond his environment, while others continue to maintain a localistic frame reference.

This variable was measured using the scale developed by Desai (1989) with modification. The frequency of visit to various institutes and centres was taken as the dimension of the variable. A score of 5, 4, 3, 2 and 1 was given for 'twice in a week', 'once in a week', 'once in a month', 'whenever possible', and 'never visit' respectively. Possible score ranged from 5 to 20. Higher score represent better cosmopolitaness. The scoring procedure is as follows

Table 3.9: Scoring procedure adopted for cosmopolitaness

Sl. No.	Name of centres	Twice in a week	Once in a week	Once in a month	Whenever possible	Never visited
1	Krishi bhavan					
2	Cooperative society					
3	Market					
4	KVK / University					

3.5.2.2.7 Innovative proneness

Innovative proneness means the degree to which a respondent is comparatively or relatively earlier in adoption of new ideas. It denotes the quality of being innovative. Wilkening (1953) stated that the adoption of any new idea which is perceived as innovation is a collection of process including learning, deciding and acting over a period of time.

Rogers (1983) defined innovation as an idea, practice / object that is perceived / accepted as new by individual or other units of adoption.

In the present research, a scale was developed based on the adopter categories. Five statements were prepared in such a way that each statement itself represents the adopters' category. The respondents were asked to choose according to the time they had adopted the innovation i.e. cultivation practices of cool season vegetables. Scoring was given to each statement as stated below. Frequency and percentage of respondents under each category was found out.

Table 3.10: Scoring procedure adopted for innovative proneness

Statements	Category	Score
Cultivation of cool season vegetables was started well before the training interventions from KVK	Innovators (Venturesome)	1
Cultivation of cool season vegetables was started just after training by KVK	Early adopters (Respectable)	2
Cultivation of cool season vegetables was started after seeing results of farmers trained by Krishi Vigyan Kendra	Early majority (Deliberate)	3
Cultivation of cool season vegetables was started after innovative fellow farmers forced to adopt	Late majority (Sceptical)	4
Cultivation of cool season vegetables was discontinued after adoption	Discontinued respondents	5

3.5.2.2.8 Production facilities

The agriculture infrastructure includes all of the basic services, facilities, equipments and institutions needed for the agricultural activities. These are the basic facilities required by all the respondents in order to start and continue any kind of innovation. Lack of production / infrastructure facilities plays an important role in

reducing the adoption of new technologies. Before initiating diffusion and adoption of any technology, infrastructure facilities of the social system must be ensured by the change agent.

In this study, a list of infrastructure facilities were prepared and presented to the respondents. Respondents were asked to give two options - yes or no. The variable was measured using a two point continuum as score 2 for 'yes' and score 1 for 'no'. Frequency and percentage were used for data analysis.

Table 3.11: Scoring procedure adopted for production facilities

Sl. No.	Statement	Yes	No
1.	Adequate road and transport facilities helped me to attend training interventions by KVK		
2.	Adequate sunlight is available for cultivation of CSVs		
3.	Adequate irrigation facilities are available for cultivation of CSV in my homestead		
4.	Adequate inputs (grow bags, etc.) are available for cultivation of CSV in my homestead		
5.	Adequate manures and plant protection inputs are available		

3.6. Data Collection

A draft questionnaire was prepared using the selected variables and circulated among the experts. Necessary modifications were made according to the experts' suggestions. A pilot study was conducted on 35 respondents (non-samples) who have attended training interventions on cultivation of cool season vegetables provided by Krishi Vigyan Kendra, Thrissur.

The pilot study was intended to assess the adequacy of the research design and the understandability of the interview schedule to be used for data collection. According to the feedback and data received from the respondents, the schedule was again simplified. Thus, the final interview schedule prepared was direct and easy to understand. Malayalam version of the interview schedule was prepared after the suggestion from the advisory committee members.

The researcher visited each and every respondent in Mathilakom and Perinjanam panchayats. The researcher had explained each component in the schedule so that the respondent would get a clear idea and give a direct and unbiased data. Filled up schedules were collected directly from 120 respondents.

Key informant interviews were done by the researcher in both the panchayats. Face to face interviews were conducted. Key informants included Assistant Director of Agriculture in Mathilakom block, Agricultural Officers and presidents of both panchayats, and Agricultural Assistants in both Krishi bhavans.

To collect qualitative data, Focussed Group Discussion (FGD) with a group of ten respondents was conducted. First FGD was conducted in one of the respondent's residence at Perinjanam panchayat during the study to understand the respondents' attitude, behaviour and general opinion about the cultivation of cool season vegetables. FGD helped the researcher to collect preliminary information prior to the main study. Second FGD was conducted in one of the innovative respondent's residence at Mathilakom panchayat during main study. FGD was done with six respondents who have undergone training programmes of KVK, Thrissur. Researcher being moderator, a guide was prepared and used to ensure that all relevant questions were asked. After a brief introduction, the respondents were asked to introduce themselves and give a few details about their background, such as occupation, experience in farming, *etc.*



Plate 1. Student researcher with the respondents during data collection



Plate 2. Key informant interviews with ADA (left), AO (right) at Mathilakom



Plate 4. Ex – trainees' meet at Mathilakom and Perinjanam



Plate 3. Focussed Group Discussions (FGD) with respondents

3.7 Statistical tools used

3.7.1 Frequency and Percentage

Frequency analysis gives the number of occurrences of each response selected by the respondents. Percentage is a number expressed as it is part of a total which is hundred. In this study, frequency and percentage analyses were used to enable valid comparisons.

3.7.2 Henry Garrett Ranking method

In this study, Garrett ranking was used to find out the most important constraints faced by the respondents in adoption of cool season vegetables. Respondents were asked to assign ranks to the listed ten constraints in such a way that the most important constraint will get the first rank and the least important constraint will get the tenth rank; according to the intensity of each constraint that the respondents experienced while adopting the technologies.

In this method, the orders of the merits / scores given by the respondents were converted into ranks by using the formula

$$\text{Percentage position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

where,

R_{ij} = Ranks given for the i^{th} item by the j^{th} individual.

N_j = Total rank given by all the respondents.

The percentage position of each rank thus obtained was converted into scores by referring to the Henry Garrett table. For each factor, the scores of individual respondents were added together and divided by the total number of respondents for whom the scores were added. The mean score for all the factors was arranged in the

order of their ranks and inferences were drawn. The factor having highest mean value was considered to be the most important constraint.

3.7.3 Correlation Analysis

Correlation coefficient is a measure of the relationship between two variables. The correlation analysis was used for explaining the relationship of different characteristics of independent variables of the respondents such as age, gender, education *etc.* with the dependent variables such as adoption of technology, utility *etc.* In this research, this method was worked out to measure the degree of relationship between the dependent variables 'Y' and independent variables 'X'.

3.7.4 Spearman's rank order correlation

Spearman's rank order correlation is a non-parametric method which indicates the strength and direction of association between two variables that are measured on an ordinal scale. In this study, Spearman's rank order correlation coefficient was used to find out the association between the dependent and independent variables that were expressed in ranks.

3.7.5 Multinomial Logistic Regression (MLR)

Multinomial logistic regression analysis is a method for studying the effects and magnitudes of the effects of more than one independent variable on one dependent variable using the principle of correlation and regression (Kerlinger, 2014). In this study, multinomial regression in SPSS was used to find out effects and magnitude of the independent variables with the dependent variables. The MLR of adoption of cool season vegetables cultivation technologies on all independent variables was carried out.

3.7.6 Factor Analysis

Kerlinger (2014) stated factor analysis, as a method for determining the number and nature of the underlying variables among larger number of measures. More succinctly, it is a method for determining k underlying variables (factors) from n sets of measures, k being less than n . It may also be called a method for extracting common factor variance from sets of measures.

Factor analysis is a technique used, when there is a systematic independence among a set of observed variables and the researcher interested in finding out something more fundamental or latent which created this commonality. This method resolved a multidimensional variable in terms of relatively few categories, known as factors and the factors so derived could be treated as new variables. The following are the major steps involved.

1. Preparation of correlation matrix of items.
2. Factor extraction.
3. Factor rotation.
4. Interpreting the rotated factors.

In this study, factor analysis was done using SPSS to reduce variables into major and minor factors that influence the determinants of adoption of CSV.

3.7.7 Qualitative data analysis

A general impression of the respondents about training interventions of KVK, Thrissur and adoption of cool season vegetables as well as various personal, socio economic, situational and technological factors of the respondents were scrutinized from qualitative data obtained through Focused Group Discussion (FGD) and key informant interviews. The data was analysed critically and concluded into a tabular form which shows the before and after effects of adoption of cool season vegetables in Mathilakom and Perinjanam panchayats of Mathilakom block.

Results and Discussion

IV. Results and Discussion

This chapter provides the ultimate extract of the investigation that the researcher had conducted to find out, upto what extent the training interventions of Krishi Vigyan Kendra were effective in adoption of cool season vegetables. For the present study four major objectives were prepared which includes effectiveness of training programmes, extent of adoption of cool season vegetables, determinants of adoption and elucidation of constraints faced by the respondents. The findings, facts and critical information gathered are described below under the following sub-headings.

- 4.1. Profile of the respondents
- 4.2. Overall adequacy of training interventions on CSV cultivation
- 4.3. Adequacy of each content / component of training intervention on CSV cultivation
- 4.4. Relation between adequacy of training contents and independent variables
- 4.5. Usefulness of training interventions on CSV cultivation
- 4.6. Degree of relationship between usefulness of training components and independent variables
- 4.7. Effectiveness of training interventions in CSV cultivation
- 4.8. Extent of adoption of CSV cultivation practices.
- 4.9. Relation of independent variables with adoption of CSV cultivation practices
- 4.10. Degree of relationship of independent variables with adoption of CSV cultivation practices
- 4.11. Determinants of adoption of CSV cultivation practises by respondents
- 4.12. Cool season vegetables grown by the respondents
- 4.13. Constraints faced by the respondents in adoption of CSV practices

4.1 Profile of respondents

The results related to personal, socio-economic, psychological characteristics of respondents are depicted in Table 4.1.

Table 4.1: Profile of the respondents of CSV training interventions

N = 120

Category	Frequency (No.)	Percentage (%)
Age (years)		
Below 30 (young)	1	0.80
31 to 50 (middle)	51	42.50
51 above (old)	68	56.70
Gender		
Male	16	13.30
Female	104	86.70
Educational status		
Illiterate	0	0.00
Can read and write	3	2.50
Primary	20	16.70
High school	48	40.00
Higher secondary	26	21.70
Collegiate	23	19.20
Occupational status		
Monthly paid employee	9	7.50
Retired employee	8	6.60
Farmer	98	81.70
Business	5	4.20

Category	Frequency (No.)	Percentage (%)
Marital status		
Single	3	2.50
Married	107	89.20
Divorcee	1	0.80
Widow(er)	9	7.50
Family size (No.)		
Below 3 members	9	7.50
3 – 4 members	71	59.20
5 – 6 members	30	25.00
Above 6 members	10	8.30
Experience in CSV cultivation (Mean = 6.84, SD= 2.38)		
Low (Less than 1 year)	24	20.00
Medium (1 – 4 years)	68	56.66
High (5 – 8 years)	28	23.34
Annual income (Rs.) (Mean =31550, SD=3740)		
Low (Below 5000)	37	30.80
Medium (5001-10000)	14	11.70
High (Above 10000)	69	57.50
Land holdings (in acre)		
Below 1	103	85.80
1 – 5	12	10.00
Above 5	5	4.20
House type		
Rented house	2	1.70
Tiled house	21	17.50
Terraced house	75	62.50
Double storied (terraced)	22	18.30

Category	Frequency (No.)	Percentage (%)
Social participation (Mean =9.88, SD=2.63)		
Low (Mean - SD)	9	7.50
Medium (Mean ± SD)	100	83.30
High (Mean+ SD)	11	9.20
Contact with Extension agents (Mean=7.33, SD=4.34)		
Low (Mean - SD)	35	29.20
Medium (Mean ± SD)	35	29.20
High (Mean+ SD)	50	41.60
Availability of inputs (Mean=71.38, SD=16.49)		
Not available in time	44	36.70
Rarely available	11	9.20
Available in time	65	54.10
Economic motivation (Mean=108.83, SD=14.9)		
Low (< 93.89)	19	15.80
Medium(93.89-123.7)	26	21.70
High (> 123.7)	75	62.50
Risk orientation (Mean=78.3, SD=10.28)		
Low (< 68.02)	11	9.20
Medium (88.58-68.02)	87	72.50
High(> 88.58)	22	18.30
Cosmopolitaness (Mean=11.28, SD=3.98)		
Low (< 7.30)	22	18.30
Medium (7.30 -15.26)	75	62.50
High (> 15.26)	23	19.20

Category	Frequency (No.)	Percentage (%)
Innovative proneness		
Innovators	1	0.80
Early adopters	75	62.50
Early majority	34	28.40
Late majority	6	5.00
Discontinued	4	3.30
Production facility		
Adequate	117	97.50
Inadequate	3	2.50

4.1.1 Age

The result presented in the table 4.1 showed that the more than half of the respondents (56.70 %) were aged above 51 years. About two-fifth of the respondents (42.50 %) belonged to the middle age group of 31 to 50 years. Only 0.8 per cent of respondents were in the young age group of below 30 years.

There was almost equal distribution of respondents between middle and aged categories. Most of the respondents who attended the training programmes of KVK on cool season vegetable cultivation from 2008 to 2015 were from middle and old age. The reason for this situation could be that most of the respondents were females and members of organisations like Kudumbasree. Hence, it is quite obvious that young respondents were very negligible.

However, it is really a matter of concern that younger generation is not giving much importance to agriculture. Efforts should be taken to attract the younger generation into agriculture and appropriate policies like modernisation and computerization in agriculture and farmer friendly strategies, should be devised.

4.1.2 Gender

From the Table 4.1, it is clear that 86.70 per cent of respondents were females. Only 13.30 per cent of respondents were males.

In both the Mathilakom and Perinjanam panchayats, about 87.00 per cent of the adopters of cool season vegetable cultivation practices were women. Most of the women, who have attended training programmes of KVK, were working in connection with Self Help Groups. They were house wives, who took new technology as a means of getting synthetic chemical free, safe to eat vegetables for domestic consumption and also as a way for making additional income.

4.1.3 Educational status

Exactly two-fifth of the respondents (40.00 %) was having high school education. A slightly higher than one fifth of the respondents (21.70 %) had higher secondary level of education followed by 19.20 per cent with collegiate education and 16.70 per cent respondents with primary education. There were very negligible respondents (2.50 %) who could read and write only. There were no illiterate respondents who have attended training programmes of KVK, Thrissur for cool season vegetable cultivation. Respondents with higher education and college education were almost equally distributed. This situation reiterates the fact that Kerala is an educated state.

4.1.4 Occupational status

The results presented in Table 4.1 showed that majority of the respondents (81.70 %) were having farming as their occupation, followed by monthly paid employees (7.50 %), retired employees (6.60 %) and businessmen (4.20 %).

Most of the respondents were female farmers who had a basic interest in vegetable cultivation in their kitchen gardens and house terraces. They were co-

ordinately doing all the farming practices with their spouses and other family members. Retired employees were also involved actively in CSV cultivation. Respondents such as monthly paid employees and those who had established their own businesses have also taken the cool season vegetable cultivation as a subsidiary source of income generation. From this, it could be inferred that people are more health conscious and want safe to eat food. Hence, irrespective of the occupational status, all the respondents have undertaken the production of cool season vegetables.

4.1.5 Marital status

Out of 120 respondents, most of them were married (89.20 %). There were widows (ers) also among the respondents (7.50 %). Very negligible respondents (2.50 %) were not married and only one respondent (0.80 %) was divorcee.

As majority of the respondents were females and belonging to middle and aged groups, it was quite natural that they belonged to married category. A few aged respondents belonged to widower category. As the number of young respondents was very less, the percentage of the respondents as single was also less.

4.1.6 Family size

The results presented in the Table 4.1 revealed that 59.2 per cent of the respondents belonged to small family with three to four members. About 25 per cent of the respondents were having medium family followed by respondents with large size family (8.3 %) and very small family (7.5 %). None of the respondents belonged to joint families. Most of them had medium family size with 3 to 4 members.

4.1.7 Experience in CSV cultivation

Table 4.1 showed that majority of the respondents (56.66 %) were having medium level of experience (1 to 4 years) in cultivation of CSV, followed by 23.34

per cent of the respondents having high level of experience (5 to 8 years). Twenty per cent had low level of experience (< 1 year) with regard to cultivation of CSV.

KVK, Thrissur started training interventions in adoption of cool season vegetables in the study area from 2008. Since most of the respondents started cultivation practices after attending training interventions of KVK Thrissur, they were having around one to four years of experience in cool season vegetable cultivation. It could also be inferred that there was a considerable percentage of early majority, who have attended the training interventions after seeing the successful results of early adopters.

4.1.8 Annual income

The results in Table 4.1 showed that majority of the respondents (57.50 %) had income of more than 10,000 INR per annum (high income group). Around 30 per cent of the respondents earned less than 5000 INR per annum (low income group). Less percentage of the respondents (11.70 %) had an income between 5001 to 10000 INR per annum (medium income group).

The area under study has coconut based cropping system. Most of the respondents were coconut farmers. The main income of majority of the respondents, who are early majority of cool season vegetables cultivation, was from marketing of copra and fresh coconuts. The early majority adopters who were middle aged female respondents enjoyed the additional income through cultivation of other vegetables such as brinjal, chilly, tomato, cucurbits, drumstick, *etc.* in their kitchen gardens and terraces. Now most of the respondents earn income by cool season vegetable seedling production also.

A considerable number of respondents belonged to low income category. The probable reason could be attributed to the fact that these respondents utilise the farm produces for domestic purpose rather than selling in the markets. According to the

general opinion gained through Focussed Group Discussion (FGD), respondents are more health conscious and prefer to consume their own kitchen garden vegetables which guaranteed safe to eat, chemical free products rather than selling it in the market. However, the marketable surplus produce is sold.

4.1.9 Land holding

The results furnished in Table 4.1 showed that more than 85 per cent of the respondents had less than 1 acre of land and ten per cent of the respondents owned one to five acres of land. More than 5 acres of land were owned by only 4.20 per cent of the respondents. There were no landless respondents.

Majority of the respondents hold less than one acre of land. As per the observation of the researcher, less land holding of respondents was not affecting the successful intervention of the KVK, Thrissur in adoption of cool season vegetables because most of the respondents utilised grow bags and their house terraces for the purpose. Reduced land holding was not a constraint on the extent of adoption of technologies. Respondents having more land holding, even minority in number, had enormous utilisation of their land for cultivation of cool season vegetables. About 63 cents area was utilised by one of the respondents for cultivation of cabbage, cauliflower, carrot, onion and beetroot. It showed the interest of the respondents to adopt the CSV.

4.1.10 House type

Table 4.1 revealed that nearly two third (62.50 %) of the respondents had constructed terraced houses. About 17.50 per cent of the respondents resided in tiled houses. Around 18 per cent of the respondents owned double storied houses and very minor percentage (1.70 %) of the respondents resided in rented houses. All houses were 100 per cent electrified and plastered.

Majority of the respondents resided in terraced houses; hence they were able to adopt the new crop without disturbing already existing crops. Cool season vegetables such as cabbage and cauliflower were cultivated in grow bags in the terraces. Most of the respondents preferred land to cultivate carrot, beetroot and onion. So the house type of respondents has played a very important role in adoption of cool season vegetables.

4.1.11 Social participation

Table 4.2: Distribution of respondents according to their social participation

N=120*

Sl. No.	Organisation	Frequency / Percentage	Membership		Attendance		
			Member	Office bearer	Attended all meetings	Attended some meetings	Never attended meetings
1.	Panchayat	Number	31	2	22	9	89
		Percentage	25.80	1.70	18.30	7.50	74.20
2.	Cooperative societies	Number	32	1	15	17	88
		Percentage	26.70	0.80	12.50	14.20	73.30
3.	Agrl. Dev. advisory committee	Number	21	2	17	4	99
		Percentage	17.50	1.70	14.20	3.30	82.50
4.	Discussion groups	Number	14	0	10	4	106
		Percentage	11.67	0.00	8.30	3.30	88.30
5.	Farmers' club	Number	50	4	39	11	70
		Percentage	41.60	3.33	32.50	9.20	58.30
6.	Kudumbasree	Number	90	9	72	18	30
		Percentage	75.00	7.50	60.00	15.00	25.00

* Multiple responses

Table 4.2 revealed that exactly three fourth of the respondents (75.00 %) were members in Kudumbasree units and 7.50 per cent of them functioned as office bearers in various capacities in kudumbasree units; 60.00 percent of them attended all the meetings, whereas 15.00 per cent attended some meetings and 25.00 per cent have never attended any meetings. Around 41.00 per cent of the respondents were members of farmers' club; out of which 32.50 per cent attended all the meetings, while 9.20 per cent attended some meetings. 25.80 per cent of the respondents had membership in panchayat; out of which 18.30 per cent attended all the meetings while 7.50 per cent attended some meetings. More than 26.00 per cent of the respondents had membership in cooperative societies. 17.50 per cent of the respondents had membership in agricultural development advisory committee and more than 11.50 per cent had membership in discussion groups.

About 9.00 per cent of the respondents were members in more than four organisations. About 16 per cent of the respondents were members in three organisations. Majority of the respondents (44.20 %) were members in two organisations. About 30.00 per cent of the respondents were involved in activities of any one of the organisations. Hence it is interesting to note that all the respondents are involved in activities of any of the organisations listed above.

Most of the respondents, being females, who work as groups in association with self help groups, had more social participation in Kudumbasree units. Krishi Vigyan Kendra, Thrissur had taken care to include kudumbasree members as trainees which have ultimately led to the successful adoption of cool season vegetable cultivation practices which was entirely new for the community. The idea of KVK, Thrissur to empower women through adoption of a new technology was a matter of appreciation.

In the research, it was found that the general tendency among females was to avoid or stay away from participating in organisational meetings. Hence except

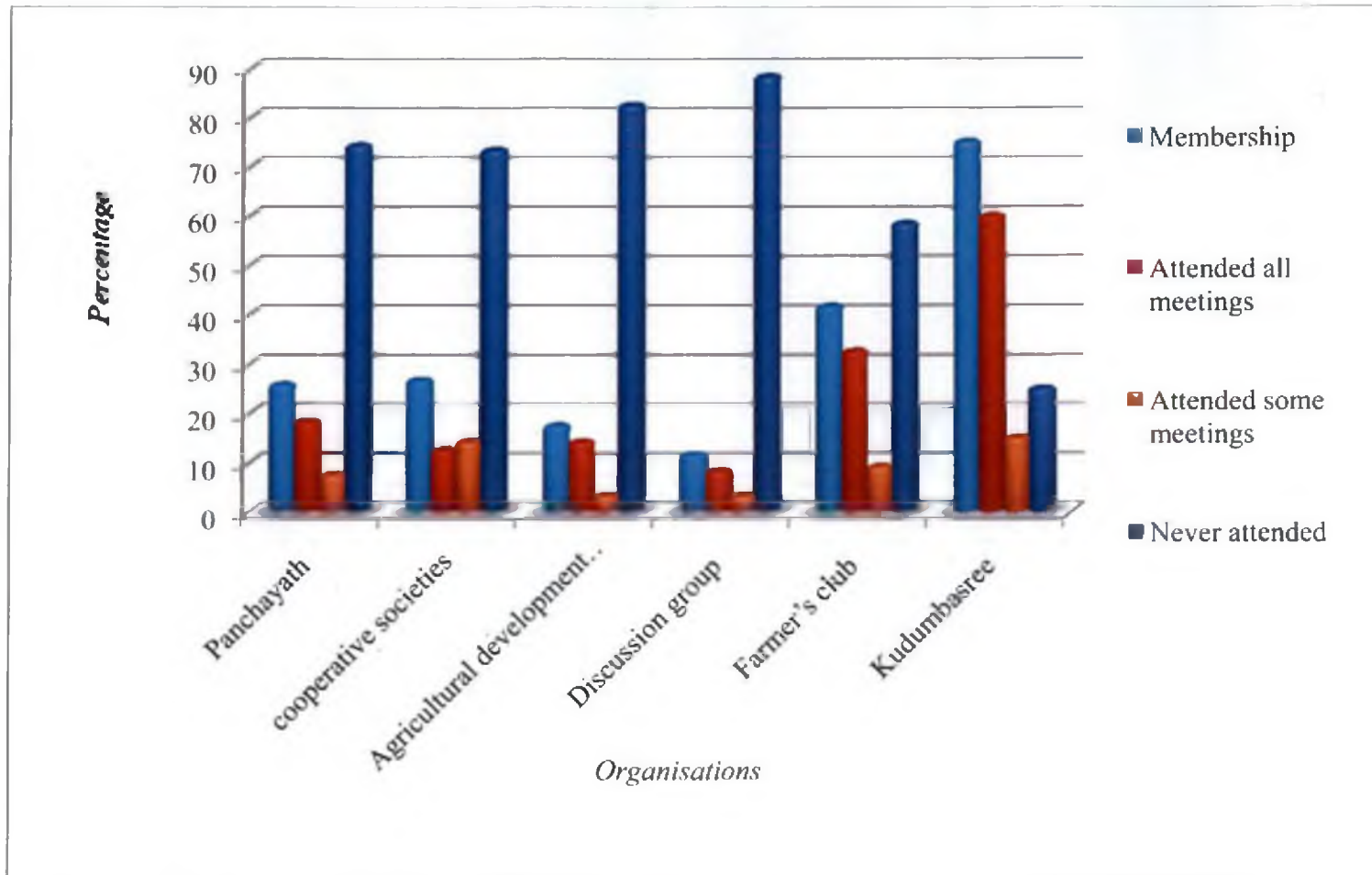


Figure 4.1 Distribution of respondents based on participation in organisations

kudumbasree, all other organisation showed very less participation of respondents. Proximity of farmers club to the residents of respondents had enhanced the participation upto nearly 42 per cent.

4.1.12 Contact with extension agents

Table 4.3: Distribution of respondents according to contact with extension agents

N=120*

Sl. No.	Name of the agent	Frequency / Percentage	Frequency of contact					
			Two or more times in a week	Once in a week	Once in a fortnight	Once in a month	Rarely	Never
1.	ATMA staff	No.	17	41	11	21	21	9
		%	14.17	34.17	9.16	17.50	17.50	7.50
2.	Agricultural Assistants	No.	21	44	17	1	23	14
		%	17.50	36.66	14.18	0.80	19.16	11.66
3.	Agricultural Officers	No.	19	48	9	31	7	6
		%	15.83	40	7.51	25.83	5.83	5.00
4.	KVK SMSs	No.	19	15	16	17	35	18
		%	15.84	12.5	13.33	14.17	29.16	15.00
5.	University Scientists	No.	0	16	17	16	19	52
		%	0.00	13.33	14.16	13.33	15.85	43.33

* Multiple responses

From the Table 4.3 we could infer that about 75.00 per cent of the respondents were in frequent contact with Agricultural Technology Management Agency (ATMA) staff and 17.50 per cent of the respondents had rare contact with ATMA

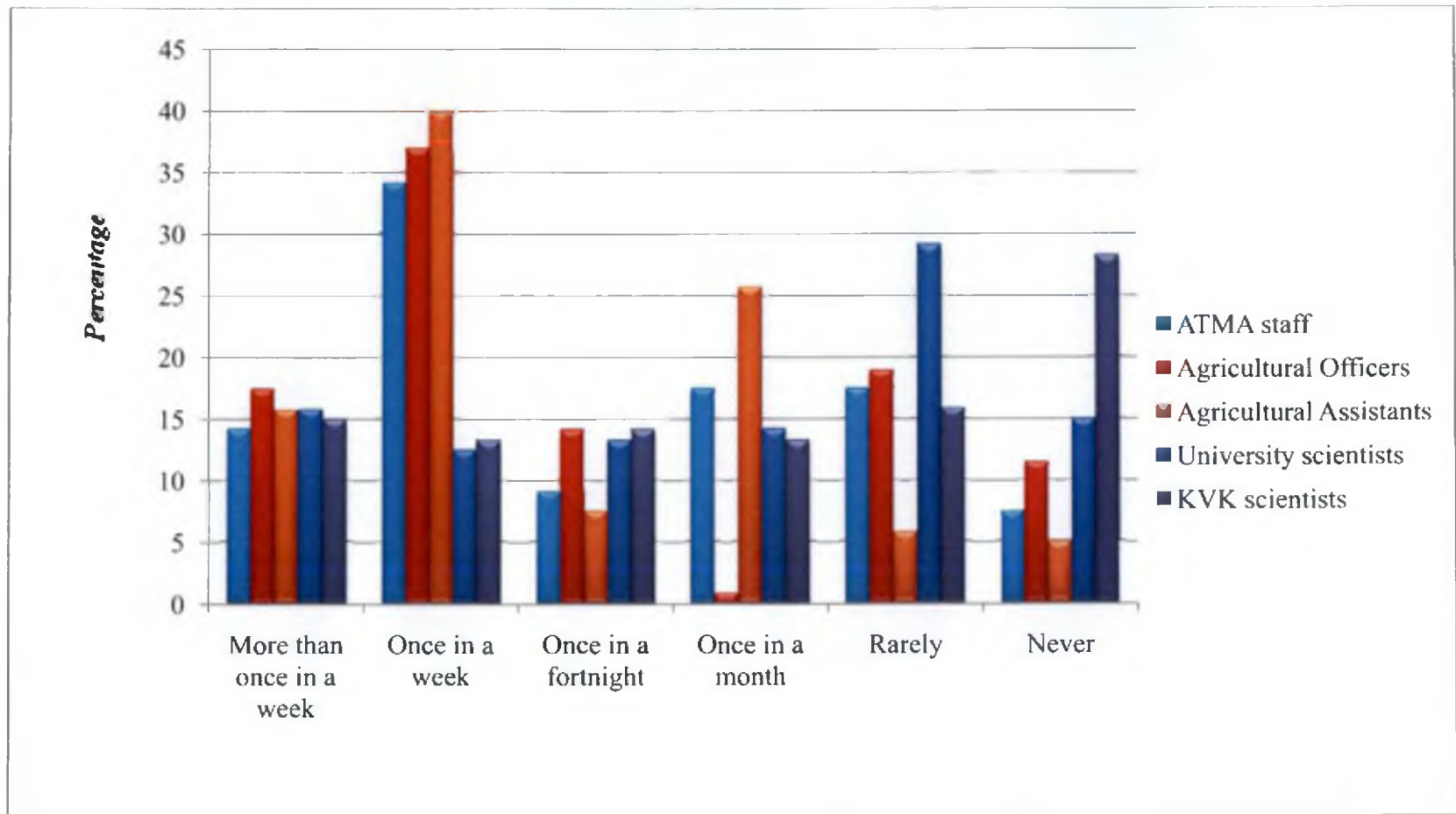


Figure 4.2 Distribution of respondents based on contact with extension agency

staff. Nearly 90.00 per cent of the respondents were in good contact with Agricultural Officers for advice and 5.83 per cent of respondents were in rare contact. About 69.14 per cent of respondents were in contact with Agricultural Assistants. The respondents had a good contact with KVK scientists and University scientist also (55.84 % & 55.82 % respectively). Among all the extension agents, agricultural officers were the most contacted persons followed by ATMA staff and agricultural assistants. Nearly 50 per cent of the respondents were rarely contacting KVK and University scientists. The remoteness or distance of the agency/ institutions and accessibility might be the possible reasons for very poor contact of the respondents.

4.1.13 Availability of inputs

According to the Table 4.4, about three fifth of the respondents (61.70 %) agreed that seeds and seedlings were available in time and very negligible respondents (2.50 %) said that it was not available in time. In case of manure availability, 48.30 per cent and 45.00 per cent gave response as available in time and sometimes available respectively. About three fifth of the respondents (60.80 %) stated that fertilizer was not available in time. Nearly two fifth of the respondents (43.30 %) revealed that plant protection inputs were sometimes available in time. In case of labour availability, even though 39.20 per cent of the respondents opined that it was available in time, it was noticed almost equal distribution of respondents among other categories also. About two third of the respondents (41.70 %) informed that credit was sometimes available. Respondents were nearly equally distributed in case of implement availability.

According to majority of the respondents, non-availability of quality seedlings was a problem during initial stages of adoption which had been overcome by establishment of cool season seedling production units in the study area by individual farmers as well as self help groups with the help of KVK interventions and krishi bhavans of Perinjanam and Mathilakom.

Table 4.4: Distribution of respondents according to the availability of inputs

N=120

Sl. No.	Name of the inputs	Frequency/ Percentage	Availability in time		
			Available in time	Sometimes available	Not available in time
1.	Seeds and seedlings	Number	74	43	3
		Percentage	61.70	35.80	2.50
2.	Manures	Number	58	54	8
		Percentage	48.30	45.00	6.70
3.	Fertilizers	Number	24	23	73
		Percentage	20.00	19.20	60.80
4.	Plant protection inputs	Number	31	52	37
		Percentage	25.80	43.30	30.80
5.	Labour	Number	47	41	32
		Percentage	39.20	34.20	26.70
6.	Credit	Number	43	50	27
		Percentage	35.80	41.70	22.50
7.	Implements	Number	45	38	37
		Percentage	37.50	31.70	30.80

Fertilizer was the major input which was not available in time among all other inputs. The overall trend in Kerala for converting agricultural sector into complete organic might have affected the availability of synthetic/inorganic fertilizers. The respondents have only few dairy and poultry units in their farm which could be attributed as a reason for less availability of manures locally. In case of availability of plant protection inputs, labour, credit and implements respondents were nearly equally distributed among 'available in time' and 'sometimes available'. Respondents

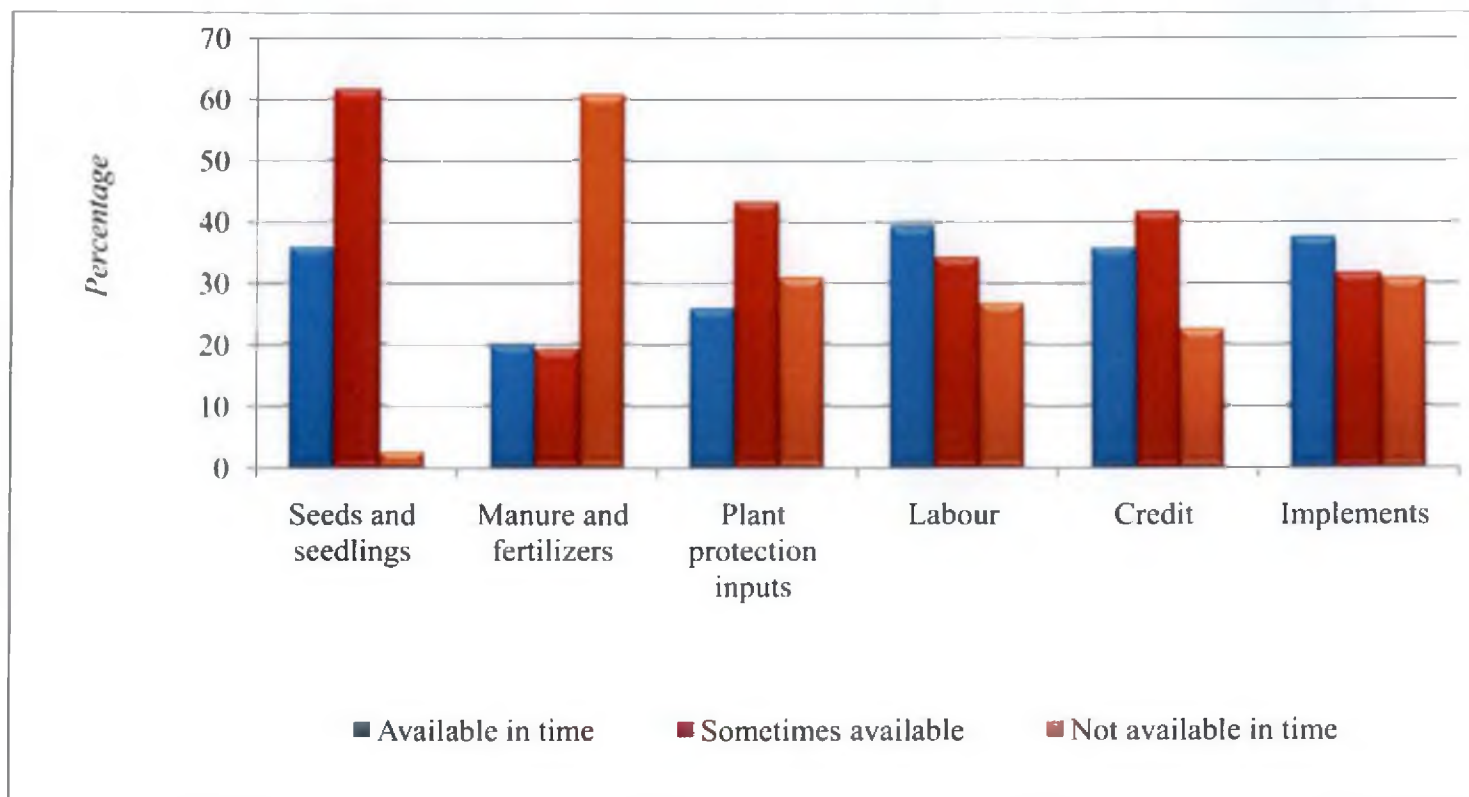


Figure 4.3 Distribution of respondents based on perception on input availability

who had high extension agency contact could manage to get required inputs in time. Low extension contact, lack of source and knowledge about the source might be the main constraints for the availability of the above inputs.

4.1.14 Economic motivation

It is evident from Table 4.1 that 62.50 per cent of the respondents had high level of economic motivation followed by medium (21.70 %) and low (15.80 %) levels.

Economic motivation is a drive of respondent for occupational success in terms of profit making and the relative value placed on economic ends. Respondents with high economic motivation (62.50 %) were more oriented towards production of cool season vegetable seedlings. In addition to income from selling of produces of cool seasonal crops, respondents managed to earn more from seedling production.

4.1.15 Risk orientation

Table 4.1 showed that only 18.3 per cent of the respondents had high risk orientation. Nearly three fourth (72.50 %) of the respondents had medium level of risk orientation. Around 9.00 per cent showed low level of risk orientation. Low extension contacts might be the possible reason for this situation.

Risk orientation is the degree to which the respondent was oriented towards taking the risk associated with cultivation of cool season vegetables. The results revealed that majority of the respondents were medium risk takers. Since majority of the respondents belonged to high income group and had medium economic status, they were found to be medium risk takers. Another possible reason for enhanced orientation towards risk taking ability of respondents might be the support and encouragement provided by KVK, Thrissur through various interventions at appropriate time in adoption of cool season vegetables.

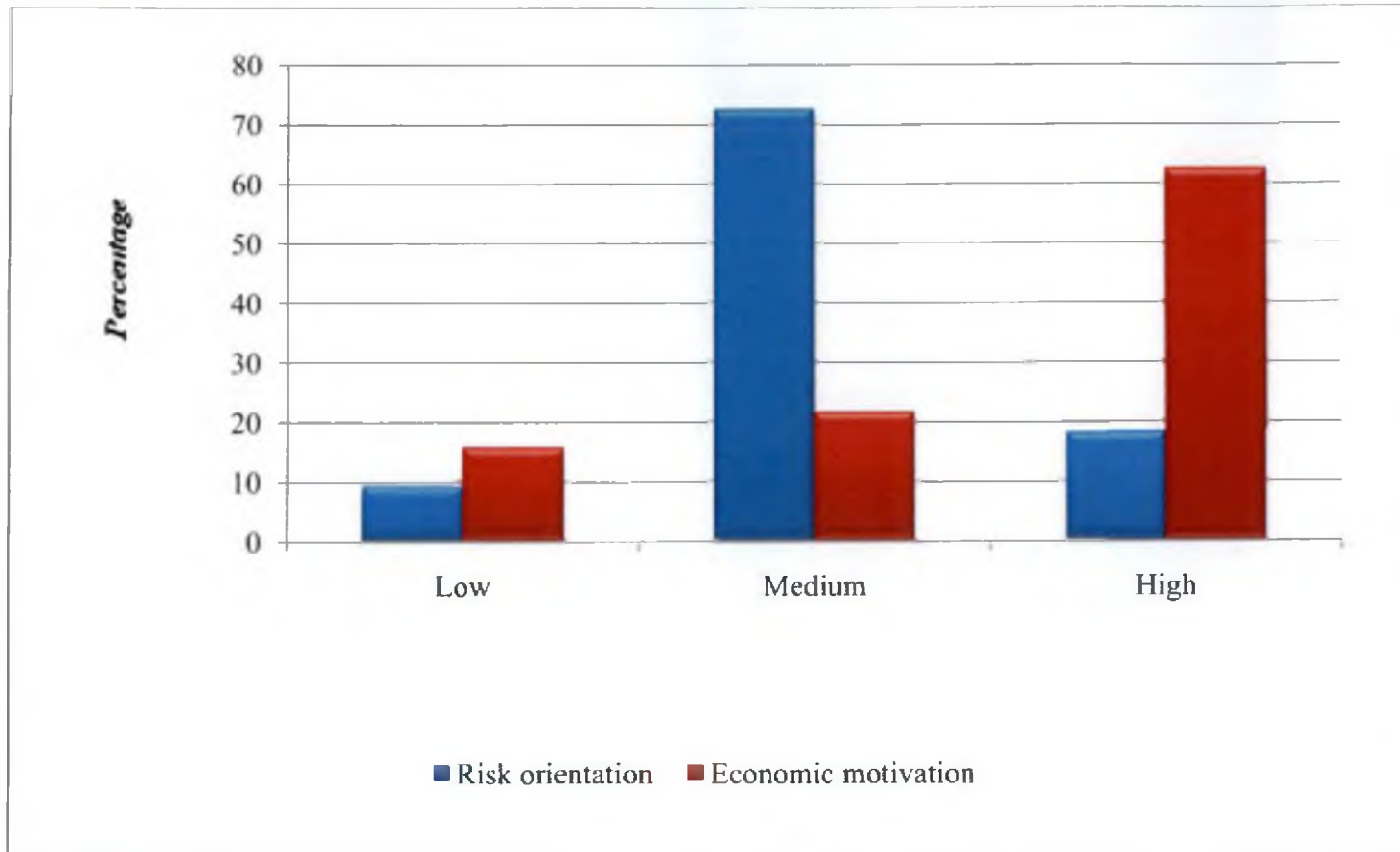


Figure 4.4 Distribution of respondents based on risk orientation and economic motivation

KVK, Thrissur had taken immense efforts to provide required inputs such as seedlings and grow bags to the respondents along with the technical support through training interventions. Careful decision of the Subject Matter Specialists (SMS) of KVK, Thrissur in encouraging the respondents for establishing seedling production units along with the adoption of cool season vegetables had supported the respondents in avoiding risks in the initial stages of adoption itself.

4.1.16 Cosmopolitaness

A slightly higher than three fifth of the respondents (62.50 %) had medium level of cosmopolitaness followed by high (19.20 %) and low levels (18.30 %). Frequently visited organisation was krishi bhavan followed by cooperative society, market and KVK. No respondents were involved in activities of any other organisations.

Proximity of krishi bhavan might be the primary reason for the increased visit of the respondents to that institute. As the important agricultural information were easily available, most of the respondents preferred to make frequent visit to Krishi bhavans. Inputs required for CSV cultivation such as seedlings, grow bags, *etc.* were provided by KVK and panchayats through krishi bhavans and this situation might be the possible factor for more visits to krishi bhavans.

The organizations such as cooperative societies and markets which are related to selling and buying of agricultural products were the next most visited places by the respondents. KVK, Thrissur is located somewhat far from the study location. Hence the respondents' visit to the institute was minimal. But it is important to note that though the operational area of the KVK is entire district, the SMSs from KVK, Thrissur visit to the study location frequently for imparting knowledge on various aspects of CSV cultivation.

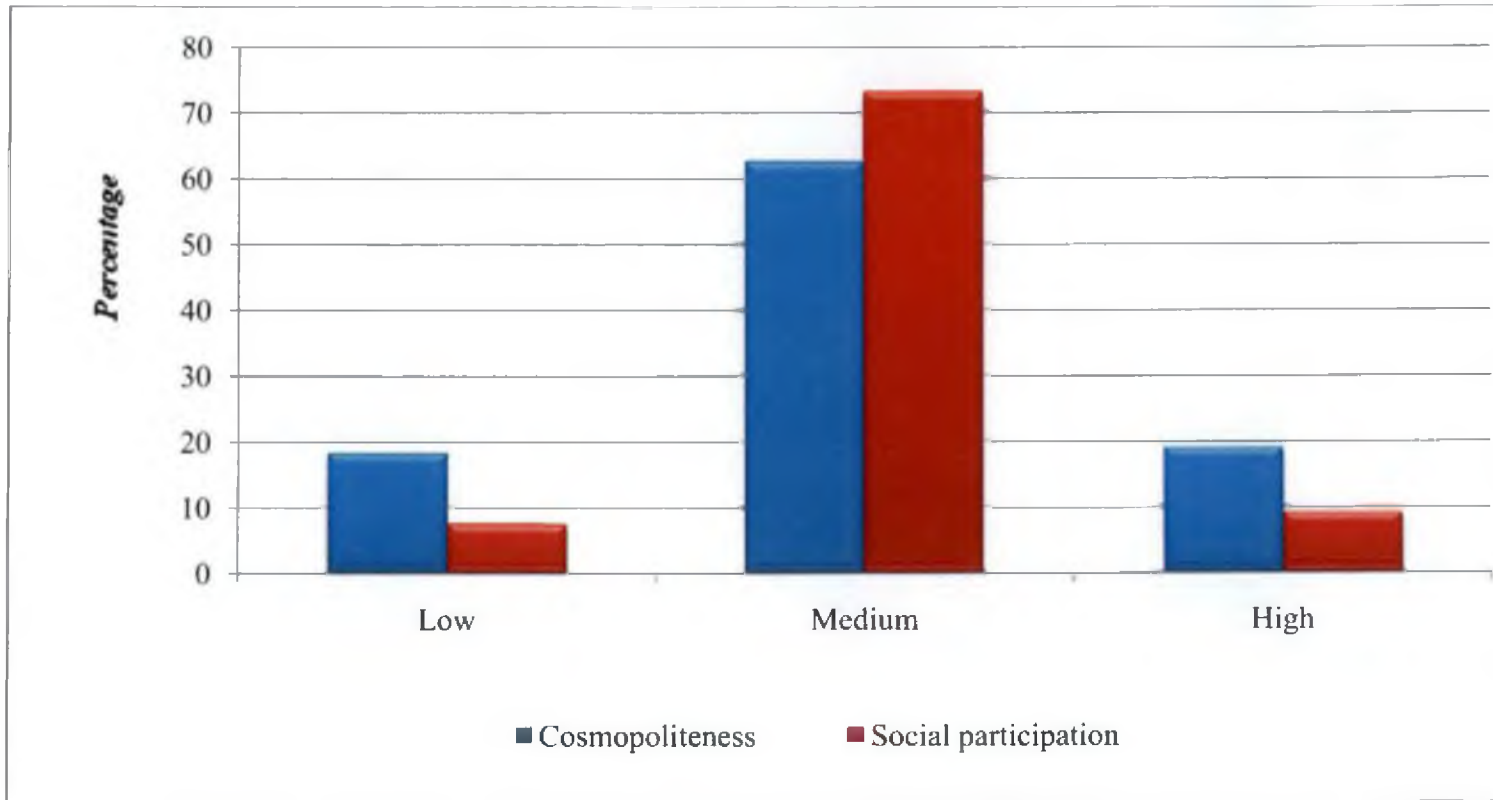


Figure 4.5 Distribution of respondents based on cosmopolitanism and social participation

4.1.17 Innovative proneness

From the Table 4.1, we could interpret that nearly two third (62.50 %) of the respondents started cultivation practices of cool season vegetables as soon as they were trained by KVK, Thrissur. Hence these respondents could be categorised as early adopters of CSV cultivation practices. Less than one per cent (0.80 %) of the respondents had knowledge about the technology and was using it before undergoing any training interventions, which could be considered as innovators. More than 28 per cent of the respondents had waited for the results of other fellow farmers to adopt the new crop in their field, which comes under early majority category. A negligible number (3.30 %) of the respondents had mentioned like they have discontinued the cultivation of CSV. non -availability of seedlings especially in case of carrot, beetroot might be some of the reasons that a negligible number of respondents had discontinued the adopted practices.

It can be concluded that majority of respondents were coming under the category of early adopters. The number of respondents who has discontinued the practices can be ignored as the percentage was very insignificant. The reasons for discontinuing the CSV cultivation by a very few respondents were found to be finding better employment such as jobs in gulf countries, leaving from self help group due to personal reasons and thus discontinuing the cultivation and crop failure due to non-availability of seedlings on time. The number of respondents as innovators was also found very less. High level of education of the respondents might be another reason for the increased innovative proneness.

4.1.18 Production facilities

From the Table 4.5, it was clear that most of the respondents (90.00 %) agreed that, transportation facilities to reach KVK, Thrissur were adequately available in the locality.

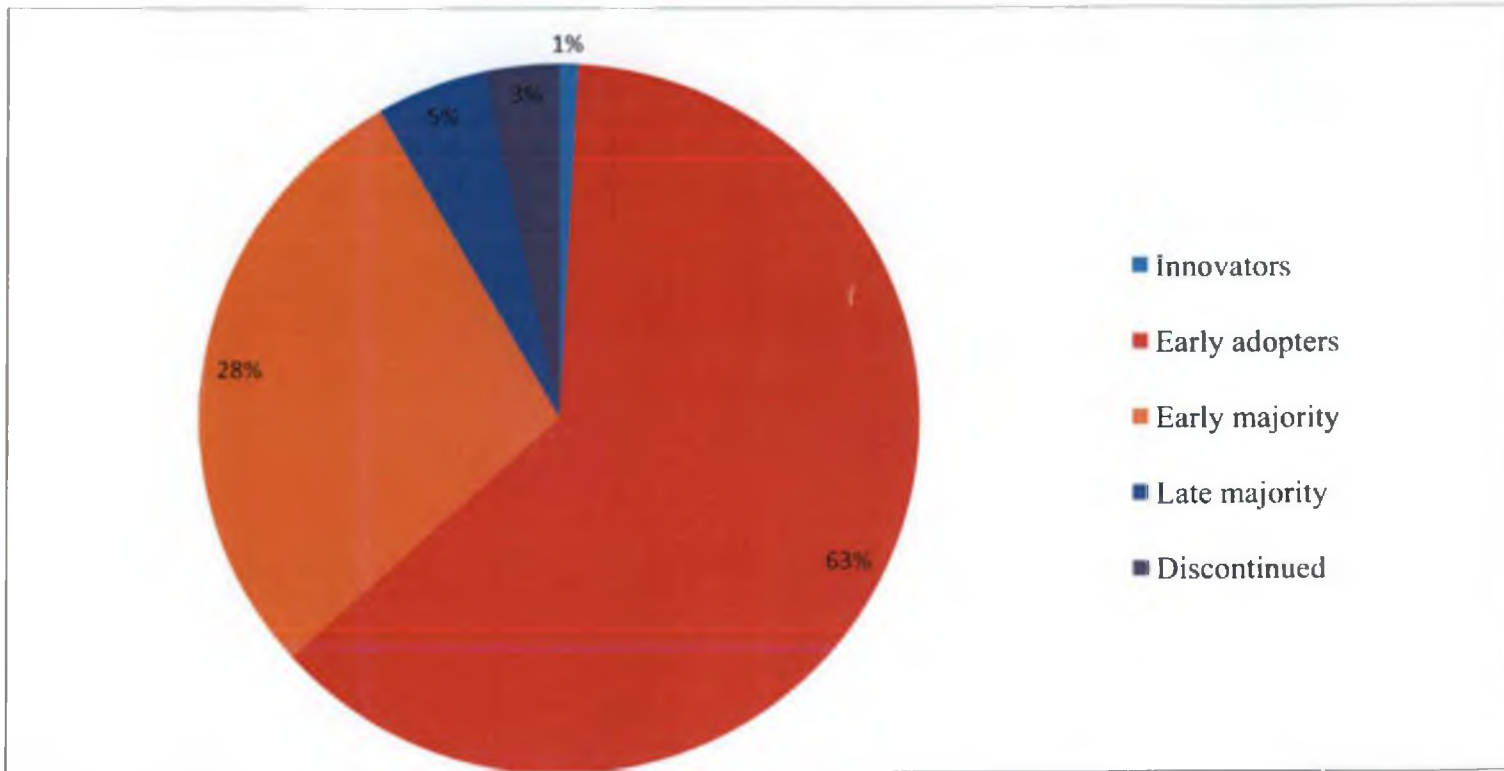


Figure 4.6 Distribution of respondents based on adoption category

Table 4.5: Distribution of respondents according to their perception about production facilities for cultivation of CSV

N=120

Sl. No.	Production facilities	Frequency (No.)	Percentage (%)
1.	Adequate road and transport facilities helped me to attend training		
	Yes	108	90.00
	No	12	10.00
2.	Adequate sunlight was available		
	Yes	120	100.00
	No	0	0.00
3.	Adequate irrigation facilities were available		
	Yes	116	96.67
	No	4	3.30
4.	Adequate inputs (grow bags, etc.) were available		
	Yes	112	93.30
	No	8	6.70
5.	Adequate manures and plant protection inputs were available		
	Yes	109	90.80
	No	11	9.20

Cent per cent of the respondents (100 %) agreed that there was no problem in availability of sunlight. Nearly equal percentage of the respondents had accorded the availability of other required facilities such as irrigation (96.67 %), agricultural inputs (93.30 %) and manure & plant protection inputs (90.80 %).

According to the result, the respondents were not facing the problem of lack of any production facilities necessary for CSV adoption. Majority of the respondents were fully satisfied with the transportation facilities available in the study location.

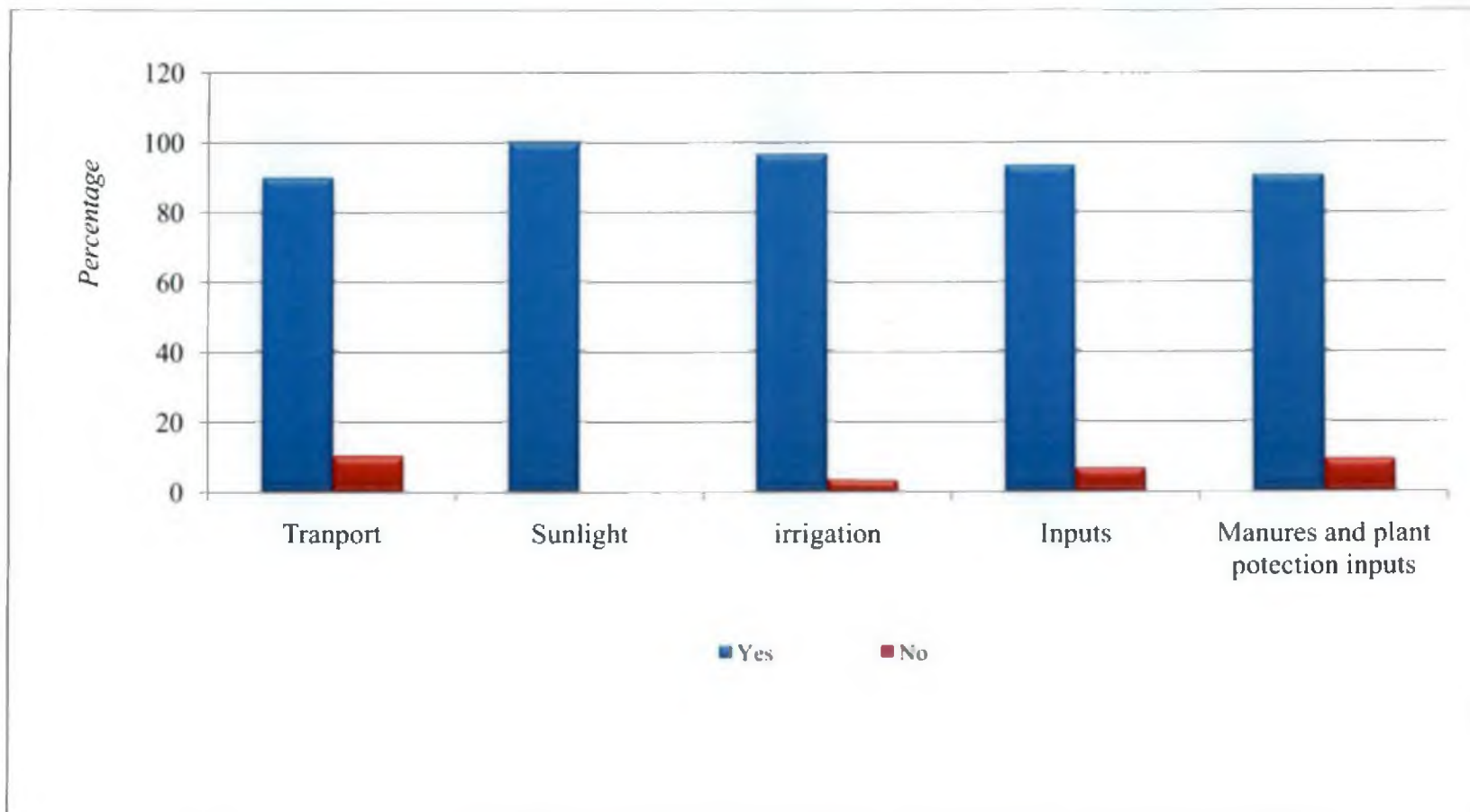


Figure 4.7 Distribution of respondents based on perception on production facilities

They were not facing the problem of water scarcity also. Since majority were utilizing the open terraces for cultivation of CSV, problem of shading was also not reported. Other inputs required for cultivation such as grow bags, manures and plant protection inputs were supplied by krishi bhavans with the support of various agricultural schemes of Government of Kerala implemented through various institutions such as panchayats, cooperatives, *etc.*

4.2 Overall adequacy of training interventions on CSV cultivation

Table 4.6: Distribution of respondents according to the perception on adequacy, effectiveness of training interventions and extent of adoption of CSV

N = 120

Category	Frequency (No.)	Percentage
Overall adequacy in training content		
Adequate	75	62.50
Inadequate	45	37.50
Effectiveness of training interventions		
Less effective (< 67)	12	10.00
Effective (between (67 and 88)	83	69.20
Very effective (> 88)	25	20.80
Mean=78, SD= 10.60		
Extent of adoption		
Not adopted (< 62.60)	17	14.20
Partially adopted (62.6 to 91.36)	88	73.30
Adopted (> 91.36)	15	12.50
Mean:76.98, SD: 14.38		

Table 4.6 showed that about three fifth of the respondents (62.50 %) were fully satisfied with the adequacy of the training interventions included by KVK, Thrissur for adoption of CSV. About 37.50 per cent of the respondents opined that KVK, Thrissur has to put more efforts to achieve adequacy in training interventions.

Since majority of the respondents had good education status and medium level of cosmopolitaness, understanding of the contents/components included in the training was not a problem for them. Respondents, who opined the training interventions as adequate, mostly belonged to early majority category of innovative proneness.

4.3 Perception of respondents about the adequacy of the each component of training intervention

As per the result shown in the Table 4.7, more than 92.00 per cent of the respondents agreed that training on transplanting and sowing methods was adequate. About 91.70 per cent of the respondents approved the adequacy of the content; timeliness of training on CSV cultivation. About 80.00 per cent to 89.00 per cent of the respondents had satisfied with adequacy of contents such as seed & seedling production, plant protection inputs and fertilizer application. Less approval of adequacy (61.70 %) was received for the component harvest and post harvest operations.

According to the qualitative data collected through focussed group discussions, it was understood that KVK, Thrissur had provided adequate knowledge on production aspects of cool season vegetables but did not include adequate components in case of storage and post harvest operations of CSV. But inadequacy of those components were not a problem for adoption of CSV in study location as most of the respondents produce cool season vegetables for domestic use only. The respondents who had taken the innovation as a venture had also responded the component as adequate.

Table 4.7: Distribution of respondents according to the perception on adequacy of each training component

N = 120

Sl. No.	Contents	Adequacy	Frequency	Percentage
1.	Timeliness and duration of training	Adequate	110	91.70
		Inadequate	10	8.30
2.	Seed and seedling production	Adequate	101	84.20
		Inadequate	19	15.80
3.	Transplanting, sowing	Adequate	111	92.50
		Inadequate	9	7.50
4.	Soil testing	Adequate	83	69.20
		Inadequate	37	30.80
5.	Fertilizer application	Adequate	107	89.20
		Inadequate	13	10.80
6.	Plant protection inputs	Adequate	102	85.00
		Inadequate	18	15.00
7.	Weed control	Adequate	95	79.20
		Inadequate	25	20.80
8.	Harvest and post harvest operations	Adequate	74	61.70
		Inadequate	46	38.30

Education plays an important role in deciding respondent's attitude and way of looking and understanding the new concepts. Large number of respondents was progressive in education but they were still few away from higher education which might be effecting the perception of some respondents regarding the adequacy of contents.

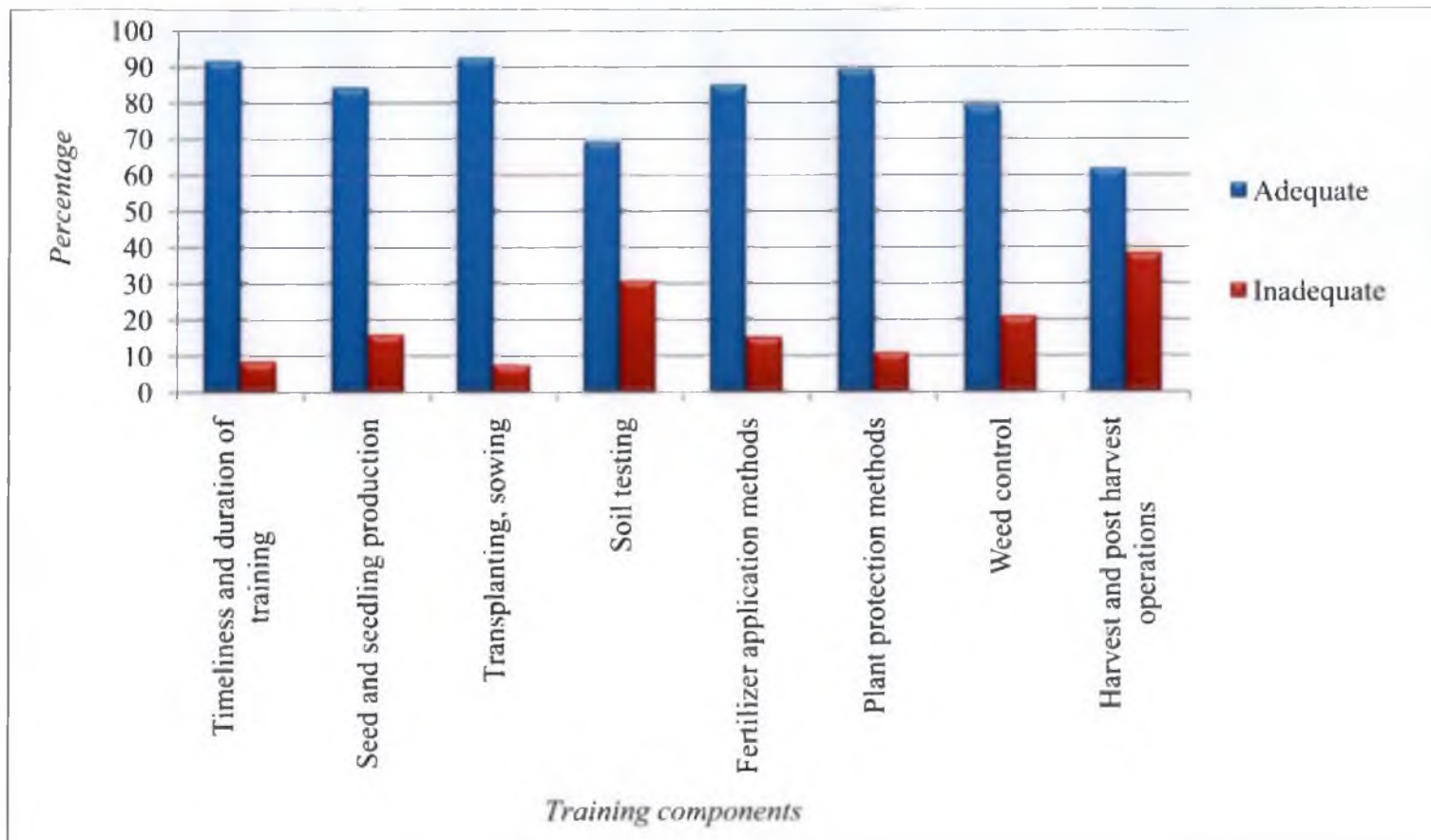


Figure 4.8 Distribution of respondents based on perception of adequacy of training components

4.4 Relationship between perception on adequacy of training content and independent variables

Table 4.8: Relationship of independent variables with respondents' perception on adequacy of the training components

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Age	-0.159*	0.083
2	Educational status	0.316**	0.000
3	Occupation	0.256**	0.005
4	Social participation	0.227*	0.013
5	Cosmopolitaness	0.258**	0.004

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level,

NS - Not significant

Results of the correlation analysis of independent variables with respondents' perception on adequacy of coverage of training content given in the Table 4.8 above showed that, age of the respondents had a negative and significant correlation at 0.05 level of probability. Education, occupation and cosmopolitaness of the respondents had positive and significant correlation at 0.01 level of probability and social participation had positive and significant relation at 0.05 level of probability with perception on adequacy of coverage of training contents. From the result we could infer that occupation, cosmopolitaness and social participation play a very important role in deciding one's perception. The remaining independent variables had no significant relationship with perception on adequacy of coverage of training content.

From the result, it can be concluded that age had a negative effect in deciding the perception about the components' adequacy. Most of the respondents were having farming as occupation. Educated respondents could learn the farming practices faster in comparison with non educated respondents. They were conscious about and inclined to adopt cool season vegetables.

In case of education, the study was in line with findings of Chaudhary *et al.* (2014) and Karthikeyan *et al.* (1995). In case of occupation, cosmopolitaness and social participation the findings showed similarity to the results of Kumar (1991).

4.5 Utility of training interventions on CSV cultivation

Table 4.9: Distribution of respondents according to their perception about utility of training contents

N = 120

Sl. No.	Contents	Usefulness	Frequency (No.)	Percentage
1.	Timeliness and duration of training	Very useful	44	36.70
		Useful	73	60.80
		Not useful	3	2.50
2.	Seed and seedling production	Very useful	34	28.30
		Useful	74	61.70
		Not useful	12	10.00
3.	Transplanting, sowing	Very useful	25	20.80
		Useful	88	73.30
		Not useful	7	5.80
4.	Soil testing	Very useful	22	18.30
		Useful	76	63.30
		Not useful	22	18.30
5.	Fertilizer application	Very useful	20	10.80
		Useful	88	76.70
		Not useful	12	12.50
6.	Plant protection inputs	Very useful	15	12.50
		Useful	92	76.70
		Not useful	13	10.80

Sl. No.	Contents	Usefulness	Frequency (No.)	Percentage
7.	Weed control	Very useful	19	15.80
		Useful	88	73.30
		Not useful	13	10.80
8.	Harvest and post harvest operations	Very useful	18	15.00
		Useful	64	53.30
		Not useful	37	30.80

Table 4.9 showed the results on utility of training contents. Very useful and useful score was given by 97.50 per cent of the respondents for the content 'timeliness and duration of training'. 94.10 per cent of the respondents stated that transplanting and sowing was the second most useful component. About 90.00 per cent of respondents rated seed and seedlings production methods as the next most useful component. The components; soil testing, fertilizer and its application, plant protection inputs and weed control were approved as very useful and useful by 81.60 per cent to 89.10 per cent of the respondents. Only 68.30 per cent of the respondents approved 'harvest and post harvest operations' as very useful and useful component.

From the discussions of group members in FGD, the reason for reduced approval in case of post harvest operations of CSV was that, most of the respondents were not interested in marketing their produce. They preferred to sell the surplus produce to the nearby homes rather than storing, packing and transporting it into whole sales and retailers markets.

The results furnished in the table 4.10 revealed that house type, social participation, extension contact, input availability and risk orientation had positive and significant relationship with utility index of training interventions at probability levels of 2.70 per cent, 0.10 per cent, 0.20 per cent, 0.10 per cent and 0.30 per cent

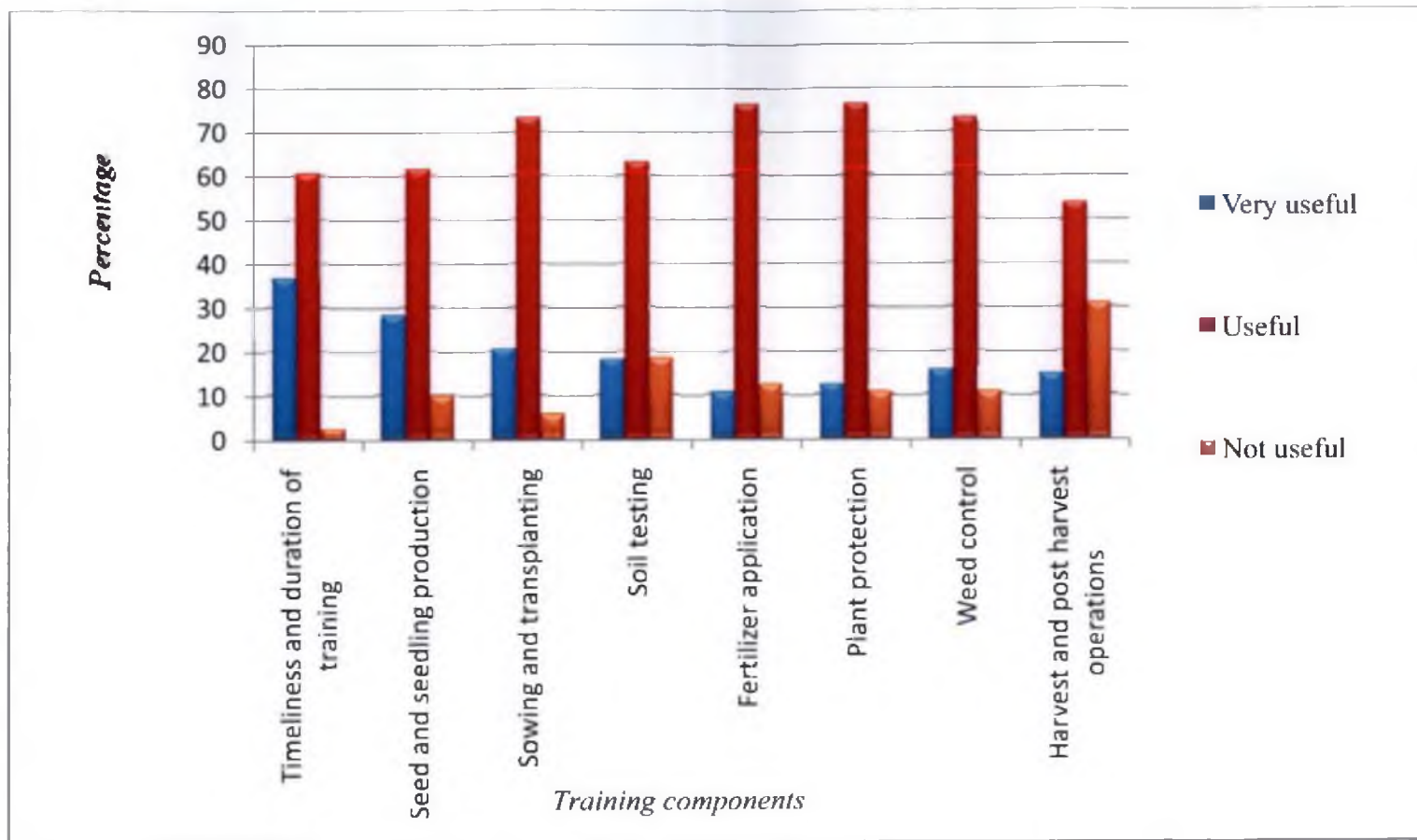


Figure 4.9 Distribution of respondents based on perception of usefulness of training contents

respectively. The remaining independent variables had no significant relationship with utility of training interventions of KVK in adoption of cool season vegetables.

Table 4.10: Relationship of independent variables with the perception of respondents on utility of the training contents

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Input availability	0.646**	0.001
2	Social participation	0.295**	0.001
3	Extension contact	0.590**	0.002
4	Risk orientation	0.267**	0.003
5	House type	0.450*	0.027
6	Annual income	0.402 *	0.051

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Better education and socio economic status enabled the respondents to establish a good relation with extension agencies and helped them to maintain better cosmopolitaness hence resulted in increased utility of training contents. It showed that KVK, Thrissur had succeeded in providing equal chances for all the respondents with different socio- economic status. Most of the respondents had fully utilised their terraced home for cultivation. Respondents had good social participation through Kudumbasree and had high and medium level of risk orientation.

The findings are in line with the earlier findings of Jibowu *et al.* (1995) and Yahiya (1995) who had reported that women farmers, belonging to various social groups as members and participate actively, helped them to benefit from opportunities derived from these groups. In case of education, cosmopolitaness and risk orientation the result showed similarity with the findings of Rathi (2015).

According to Opera (2010), annual income significantly contributed to farmer's use of innovative information technologies.

4.6 Degree of relationship between respondents' perception on utility of training contents and independent variables

Binomial logistic regression of utility of training contents on parameters such as age, gender, education status, marital status, family size, occupation, experience, land hold, annual income, house type, social participation, extension agency contact, input availability, economic motivation, risk orientation, cosmopolitaness, and innovativeness was done. Utility index ranged from 8 to 24. As the range was high, rationality was evolved to group the individuals based on the utility score as follows. The summary statistics with mean and standard deviation was calculated and groups were arranged accordingly as follows:

- Group 1 : Respondents with Mean – Standard deviation
- Group 2 : Respondents with values in between low and high scores
- Group 3 : Respondents with Mean + Standard deviation

Table 4.11 showed the degree of relationship of different independent variables as they were related to the utility of training contents calculated through binomial regression analysis. Three variables namely income, risk orientation and input availability were found to be significant at 10 per cent level of probability. All other independent variables had shown no relationship with utility of training interventions.

Table 4.11: Summary of binomial logistic regression of relationship between independent variables and utility of training interventions of CSV cultivation

Likelihood Ratio Test				
Effect	Model Fitting Criteria	Likelihood Ratio Tests	df	Sig.
	-2 Log Likelihood of Reduced Model	Chi-Square		
Intercept	140.841	0.000	0	0
Age	140.250	0.089	1	0.766
Gender	140.752	0.591	1	0.442
Education	141.409	1.248	1	0.264
Occupation	140.188	0.027	1	0.869
Experience	140.327	0.166	1	0.684
Social participation	140.322	0.161	1	0.688
Land hold	141.320	1.159	1	0.282
Income	146.838	6.677**	1	0.010
House type	140.205	0.044	1	0.834
Extension agency	140.162	0.001	1	0.979
Input availability	145.811	5.650**	1	0.017
Economic motivation	140.763	0.602	1	0.438
Risk orientation	143.618	3.457**	1	0.063
Cosmo politeness	140.291	0.130	1	0.718
Innovativeness	140.352	0.191	1	0.662

** Significant level at 10%

Table 4.12: Odds ratio and percent probability of matching

Level of usefulness / utility of training contents	Variables	Odds ratio	% probability
Low level to high level of usefulness	Income	1.969	66.32
	Input availability	0.851	54.02
	Risk orientation	0.877	46.72

The binomial logistic regression analysis resulted in the complete exclusion of the respondents who reported the contents as 'useful' (group two respondents), as training interventions may affect the upgrading of the respondents from low level of usefulness (group one respondents) to high level of usefulness (group three respondents) at a stretch. The summary of computed odds ratio and per cent probability of upgrading of group one respondents to group three respondents inferred that three variables – income, input availability and risk orientation were primarily responsible for this upgradation.

Table 4.12 above provided a summary of computed odds ratio and percent probability of upgrading of group one to group three. From the summary of binomial regression analysis, it can be inferred that it has a good fitting model and the three variables namely income, input availability and risk orientation are significant predictors of likelihood of improving utility from less to high. Other variables cannot be considered as contributing factors. Hence odds of transforming respondents' perception on utility are good. So training should be given in such a way that it should motivate the respondents to take up more risks.

4.7 Effectiveness of training interventions in CSV cultivation

In the Table 4.13, the effectiveness index of each component was calculated and total effectiveness was 77.89 per cent. Maximum effectiveness score was

obtained to the component timeliness and duration of training followed by planting methods. The training on CSV cultivation was conducted by KVK during august month i.e. just prior to the start of season (September to February). Hence the components were perceived as very effective.

Planting methods such as transplanting (cabbage, cauliflower and onion) and sowing (carrot, beetroot) were very important components dealt by the SMS of KVK which was found to be next effective component as per the effectiveness index score. Seed and seedling production was very effective and the respondents had a very good earning through seedling production. Among all components minimum score was obtained by the component harvest and post harvest operations. Cool season cultivation in the locality was not market oriented. Intension of the respondents was to cultivate and consume chemical free fresh cole crops. Hence production was confined to domestic purpose only. All other components had nearly equal scores.

Table 4.13 Effectiveness index of training contents

Sl. No.	Content of training	Training Index (120 respondents)		
		Total Score (X)	Maximum possible score (Y)	Index = $\frac{X}{Y} \times 100$
1	Timeliness and duration of training	511	4800	10.61
2	Seed & seedling production	483	4800	10.06
3	Transplanting, sowing	489	4800	10.19
4	Soil testing	443	4800	9.23
5	Fertilizer & its application	475	4800	9.90
6	Plant protection inputs	464	4800	9.70
7	Weed control	461	4800	9.60
8	Harvest and post harvest operations	413	4800	8.60
	Total score	3739	4800	77.89

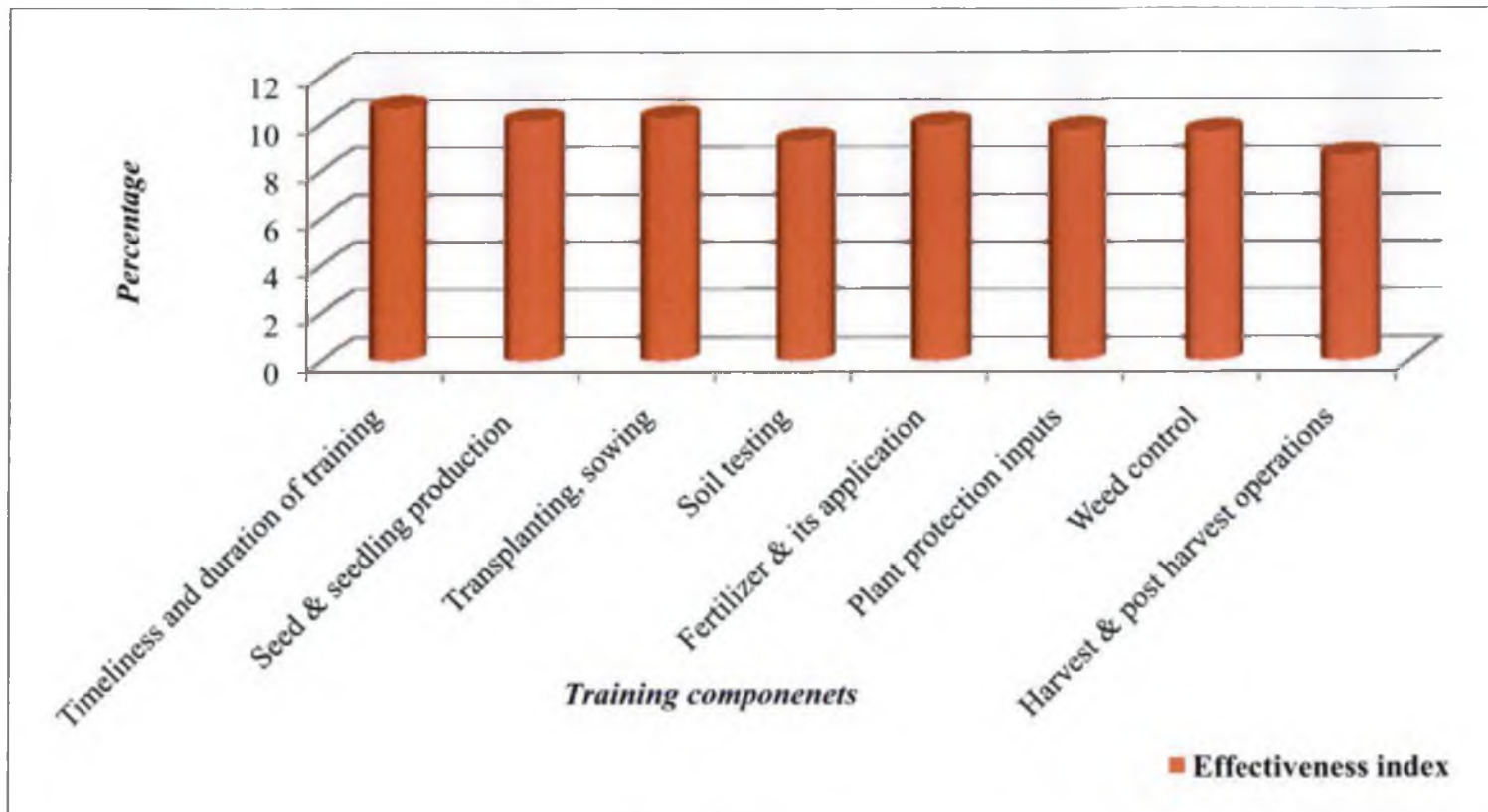


Figure 4.10 Effectiveness indexes of training components

4.8: Extent of adoption of cool season vegetables

From the Table 4.6 it is understood that majority (73.30 %) respondents had medium level of adoption of cool season vegetables. About 12.50 per cent of respondents had high level of adoption and 14.20 per cent of respondents came under low level of adoption

Table 4.14: Distribution of respondents according to their adoption of technology

Sl. No.	Technology	Full adoption		Partially adopted		Not at all adopted	
		F	P	F	P	F	P
1.	Season for cultivation of CSV	71	59.20	43	35.80	06	5.00
2.	Site selection	71	59.20	45	37.50	04	3.30
3.	Soil preparation	54	45.00	52	43.30	14	11.70
4.	Planting methods	72	60.00	44	36.70	04	3.30
5.	Manure & fertilizers application	74	61.70	41	34.20	05	4.20
6.	Irrigation	78	65.00	37	30.80	05	4.20
7.	Weed control	65	54.20	47	39.20	08	6.70
8.	Blanching	52	43.30	45	37.50	23	19.20
9.	Harvesting maturity	71	59.20	35	29.20	14	11.70
10.	Harvesting methods	68	56.70	38	31.70	14	11.70
11.	Post harvest handling	40	33.30	53	44.20	27	22.50
12.	Plant protection measures	69	57.50	37	30.80	14	11.70
13.	Storage	15	12.50	21	17.50	84	70.00
14.	Drying of onion	15	12.50	32	26.70	73	60.80

F – Frequency (No.), P – Percentage (%)

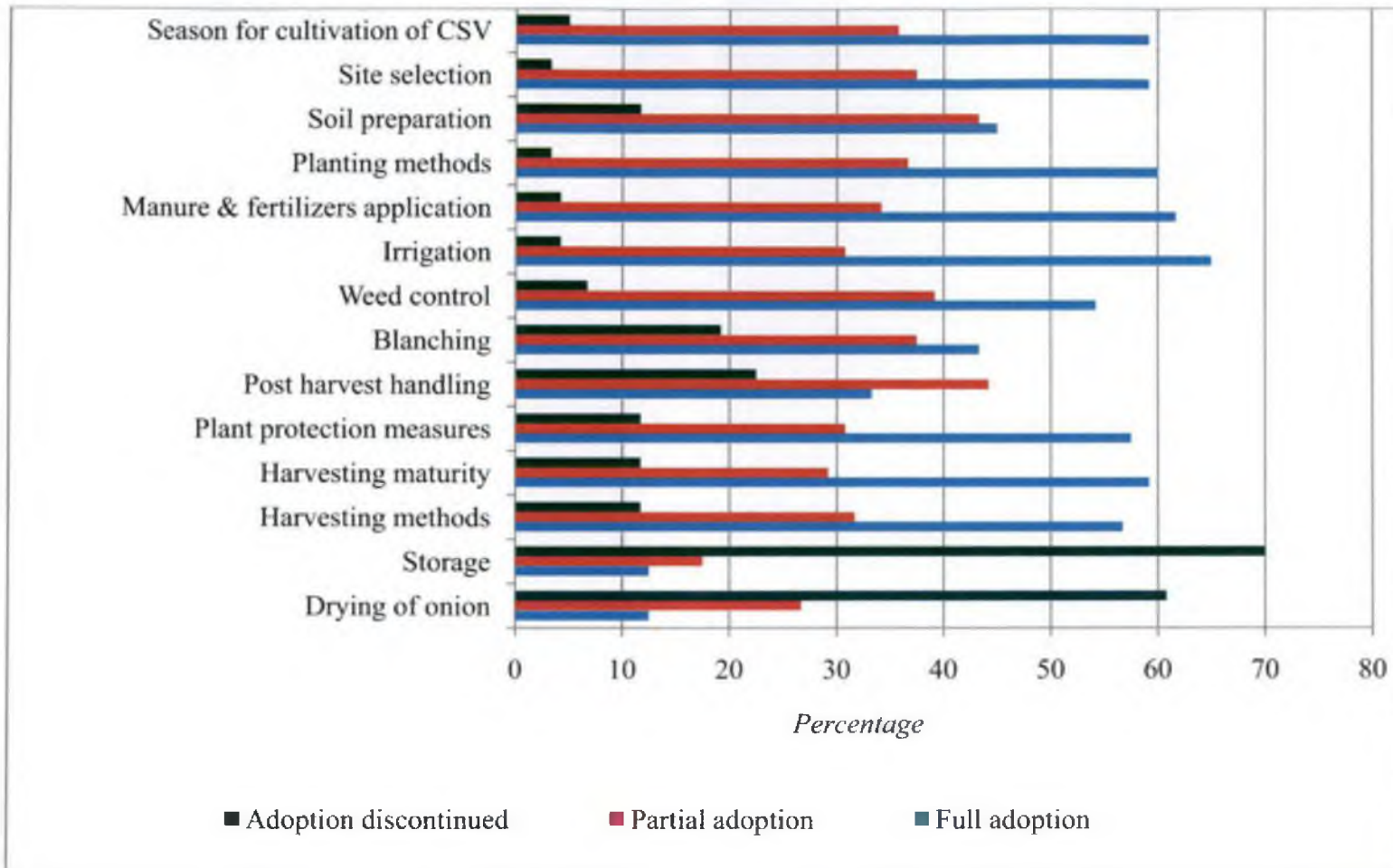


Figure 4.11 Distribution of respondents based on extent of adoption of CSV cultivation practices

Table 4.14 explained that majority of the respondents had fully adopted the technologies recommended to them by the Subject Matter Specialists of KVK: irrigation (65.00 %); manure and fertilizers application (61.70 %); planting methods (60.00 %); site selection (59.20 %) season for CSV cultivation (59.20 %); harvesting maturity (59.20 %) and harvesting methods (56.70 %). Very minor percentage of respondents showed discontinued adoption of technologies. A considerable percentage of respondents had adopted the technologies partially. The technologies, storage of cool season vegetables and drying of onions was not at all adopted by majority of respondents *i.e.* 70.00 per cent and 60.80 per cent respectively.

Table 4.15: List of independent variables correlated with adoption of season for cultivation of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Age	-0.198*	0.030
2	Gender	0.279**	0.002
3	Social participation	0.274**	0.002
4	Extension contact	0.203*	0.026
5	Innovativeness	0.228*	0.012

Table 4.15 revealed that the age of respondents had a negative and factors such as gender, social participation, extension contacts and innovativeness of respondents had positive significant relation with adoption of season for cultivation of cool season vegetables at 0.01 and 0.05 levels of probability.

4.9 Relationship of independent variables with adoption of methods of soil preparation

From the Table 4.16, it was seen that gender and innovativeness factors had positive and significant relationship in deciding adoption of the technology of soil preparation methods in cool season vegetable cultivation at a probability level of 0.05.

Table 4.16: List of independent variables correlated with adoption of methods of soil preparation for cultivation of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Gender	0.187*	0.041
2	Innovativeness	0.424*	0.000

Table 4.17 showed that gender, innovativeness and social participation had positive and significant relation with adoption of planting methods of cool season vegetables.

Table 4.17: List of independent variables correlated with adoption of planting methods of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Gender	0.182*	0.047
2	Innovativeness	0.282*	0.002
3	Social participation	0.184*	0.044

The observations of Table 4.18 revealed that innovativeness and social participation of respondents had positive and significant relation with adoption of site selection for cultivation of cool season vegetables at 0.05 per cent level of probability.

Table4.18: List of independent variables correlated with adoption of site selection for cultivation of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Innovativeness	0.300*	0.001
2	Social participation	0.191*	0.037

As per the results in table 4.19 it is clear that innovativeness and social participation of respondents had positive and significant relation with adoption of methods of manure and fertilizers application for cultivation of cool season vegetables at 0.05 per cent level of probability.

Table4.19: List of independent variables correlated with adoption of methods of manure and fertilizers application for cultivation of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Innovativeness	0.221*	0.015
2	Social participation	0.200*	0.029

Table 4.20: List of independent variables correlated with adoption of methods of irrigation for cool season vegetables cultivation

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Innovativeness	0.227*	0.013

Table 4.20 showed the result of correlation analysis between the dependent variable i.e. adoption of methods of irrigation for cool season vegetables cultivation

and independent variables. Only the variable innovation was showing positive and significant relation with dependent variable at 0.05 level of probability.

Table 4.21: List of independent variables correlated with adoption of post harvest handling of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Income	0.216*	0.018
2	Input availability	-0.242*	0.008
3	Economic motivation	0.184*	0.044
4	Infrastructure facilities	0.230*	0.012

From the Table 4.21, it is clear that the factors such as income, economic motivation and infrastructure facilities had positive and significant relation while input availability had a negative and significant relationship with adoption of post harvest handling of cool season vegetables at 0.05 level of probability.

Table 4.22: List of independent variables correlated with adoption of plant protection measures of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Age	-0.183*	0.045
2	Family size	0.183*	0.045
3	Input availability	0.189*	0.039
4	Innovativeness	0.202*	0.027
5	Extension agency contact	0.189*	0.039

Table 4.22 showed that family size, innovativeness and extension agency contact had positive and significant correlation but age of the respondents had

negative and significant relation with adoption of pest and disease management practices of cool season vegetables.

Table4.23: List of independent variables correlated with adoption of harvesting maturity of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Risk orientation	0.254**	0.005
2	Innovativeness	0.185*	0.043
3	Social participation	0.217*	0.017

As per the result in Table 4.23, risk orientation (at 0.01 level of probability), innovativeness and social participation (at 0.01 level of probability) had positive and significant relation with adoption of harvesting maturity of cool season vegetables.

Table4.24: List of independent variables correlated with adoption of harvesting methods of cool season vegetables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Risk orientation	0.180*	0.049
2	Innovativeness	0.207*	0.023
3	Social participation	0.192*	0.036
4	Input availability	-0.205*	0.025

Table 4.24 revealed that risk orientation, innovativeness and social participation had positive and significant relation at 0.05 levels of probability while input availability had a negative and significant relation with adoption of harvesting methods of cool season vegetables.

Table4.25: List of independent variables correlated with adoption of method of storage of CSV

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Education	-0.195*	0.033

As per the result given in table 4.25, it is clear that among all factors education was the only one factor which is significantly but negatively related to the adoption of method of storage of cool season vegetables at 0.05 level of probability. Correlation matrix of independent variables with remaining technologies such as adoption of weed control methods, adoption of blanching (cauliflower) and adoption of method of drying in onion were showing as non -significant. According to the findings of Enitan (2010), relatively high percentage of respondents with no formal education has implication for technology adoption.

Table4.26: Result of correlation analysis between adoption index and independent variables

Sl. No.	Factors	Rho (ρ)	Level of significance
1	Social participation	0.255**	0.005
2	Input availability	0.205*	0.025
3	Innovativeness	0.228*	0.012

4.10: Degree of relationship between adoption of practices and independent variables

Multinomial Logistic Regression (MLR) of adoption of cool season vegetables was done on parameters such as age, gender, education status, marital status, family size, occupation, experience, land hold, annual income, house type, social participation, contact with extension agents, availability of inputs, economic

motivation, risk orientation, cosmopolitaness and innovativeness. Adoption ranged from 14 to 42 as the range was high and rationality was evolved to group the individuals based on the utility score as follows.

- Group 1 : Respondents with Mean - Standard deviation (low score)
 Group 2 : Respondents with values in between low and high scores
 Group 3 : Respondents with Mean + Standard deviation (high value)

Table 4.27: Result of Multinomial Logistic Regression with degrees of relationship of independent variables with adoption of cool season vegetable cultivation

Likelihood Ratio Test				
Effect	Model Fitting Criteria	Likelihood Ratio Tests	df	Sig.
	-2 Log Likelihood of Reduced Model	Chi-Square		
Intercept	147.618	0.011	2	0.994
Age	153.401	5.794**	2	0.055
Gender	148.440	0.833	2	0.659
Education	147.813	0.206	2	0.902
Occupation	149.859	2.253	2	0.324
Experience	149.337	1.731	2	0.421
Social participation	152.589	4.982**	2	0.083
Land hold	148.209	0.602	2	0.740
Income	148.353	0.746	2	0.689
Extension agency	147.900	0.293	2	0.864
Economic motivation	157.166	9.559**	2	0.008
Risk orientation	148.426	0.819	2	0.664
Cosmo politeness	147.753	0.146	2	0.929
Innovativeness	153.500	5.894**	2	0.053

** Significant level at 10%

Table 4.27 showed the result of MLR analysis done to compare the two adoption categories *i.e.* full adoption and partial adoption, keeping the third category 'discontinued adoption' as reference. From the summary it can be inferred that, in case of model fitting information the alpha value is 0.000 which is a significant value less than 0.05 so there is a very good model fitting. From the likelihood ratio test it can be inferred that the four variables, age, social participation, economic motivation and innovativeness has statistical significant as those factors had significant value less than 0.10.

Table 4.28: Level of adoption: Odds ratio and percent probability of matching

Level of adopters	Variables	Odds ratio	% probability
Discontinued adoption to partial adoption of cool season vegetables	Economic motivation	0.967	49.16
	Social participation	0.744	42.66
	Innovativeness	1.961	66.22
Partial to full adoption of cool season vegetables	Age	0.056	5.3%
	Economic motivation	0.411	29.13%

Table 4.28 gives a summary of computed odds ratio and percent probability of conversion to full adoption from no adoption. Three variables, economic motivation, social participation and innovativeness of respondents has significant role in improving the adoption level to partial adoption when compared to discontinued adoption. The two variables namely, economic motivation and social participation which are having odds ratio less than one has positive significance *i.e.* with increase in those factors the probability of improving the level of adoption to partial adoption compared to 'discontinued adoption' increases with increase in those factors. But the factor, innovativeness has odds value greater than one (1.961) which shows that the

odds of improving to partial adoption compared to 'discontinued adoption' decreases with increase in innovativeness with a greater probability (66.22%). Age and economic motivation has odds value less than one with smaller probability being partial adoption to full adoption as compared to discontinued adoption. Hence it can be understood that with increase in these two factors the odds of transforming from partial level adoption to full adoption when compared to discontinued adoption increases with increases in those factors.

4.11: Determinants of adoption of CSV by the respondents

Table 4.29 showed the result of factor analysis to recognise and understand the items underlying the factors that determines the adoption of cool season vegetables.

Outreach behaviour: The three items loaded onto the factor one all related to the degree of communication or contact of respondents with their immediate outside social system. The underlying items include social participation, extension agency contact and cosmopolitaness.

Facilitating environment: The two items loaded onto the second factor explains about the infrastructure and inputs available and not available which are necessary for adoption of cool season vegetables.

Motivational Factor: The three items loaded onto the third factor was related to respondent's orientation towards risk taking, up to what extent respondents are motivated economically and what may be the position of respondents regarding the innovativeness.

Social status: The items loaded onto factor 4 were related with the educational status and how it is influencing the adoption of cool season vegetable cultivation. The items include education and house types of respondents.

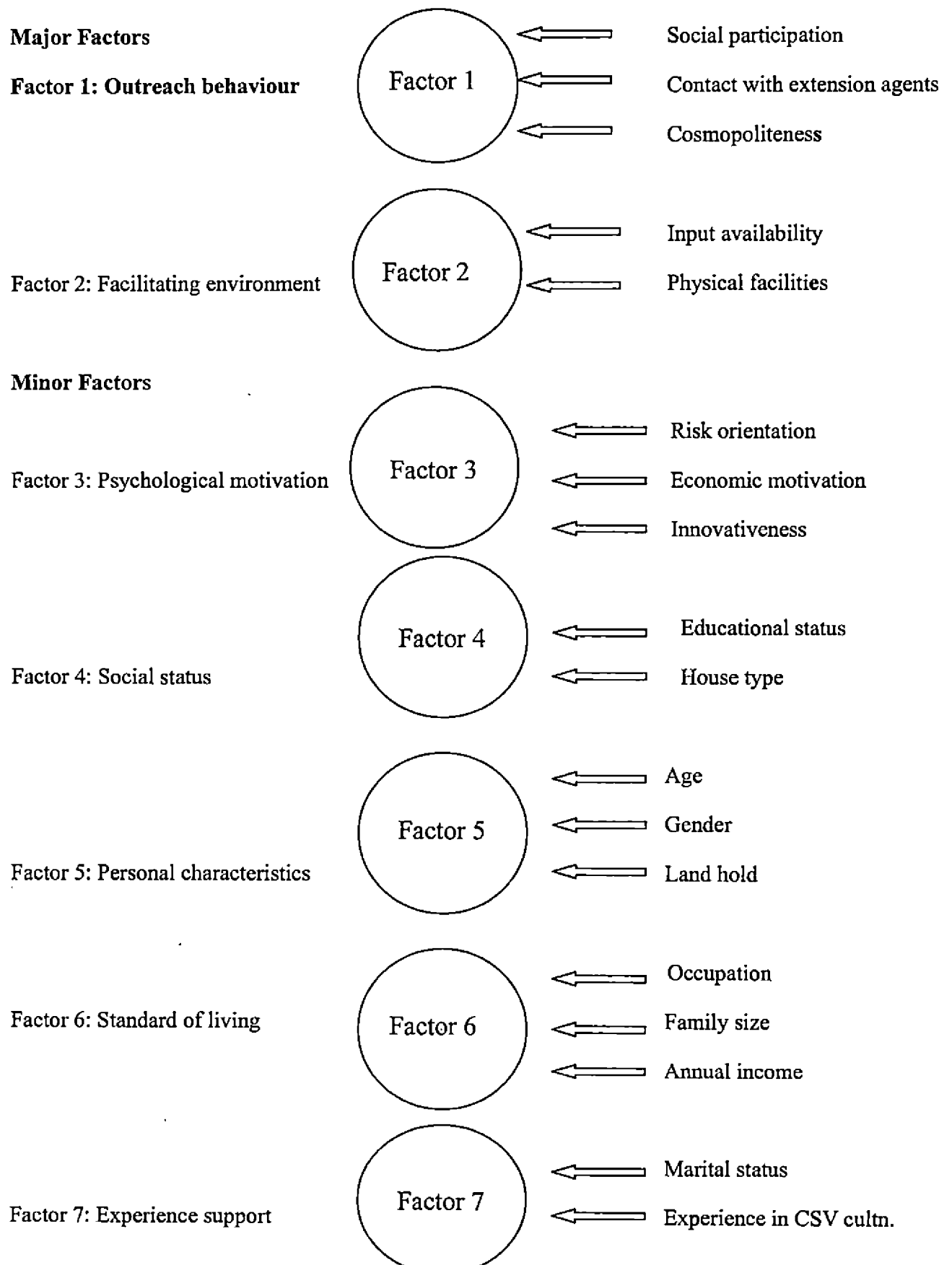


Figure No. 4.12 Summary of factor analysis

Table4.29: Result of factors analysis for factors underlying determinants of adoption of cool season vegetables

Obliquely rotated component loadings for 18 variables							
Components							
	1	2	3	4	5	6	7
Social participation	0.794						
Contact with extension agency	0.788						
Cosmopolitaness	0.681						
Input availability		0.804					
Infrastructure facilities		0.663					
Risk orientation			0.696				
Economic motivation			0.664				
Innovativeness			-0.659				
Education				0.790			
House type				0.607			
Age					0.717		
Gender					-0.651		
Land hold					0.567		
Occupation						0.703	
Family size						0.590	
Income						-0.487	
Marital status							0.711
Experience							0.580
Eigen values	2.680	2.071	1.589	1.410	1.226	1.200	1.088
Percentage of total variance	14.889	11.507	8.825	7.825	6.809	6.668	6.046
Number of test measures	3	2	3	2	3	3	2
Extraction Method: Principal Component Analysis							

Scree Plot

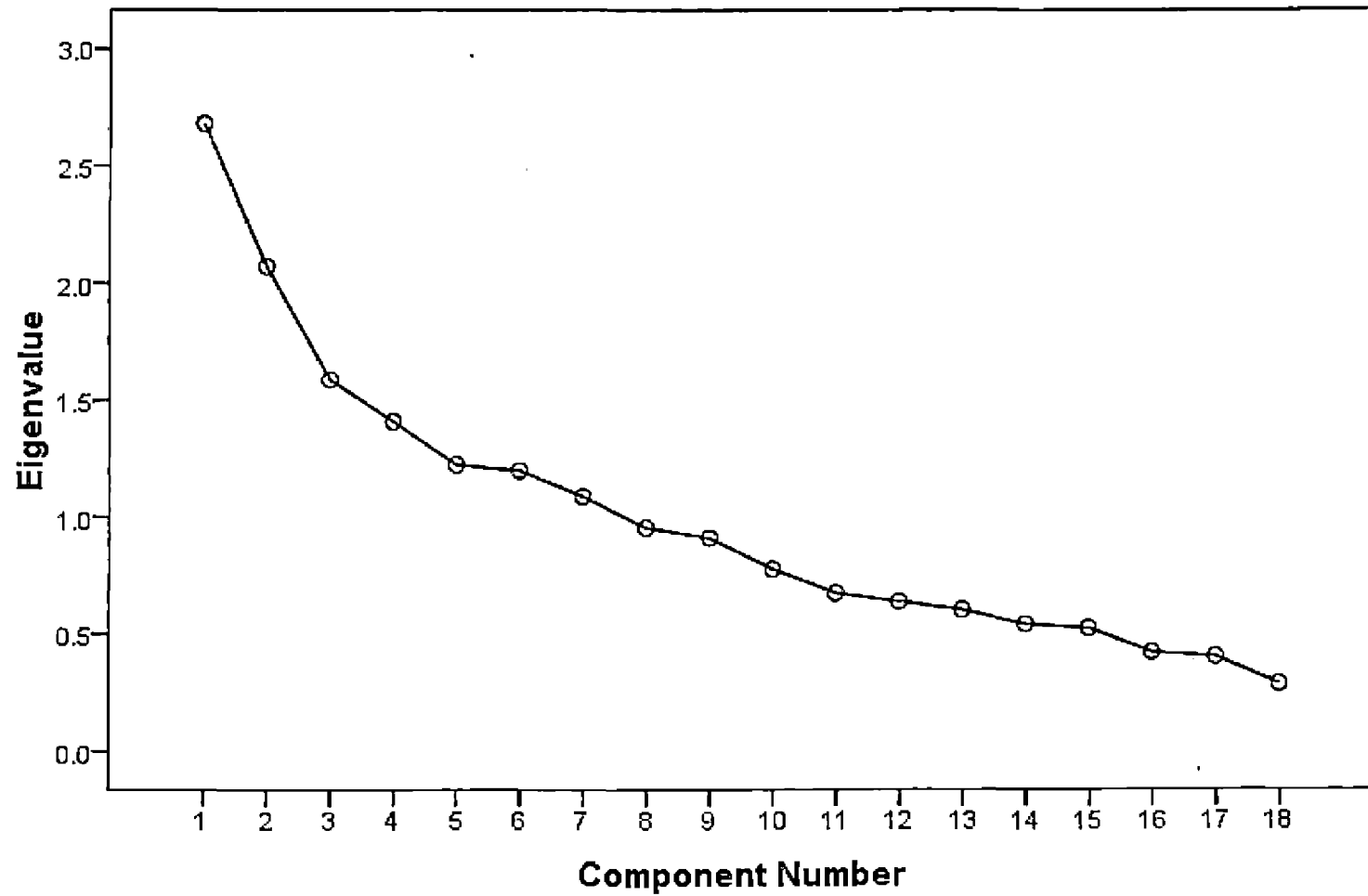


Figure No. 4.13. Scree plot of Principal Component Analysis

Personal characters: Three items namely age, gender and land hold were loaded onto factor 5. The items are related to the personal attributes of the respondents. It explains how the personal qualities determine the adoption of cool season vegetables.

Occupational factors: The items loaded onto the factor 6 was related to the information such as how the earning and job as well as the family size of the respondents can influence the adoption of cool season vegetables

Experience: The loaded items onto the factor seven gives answer whether the marital status and experience of the respondents had any relation with adoption of cool season vegetables.

The farmers who came to the foray of cool season vegetables production is a heterogeneous group. As such each and every measurement made on the respondents were of a variable nature this could be one of the possible reasons why seven components were extracted from 17 variables with every component explaining nearly 10 per cent of variation. However the factor analysis resulted in the extraction of the major factors i.e. Social and Extension factors and motivation factors. The other minor factors are personal factors, gender factors, family factors, occupational factors, ownership factors.

4.12: Cool season vegetables grown by the respondents

From Table 4.29 we can see that most of the respondents (66.7%) were cultivating both cabbage and cauliflower together. About 13 per cent of respondents were cultivation onion with cabbage cauliflower combo. Cultivation of all the cool season vegetables was adopted by only 13 per cent of respondents.

Table 4.30: Distribution of respondents according to the number of cool season vegetables cultivated

Sl. No.	Category	Frequency (No.)	Percentage
1.	Discontinued the cultivation	4	3.33
2.	Cabbage only	7	5.83
3.	Cabbage and cauliflower	80	66.70
4.	Cabbage, cauliflower and onion	16	13.33
5.	Cabbage, cauliflower, onion, beetroot & carrot	13	10.81

From the Table 4.30, it can be inferred that cabbage and cauliflower combination was adopted by exactly two third of the respondents (66.70 %). Similarity in cultivation practices of cabbage and cauliflower might be the reason for that most of them for having adopted this combination of cole crops and also, these farmers were experts in production of cabbage and cauliflower seedlings. Hence seedling was available in time to these respondents. Cabbage, cauliflower and onion combination was also tried by around 13 per cent of the respondents. Even though the percentage of respondents who had adopted this combination was few, they have come out with successful results in case of cultivation of onion with cabbage and cauliflower. The percentage of respondents who had cultivated all CSV was very less (10.81 %). In case of carrot, beetroot and onion; quality seeds and seedlings were not available in the study area. Technology to produce onion seedlings was also not much practiced by the respondents. When percentage of the adopters was considered, the percentage of discontinuers were very negligible (3.33%).

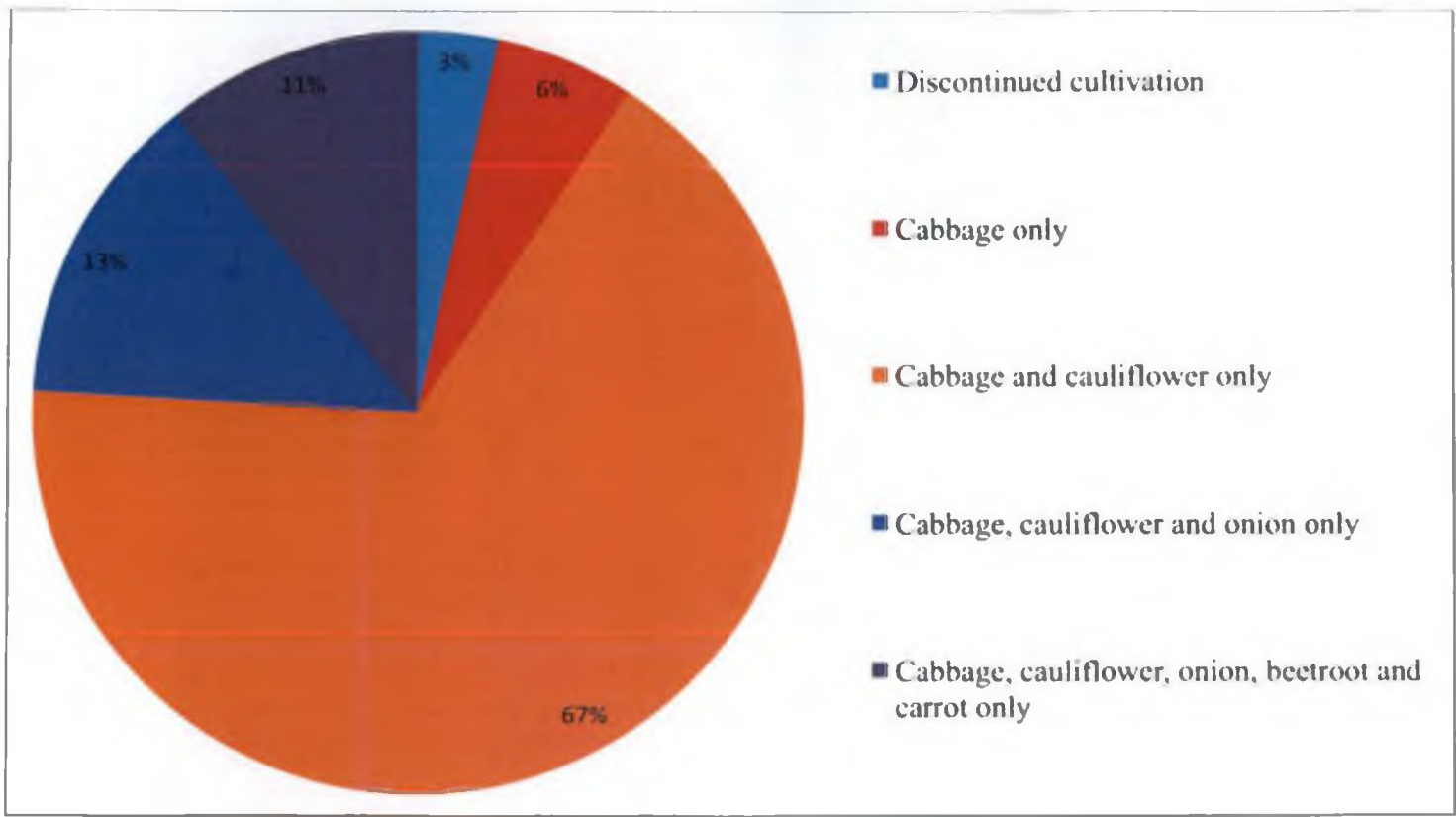


Figure 4.14 Distribution of respondents based on number of CSVs cultivated

Table 4.31: Distribution of respondents according to the area under cool season vegetables

N = 120

Sl. No.	Area under CSV (cents)	Frequency (No.)	Percentage
1.	Below 1	31	25.80
2.	1 to 10	69	57.50
3.	11 to 20	12	10.00
4.	21 to 30	4	3.30
5.	31 to 40	2	1.70
6.	41 to 50	1	0.80
7.	51 to 60	0	0.00
8.	Above 60	1	0.80

As per the result presented in table 4.31 most of the respondents (57.5%), who have adopted cool season vegetable cultivation technologies in an area ranging from one to ten cents. About 25.8 per cent of adopters had utilised only below one cent of land for cool season vegetable cultivation. About 10 per cent of respondents cultivate in 11 to 20 cents of land. About 5.8 per cent of the respondents used 21 to 50 cents of land. A negligible percentage (0.08%) had above 60 cents of land under cool season vegetable cultivation.

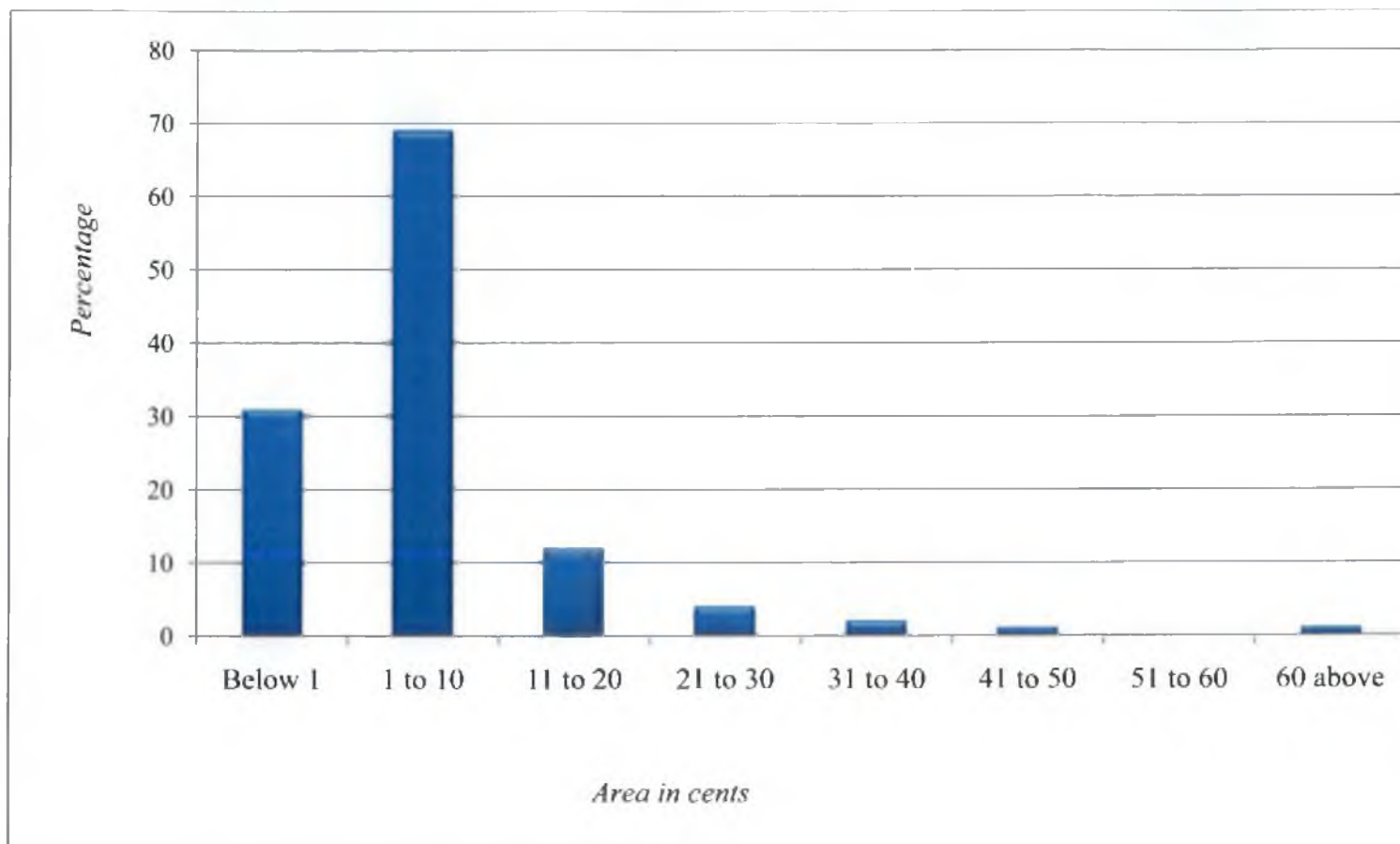


Figure 4.15 Distribution of respondents based on area under cultivation of CSVs

4.13: Constraints faced by respondents in cultivation of cool season vegetables

Table 4.32: Result of Garrett ranking: Frequency of respondents' ranking for each constraint

Constraints	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th
C1	32	25	10	14	5	7	9	11	7	0
C2	20	9	14	13	18	12	14	11	8	1
C3	15	15	9	16	22	11	11	11	9	1
C4	8	12	21	12	13	18	17	7	11	1
C5	4	23	20	10	5	9	5	17	16	11
C6	27	11	12	6	9	3	1	5	15	31
C7	3	9	12	21	13	15	13	14	12	8
C8	7	5	10	14	14	17	30	8	6	9
C9	1	6	11	9	16	25	17	23	10	2
C10	3	5	1	5	5	3	3	13	26	56

Result of Garrett Ranking for constraints of respondents

Constraints rank	$100 (R_{ij} - 0.5)/N_j$	Percent position	Garrett Value	Average score (Total/120)	Ranking
1	$100 (1 - 0.5)/ 10$	5	82	52.98	4
2	$100 (2 - 0.5)/ 10$	15	70	55.43	2
3	$100 (3 - 0.5)/ 10$	25	63	54.86	3
4	$100 (4 - 0.5)/ 10$	35	58	48.23	7
5	$100 (5 - 0.5)/ 10$	45	52	46.81	9
6	$100 (6 - 0.5)/ 10$	55	48	61.57	1
7	$100 (7 - 0.5)/ 10$	65	42	48.28	8
8	$100 (8 - 0.5)/ 10$	75	36	49.61	5
9	$100 (9 - 0.5)/ 10$	85	29	49.29	6
10	$100 (1 - 0.5)/ 10$	95	18	30.91	10

Table 4.33 showed the rank given by the respondents for the constraints faced by them. The ranks were given according to the intensity of constraints faced by them while adopting the technology of cool season vegetables. Majority of respondents gave high cost of production of cool season vegetables compared to other vegetables as the most important constraint followed by the lack of availability of seed and seedlings in time, poor availability of fertilizers and manures and unavailability of quality seedlings in case of onion.

Table4.33: Arrangement of constraints according to the magnitude rated by the respondents

N = 120

Sl. No.	Constraints Arranged according to the ranking	Rank
1.	High cost of production compared to other vegetables	I
2.	Lack of timely availability of seeds/seedling	II
3.	Lack of availability of fertilizers and organic manure	III
4.	Poor quality of onion seedlings	IV
5.	Technical support is not available when needed	V
6.	Suitable plan protection materials are not available when required	VI
7.	Pest and diseases of the crop are out of control	VII
8.	Weather condition and soil are not supporting	VIII
9.	Access to market of inputs for cool season vegetables is very poor	IX
10.	Training programmes of KVK do not cover all aspects regarding cultivation of CSV	X

Other minor constraints were unavailability of technical assistance in time, weather and soil conditions also less supporting for cultivation. For the statement ‘Training programmes of KVK do not cover all aspects regarding cultivation of cool season vegetables’ respondents gave the last ranking. It showed that KVK did not fail in including all the essential contents in their training interventions for adoption of cool season vegetables.

Summary and Conclusion

V. Summary and Conclusion

Krishi Vigyan Kendra (KVK) Thrissur established in 2004 under the Kerala Agricultural University, with full financial support of Indian Council of Agricultural Research (ICAR), has opted innovative approaches to reach the unreached to identify constraints and opportunities, test technologies and innovations, seek responses and help in adaptation and adoption of agricultural technologies. Technology spread, women empowerment, production of inputs, entrepreneurial development, promotion of eco-friendly technologies and resource conservation have been the major thrust areas identified for formulating the activities of Kendra. Krishi Vigyan Kendra, Thrissur through its multitude of interventions, from scientific cultural practices to value addition and formation of growers' societies, has been the light house for the farming community of Thrissur.

KVK Thrissur conducts several On Farm Trials, Front Line Demonstrations, and trainings to hasten the transfer of farm technology, and trainings on cool season vegetables in the recent past have created convincing reflections in the community. Performance assessment of onion variety, Agri Found Dark Red under different methods of planting is in progress in KVK. Popularization of organic cultivation of cabbage and cauliflower was the intention of KVK's FFS. Farmers' Field School (FFS) on popularization of Cole crops was already completed at Madakkathara Gram Panchayat. Cabbage, Cauliflower Carrot, Beetroot and Onion were the major crops cultivated by the group. Cultivation of cool season vegetables was a fairy tale for the farmers of Thrissur eight years back, but now they are a familiar sight during the months of November to February. The heat tolerant varieties screened at the agricultural Research station of Kerala Agricultural University (KAU) was taken to the homesteads by KVK and the steep rise in demand for planting materials of cole crops in the district is an indicator of the impact created.

For introduction and popularization of cool season vegetables in the coastal areas of Thrissur, KVK had selected trainees from Mathilakom and Perinjanam panchayats and provided training on various technologies of cole crop cultivation such as season for cultivation of CSV (September to February), site selection for cultivation of CSV, soil preparation, planting methods (transplanting and direct sowing), manure and fertilizers application, irrigating the crop, weed control, blanching (cauliflower), post harvest handling, pest and disease management practices, harvesting maturity, harvesting methods, storage and drying method in onion.

This study entitled “Effectiveness of training interventions of Krishi Vigyan Kendra, Thrissur in adoption of cool season vegetables” was undertaken with following objectives.

1. To assess the effectiveness of KVK training interventions influencing the adoption of cool season vegetables
2. To assess the extent of adoption of cool season vegetables in coastal areas of Thrissur District
3. To identify the determinants of adoption of the technology of CSV cultivation
4. To elucidate the constraints of farmers in adopting cool season vegetables.

The sample consisted of 120 randomly selected respondents of cool season vegetable cultivation with small homesteads of at least five cents of cultivable land. Respondents were selected by simple random sampling method. Major portion of the respondents was from Mathilakom panchayat (90 no.) and the rest from (30 no.) Perinjanam panchayat of Mathilakom block. Maximum number of interventions by KVK on cool season vegetable cultivation was conducted in these two panchayats.

The ex-post facto research design was adopted for the study. Variables were selected through judges rating and expert opinions. Dependent variables of the study were effectiveness of training interventions, extent of adoption of technologies and

constraints faced in adoption of technologies. Age, gender, marital status, family size, education qualification, experience in farming, Occupation, economic status, social participation, extension agency contact, risk orientation, cosmopolitaness, innovativeness, economic motivation, availability of inputs and infrastructure facilities were the independent variables considered for the study.

Based on the feedback of respondents obtained after pilot study and from the opinions of experts in Agricultural Extension the questionnaire was prepared and finalized. The researcher had collected data from the respondents using the questionnaire. Focused Group Discussion (FGD) was conducted in both Panchayats and Key informant interviews were done for qualitative data collection.

Data were analysed using frequency and percentage analysis, Pearson's correlation, Spearman's rank order correlation, Multinomial Logistic Regression (MLR), Garrett ranking method and factor analysis.

The salient findings of the study are highlighted below:

- ❖ The decision of Krishi Vigyan Kendra to diffuse the technology of cole crops cultivation through several women groups is highly appreciable as it resulted in double benefits; good quality cole crops became available to the consumers and the women involved in the intervention have become empowered. In case of age, there is almost equal distribution of respondents in middle and aged categories. In both Mathilakom and Perinjanam, about 87 per cent of the adopters of cool season vegetable cultivation practices were women. Most of the women, who have attended training programmes of KCK, Thrissur are working in connection with Self Help Groups or other social groups. Except a negligible percentage all the respondents were having primary and above primary education. Respondents with higher education and college education were almost equally distributed. Number of illiterate respondents was nil. Most

of the respondents were female farmers who had a basic interest in vegetable cultivation in their kitchen gardens and house terraces. They were co-co-ordinately doing all the farming practices with their spouses and other family members. Since majority of the respondents belong to above 31 years old females naturally most of the respondents belong to married category. More than 70 per cent of respondents belong to small and medium sized families. Above 50 per cent of respondents had experience in cool season vegetable cultivation. About 70 per cent of the respondents were earning more than Rs. 10,000/- per annum. Other than cool season vegetables the crops cultivated by respondents included coconut, spices, fruit crops, ornamental plants and vegetables. The respondents had included animal, poultry, rabbit and fish components in their homesteads. Majority owned land holdings less than one acre and owned plastered, terraced homes with facilities of electricity. Majority of respondents preferred to cultivate cole crops such as cabbage and cauliflower in poly bags in terraces.

- ❖ Social participation of respondents was medium. About 87 per cent of respondents being women, showed high frequency in participation in Kudumbasree activities. And there was medium participation in farmers' club activities.
- ❖ Extension agency contact of respondents with Agricultural Officer, ATMA staff and Agricultural Assistants were satisfactory; while contact with scientists in KVK and KAU was minimal.
- ❖ Unavailability of quality seedlings was a problem during initial stages of adoption which had been overcome by establishment of cool season seedling production units to which KVK, Thrissur has provided great help. All other inputs except chemical fertilizer were available in the locality.

- ❖ Above 60 per cent of respondents were highly economically motivated. Only 16 percent respondent showed low level of economic motivation.
- ❖ About 72 per cent of the respondents were found to be medium risk takers. The support and encouragement provided by KVK, Thrissur through various interventions at appropriate found to be the possible reason for increased risk taking capacity.
- ❖ In case of the innovativeness of respondents, 62 per cent of respondents found as early adopters. A few respondents were innovators also. About 28 per cent were early majority in adoption of cool season vegetable cultivation technologies.
- ❖ About 80 to 92 per cent of the respondents had perceived the content such as method of planting, timeliness of training, seed and seed treatment, plant protection inputs and Fertilizer and its application as adequate. It gives the result that KVK, Thrissur has succeeded in including all the significant contents regarding cool season vegetable cultivation in training interventions. Less approval of adequacy (61.7%) was received for the content harvest and post harvest operations.
- ❖ Educational qualification, occupation, cosmopolitaness had positive and significant relation with perception of respondents regarding adequacy of training contents. But age shows negative and significant correlation.
- ❖ About 81 to 97 per cent of respondents perceived all the contents included by KVK, Thrissur in training programmes of cool season vegetable cultivation as useful and very useful. When all the contents are considered only harvest and post harvest operations were rated (68.3%) as useful.

- ❖ The factors like input availability, social participation, extension contact, risk orientation, house type and annual income had positive and significant relation while occupation had negative and significant relation with utility of training contents.
- ❖ The factors such as income, input availability and risk orientation found to be playing a significant role in transforming respondents with low level of utility to high level of utility.
- ❖ The training contents of KVK, Thrissur shows 78 per cent effective.

Effectiveness index of each component is as follows.

Contents/Components	Percentage
Timeliness of training	- 10.61 %
Seed and seed treatment	- 10.06 %
Transplanting, sowing	- 10.19 %
Soil testing	- 9.23 %
Fertilizer and its application	- 9.90 %
Plant protection inputs	- 9.70 %
Weed control	- 9.60 %
Harvest and post harvest operations	- 8.60 %

- ❖ Findings regarding extent of adoption show that more than 70.00 per cent of respondents falls under medium level of adoption. Only 12.50 per cent shows high level of adoption.

- ❖ The technology, season for cultivation of cool season vegetables was adopted fully and partially by 59.2 and 35.8 per cent of respondents respectively.
- ❖ The technology, soil preparation was adopted fully and partially by 45 and 43.30 per cent of respondents respectively.
- ❖ The technology, planting methods was adopted fully and partially by 60 and 36.00 per cent of respondents respectively.
- ❖ The technology, site selection was adopted fully and partially by 59.20 and 37.50 per cent of respondents respectively.
- ❖ The technology, manure and fertilizers application was adopted fully and partially by 61.70 and 34.20 per cent of respondents respectively.
- ❖ The technology, irrigation was adopted fully and partially by 65.00 and 30.80 per cent of respondents respectively.
- ❖ The technology, weed control was adopted fully and partially by 54.20 and 39.20 per cent of respondents respectively.
- ❖ The technology, blanching (cauliflower) was adopted fully and partially by 43.30 and 37.50 per cent of respondents respectively.
- ❖ The technology, post harvest handling was adopted fully and partially by 33.30 and 42.20 per cent of respondents respectively.
- ❖ The technology, pest and disease management was adopted fully and partially by 57.50 and 30.80 per cent of respondents respectively.
- ❖ The technology, harvesting maturity was adopted fully and partially by 59.20 and 29.20 per cent of respondents respectively.

- ❖ The technology, harvesting methods was adopted fully and partially by 56.70 and 31.70 per cent of respondents respectively.
- ❖ The technology, harvesting methods was adopted fully and partially by 12.50 and 17.50 per cent of respondents respectively.
- ❖ The technology, drying of onion was adopted fully and partially by 12.50 and 26.70 per cent of respondents respectively.
- ❖ Social participation, innovation and input availability had positive and significant relation with extent of adoption of cool season vegetables.
- ❖ In transforming low adopters to medium adopters, economic motivation, social participation and innovation plays a very significant role. While transforming medium level of adopters to high level adopters it is age and economic motivation which is to be considered as significant factors.
- ❖ The underlying items were reduced to eight factors that determines the adoption. The factors are extension factor, input factor, motivational factor, educational factor, personal factors, occupational factor and experience factor.
- ❖ About 66.70 per cent of respondents prefer to cultivate cabbage and cauliflower in their homesteads as both do not require land for planting. Terraced home and grow bags were the important components helped the respondents in adopting the combination of cabbage and cauliflower.
- ❖ About 13.33 per cent of respondents were cultivating cabbage, cauliflower and onion in their homesteads.
- ❖ Among cole crops such as cabbage, cauliflower, beetroot, carrot and onion adoption was high in case of cabbage and cauliflower (66.70 %).

- ❖ Majority of respondents cultivated cole crops in an area ranging between 1 and 10 cents.
- ❖ Most important three constraints faced by respondents in adopting cool season vegetables are high production cost of cole crops compared to other vegetable crops, difficulty in pest and disease management, rare availability of synthetic pesticides.
- ❖ Availability of seedling materials was not a major problem for respondents

Thus the null hypothesis 1: Training interventions of Krishi Vigyan Kendra, Thrissur in adoption of cool season vegetables is not effective stands rejected while the alternative hypothesis 1: Training interventions of Krishi Vigyan Kendra, Thrissur in adoption of cool season vegetables is effective is accepted. Null hypothesis 2: Krishi Vigyan Kendra, Thrissur has had no role in adoption of cool season vegetables in the coastal areas of Thrissur District stands rejected while the alternate hypothesis 2: Krishi Vigyan Kendra, Thrissur had played a very significant role in adoption of cool season vegetables in the coastal areas of Thrissur District is accepted.

Through this study, a careful documentation of effectiveness of training interventions of KVK in introducing and diffusing cole crop technology has been done and the study had unveiled the truth that the intervention of KVK, Thrissur in adoption of cole crops in plains of Thrissur District is very effective. Strategies of Subject Matter Specialists of KVK helped the farmers to adopt the technology without fail from the initial stage itself.

The study brought out the fact that with the cooperation of farmers in Mathilakom block; KVK, Thrissur had successfully battled the odds to embrace the production of cabbage, cauliflower, carrot, beetroot and onion with increasing

success. The participants of training programme is now enjoying the fruit of effort that they made by cooperating to an innovative movement of KVK.

Krishi Vigyan Kendra is untiringly going forward in its outreach endeavours through its multitude of interventions. Regarding the adoption of cool season vegetables KVK can still improve by helping the trainees to overcome some of the constraints that they perceived as barriers which block them in achieving their goal. Those constraints includes high cost of production of cole crops compared to other vegetable crops, Poor quality of seedlings, non-availability of seedlings in time and problem in controlling pest and disease in cole crops.

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References

REFERENCES

- [Anonymous]. 2014. Onion farming takes root in Thrissur district. *The Hindu*, 17 April 2014, Available: <http://m.thehindu.com/news/national/kerala/onion-farming-takes-root-inthrissur-district/article5922103.ece> [21 March 2015].
- [Anonymous]. 2015. Onions can now be grown in Kerala, say KAU researchers. *Times of India*, 5 Sep. 2015, p.13.
- Adhikarya, R. 1996. Strategic extension campaign: increasing cost - effectiveness and farmers' participation in applying agricultural technologies [on-line]. Available: <http://www.fao.org/sd/EXdirect/EXan0003.htm> [05 Dec. 2015].
- Agrawal, S. S. Bhopal, R. S., and Sagar, M. A. 1993. Evaluation of national workshop on watershed management. *Maharashtra. J. Ext. Educ.* **12** : 145-148.
- Alex, P. J. 2015. PGS 505 Agricultural research, research ethics and rural development programmes [e-course]. College of Horticulture, Vellanikkara, Thrissur, 19p.
- Allan. T. 2004. Technology assessment in the home garden systems. Ph. D thesis, Kerala Agricultural University, Thrissur.159p.
- Anik, A. R. and Salam, M. A. 2015. Determinants of adoption of improved onion variety in Bangladesh. *J. Agric. Environ. Int. Dev.* **109** (1): 71- 88.
- Anup R. 2003. Training needs of pig farmers of Thrissur District. M. V. Sc. Thesis, Kerala Agricultural University, Thrissur, 92p.

- Aravind, N. and Rakshesh, D. 2001. Krishi Vigyan Kendras - The Grass root endeavours in dissemination of appropriate technology for rural Poverty alleviation. *Leisa India* 4 (1): 28 – 29.
- Arora, R. K., Singh, U., and Kumar, R. 2014. Impact of front line demonstrations of rabi onion in Ambala district of Haryana. *Agric. Updates* 9 (3): 333-336.
- Asiwal, B. L., Hussain, A., Akther, J., and Ram, L. 2014. Impact analysis of groundnut FLDs technology on extent of adoption, enhancing the productivity and profitability in Sikar district of Rajasthan. *Agric. Updates* 9 (4): 562-565.
- Aziz, A. E. 1988. Adoption of drought management practices by farmers - a critical analysis. M. Sc. (Ag) Thesis, Kerala Agricultural University, Thrissur, 96p.
- Bar, N. 2015. Impact of KVK training on development of tribal farmers. *J. Environ. Ecol.* 5 (2): 259-257.
- Beena, B. S. and Singh, B. 2013. Perceived constraints and suggestions for effective functioning of Krishi Vigyan Kendras. *Agric.Updates* 8 (3): 332 – 335.
- Behara, B.S. and Das, M. 2015. Constraints and case studies of adoption of vegetables by tribal farmers of Keonjhar district of Odisha. *Int. J. Agric. Sci. Res.* 5 (5): 375 - 391.
- Behera, S. K., Maharana, J. R., and Acharaya, P. 2014. Transfer of technology through Krishi Vigyan Kendra for the tribal farmers in Hilly areas of Koraput District. *Indian J. Hill Farming* 27 (2): 34 - 37.
- Bhagyalakshmi, J. 2001. Meeting communication needs of rural women. *Yojana* 45 (1):34 pp.

- Bila, J. N., Mortensen, C., Wulff, G. E., and Mondjana, A. M. 2009. Cabbage production and black rot disease management by small holder farmers in Southern Mozambique. In: Bila, J. N and Mortensen, C. (eds), *Cabbage Production and Black rot Disease Management*. African Crop Science Conference Proceedings, Uganda. African Crop Science Society, Uganda, pp. 667 -671.
- Biswas, S., Singh, A. K., and Mondal, S. K. 2014. An assessment study on ex - trainees of KVK in awareness generation and adoption of improved agricultural practices in Dakshin Dinapur of W.B. *India. Agric. Sci. Digest* 34 (4): 277-280.
- Burton, D. 2000. 'Using literature to support research', in D. Burton (ed.), *Research Training for Social Scientists: A Handbook for Postgraduate Researchers*. Sage publications. London, 528p.
- Chandrakandan, K. and Knight, A. J. 1989. A new scale for adoption of farm technology. *Madras Agric. J.* 76 (10): 578 - 580.
- Chattopadhyaya, S. N. 1963. A study of some psychological correlations of adoption of innovation in farming. Ph. D thesis, Indian Agricultural Research Institute, New Delhi, 120p. *
- Chaudhary, R. P., Singh, A. K., Singh, S. K., Goyal, V., and Singh, I. P. 2014. Association of characteristics of farmers with adoption of improved chick pea production technologies. *Ann. Agric. Res. New Ser.* 35 (2): 224 -226.
- Chavai, A. M., Yamgar, A. S., and Barange, P. K. 2015. Adoption behaviour of turmeric growers about post harvest technology. *Int. J. Trop. Agri.* 33(2): 1647-1651.

- Chennakesavan, R. 1978. Factors effecting farm mechanisation and problems encountered in it. M. Sc. (Ag) thesis, Tamil Nadu Agricultural University, Coimbatore, 99p.
- Chenniappan. V. K. 1987. The study of knowledge and extent of adoption of improved practices for irrigated cotton. M. Sc. (Ag) thesis, Tamil Nadu Agricultural University, Coimbatore, 120p.
- Chouhan, B. P. S., Singh, S., and Sehrawat, P. S. 2002. Communication media mix in terms of gain in knowledge. *Agric. Ext. Rev.* 14: 6 -10.
- Copp J. H., Sill, M. L., and Brown, B. T. 1958. The function of information sources in the farm practices adoption process. *Rural Sociology* 23: 48 - 59.
- David, R. 1987. *The Origins of Agriculture: An Evolutionary Perspective*. Academic Press, 312p.
- David, R., Sarkar, J. D., Srivasthav, K. K., and Sharma, M. L. 2008. Facilities available, problems faced, and suggestions offered by the trainees during home science training programmes at Krishi Vigyan Kendra, Bilaspur. *J. Soils Crops* 18 (2): 357-361.
- Desai, A. N. 1989. *Management Strategies and Organisational Behaviour*. Ashish Publishing House, New Delhi, 287p.
- Deshmukh, G., Parmar, S., Sangada, B., and Lende, S. 2015. Socio - personal characteristic and constraints faced by migrant Siddi tribal farmers in adoption of innovations. *Int. J. Trop. Agric.* 33 (2): 241 - 244.
- Deshmukh, P. R. 2007. Knowledge and adoption of agricultural technologies in Marathwada, *Indian Res. J. Ext. Edu.* 7 (1): 41-44.

- Dhayal, B. L., Patel, C. R., and Mehtha, B. M. 2015. A study on constraints faced by farmers in adoption of moong bean production technology in Vadodara and Chouhdaipur districts of Gujath. *Agric. Updates* 10 (4): 343-350.
- Dhurwey, C. K., Choudhry, V. K., Bante, R., and Shrey, R. 2015. Constraints perceived by farmers in production and marketing of major cole vegetable crops in Bemetara district of Chhattisgarh state. *Int. Res. J. Agric. Econ. Statist.* 6 (1): 193-196.
- Dubey, A. K., Srivastva, J. P., Singh, R. P., and Sharma, V. K. 2008. Impact of KVK training programme on socio-economic status and knowledge of trainees in Allahabad district. *Indian Res. J. Ext. Edu.* 8: 60-61.
- Enitan, F. O. 2010. Influence of socio - economic characteristics on use of modern cassava processing technologies among women processors in Ogun state, Nigeria. *J. Soc. Sci.* 24 (1): 43 - 50.
- FAO [Food and Agriculture Organization]. 2007. A guide to maize marketing for extension officers. Agriculture and Consumer Protection. France. 92p.
- Fayas, A. M. 2003. Viability of Self Help Groups (SHGs) in Vegetable and Fruit Promotion Council Keralam (VFPCCK) - a multidimensional analysis. M. Sc (Ag) thesis, Kerala Agricultural University, Thrissur, 123p.
- Fred, C. E. and Joseph, A. 1972. Marketing farm supplies in rural areas: a study of farm inputs availability in Totu division. In: *Working Paper 48, Nairobi: Institute for Development studies, University of Nairobi*. Available: <http://opendocs.ids.ac.uk/opendocs/handle/123456789/941> [10 July 2016].

- Godhandapani, G. 1985. Knowledge and adoption of nutrient recommendation for irrigated groundnut. M. Sc (Ag) thesis, Tamil Nadu Agricultural University, Coimbatore, 134p.
- Gondukar. S. S., Hudda, R. S., Shehravath, P. S., and Joshi, V. 2015. Constraints faced by farmers engaged in commercial vegetable cultivation in Haryana. *Ann. Agri – Bio Res.* **20** (2): 253 - 255.
- Goswami, K. K., Mandal, T. K., Saha, A., Sarkar, B., Abigail. M. D., Shiha, A., and Panchavai, S. N. 2012. Impact of training programme on adoption of hybrid tomato production technology among tribal farmers. *Environ. Ecol.* **31** (2): 543- 545.
- Halakatti, S. V., Sajjan, C. M., Gowda, D. S. M., and Kamaraddi, V. 2007. Empowerment of women through dairy training. *Karnataka J. Agric. Sci.* **20** (1): 89-92.
- Hall, A. 2003. *Challenges to strengthening agricultural innovation system: where do go from here?*. United Nations University, Maastricht, The Netherlands. 28p. Available: www.merit.unu.edu/publicat. [15June 2015]
- Hegde, N. G. 1999. Empowerment of women towards socio-economic dimensions in Tumkur district, Karnataka. *Rural India* **2** (1): 40-41.
- Hoq, M. S., Matin, M. A., Hossain, T. M. B., and Hossain, S. 2014. Cabbage (*Brassica oleracea*) and Cauliflower (*Brassica oleracea*) marketing in selected areas of Bangladesh. *Bangladesh J. Agric. Res.* **39** (1): 127-141.
- ICAR [Indian Council of Agricultural Research]. 2014. Report of the high power committee on management of Krishi Vigyan Kendra (KVK). Krishi Anusandhan Bhavan, Pusa, New Delhi, 216p.

- Inibong, A., Akpabio., Etim, N.A., and Okon, S. 2012. Perceptions of constraints affecting adoption of women in agricultural programme technologies in the Delta, Nigeria. *Int. J. Agric. Manag. Dev.* 2 (3): 215-222.
- Jadhav, K. and Aski, S. K. 2014. Extent of adoption of red gram production technologies by the trained and untrained farmers. *Int. J. Plant. Sci.* 9 (2): 431- 434.
- Jaffres, L. W., Bracken, C. C., Neuendorf, K., and Kopfman. J. 2002. Cosmopolitaness, cultivation and media use In: *Conference of 'Association for Education in Journalism and Mass Communication'*, 2002, Miami beach [On-line]. Available: Academic. csuohio.adu [2 July 2016].
- Joshi, V. Vijaya, M. Reddy, R. V. S. K. and Vinod Kumar. 2013. Evaluation and popularization of onion (*Allium cepa* var. *cepa*) varieties during kharif season under semi-arid conditions of Andhra Pradesh. *J. Res. on Crops.* 14 (1): 237- 240.
- Kadam, S.T. 2008. A study of technological gap in ginger cultivation. M.Sc(Agri) Thesis. Mahathma Phule Krishi Vidyapeeth, Maharashtra, Rahuri.110p.*
- Kerlinger, F. N. 2014. *Foundations of Behavioural Research.* (15th Reprint). Surjeeth Publications, New Delhi, 741p.
- Khadar, S. K. 1999. Maximizing all round productivity. *Yojana* 43 (1): 35 - 88.
- Kiresur, V. R., Pandey, R. K., and Mruthyunjaya. 1999. Determinants of adoption of modern sorghum production technology - the experience of Karnataka state. *Indian J. Agric. Econ.* 54 (2): 155-168.

- Kumar, N and Dutt, P. 2000. Evaluation of training courses on agricultural machinery for higher productivity and income generation, *Agric. Ext. Rev*, 12:28-30
- Kumar, N. V. R. 2003. Training needs of dairy farm instructors of the dairy development of Kerala. M. V. Sc. Thesis, Kerala Agricultural University, Thrissur, 136p.
- Kumar, P. G., Jyothisna, M. K., and Reddy, P. L. 2013, Knowledge and extent of adoption of improved practices of chickpea through KVK interventions. *J. Res. ANGRAU*, 41 (3): 58-63.
- Kumar, R. 1996. *Research Methodology: A Step-by-Step Guide for Beginners*. Sage publications, London. 76p.
- Kumar, V. A. C. 1991. A study on adoption pattern and certain aspects of marketing of potato by farmers in Mulur Taluka, Kolar District. *The Mysore. J. Agric. Sci.* 25 :(1) 535 - 536 pp.
- Kunche, A., Puli, R. K., Guniganti, S., and Puli, D. 2011. Analysis and evaluation of training effectiveness. *Hum. Resour. Manag. Res.* 1 (1): 1- 7.
- KVK [Krishi Vigyan Kendra]. 2010. *Annual Report 2009-2010*. Krishi Vigyan Kendra, Thrissur, 89p.
- KVK [Krishi Vigyan Kendra]. 2010. *Report for QRT 2005-06 to 2009-10*. Krishi Vigyan Kendra, Thrissur, 91p.
- KVK [Krishi Vigyan Kendra]. 2012. *Annual Report 2011-2012*. Krishi Vigyan Kendra, Thrissur, 103p.
- Lynton, R. P. and Pareek, U. 1990. *Training for Development*. Vistaar Publications, New Delhi, 105p.

- Maheriya, H. N., Patel, J. K., and Patel, R. C. 2015. Extent of adoption of recommended paddy production technology. *Agric. Updates* 10 (3): 249 - 251.
- Mandavkar, P. and Talathi, M. 2013. Adoption level of oilseed production technology in Konkan region of Maharashtra. *J. Krishi Vigyan* 2 (1): 1- 4.
- Meena, B. S. and Bhati, D.S. 2010. Impact of Krishi Vigyan Kendra's trainings on knowledge and adoption of cotton production technologies. *Agric. Update*. 5 (1&2): 92-95.
- Minten, B. 1999. Infrastructure, market access, and agricultural prices: evidence from Madagascar, MSSD Discussion paper no.26, International Food Policy Research Institute, Washington, DC.32pp.
- Monge, M. and Halgin, D. 2008. How change agent and social capital influence the adoption of innovations among small farmers. In: *IFPRI Discussion Paper. International Food Policy Research Institute, Washington DC, 52p.*
- Mulwafu, A. O. 2012. Enhancing the role of information sector in food security and poverty reduction in Malawi- policy implications and recommendations. M. Sc. (Ag) thesis, Kerala Agricultural University, Thrissur, 94p.
- Mundra, S. N. and Bentham, K. N. 1967. Impact of caste on adoption of improved farm practices. *Indian J. Ext. Educ.* 3 (3):143-148.
- Murthy, H. S. R and Rao, T. R. 1990. Training methods to be used in horticultural training programmes. *Maharashtra J. Ext. Educ.* 9: 185-194.
- Nijkampf. P. 1986. Infrastructure and regional development: A multi dimensional policy analysis. *Empirical Econ.* 11:1-21.*

- Odebode, S.O. 1997. Appropriate technology for rural women in the processing of cassava and soyabean in Oyo state. Nigeria. Ph. D. Thesis, University of Ibadan, 98p.*
- Ojha, R. K. 2001. Self help groups and rural development. *Yojana* 45 (1): 20.
- Opera. 2010. Personal and socio-economic determinants of Agricultural information use by farmers in the agricultural development programme (ADP) zone of Imo state, Nigeria. Library philosophy and practices. Available: [Unllib.unl.edu / LPP /opera.htm](http://Unllib.unl.edu/LPP/opera.htm). [4 July 2016].
- Orebiyi, J. S., Benchendo, N. G. and Onyeka, U. P. 2004. Determinants of contact farmers adoption of improved cassava production technologies in Imo state, Nigeria.pp11-17. *Afr. J. Online* [e-journal]. Available: www.ajol.info [19 May 2015].
- Pan.Y., Smith, C.S., Sulaima, M. 2015. Agricultural extension and technology adoption for food security: evidence from Uganda.In: Discussion paper No. 9206. Institute for the study of labor.47p. Available: Wol@iza.org. [28 July 2016].
- Pandey, K. N. 1989. *Adoption of Agricultural innovation. Study of Small and Marginal Farmers of Varanasi (UP)*. Northern Book Centre, New Delhi, 141p.
- Pandey, R., Singh, J. B., Singh, S., and Kumar, N. 2011. Impact evaluation of training on the adoption of technology. *Agric. Update* 6 (1): 114-116.
- Parimaladevi, S. 2004. Effectiveness of agri-clinics and agribusiness training programme in Kerala. M. Sc. (Ag) thesis, Kerala Agricultural University, Thrissur, 85p.

- Parmar, M. R., Ajravath, B., and Jamwal, M. 2013. Impact of front line Demonstration of oil seed crops in transfer of improved technology in India. *Agric. Updates* 8 (1&2): 174-176.
- Patoliya, J., Deshmukh, G., and Bariya., M. 2014. Comparative evaluation of characteristics of farmers and perceived constraints and suggestions in adoption of ground nut production technology. *Agric. Updates* 9 (2): 207-212.
- Pennaboliswamy, G. R., Swamy, B. K. N., Nagaraja, N., and Gouda, M. J. C. 2010 Scale to assess the performance of Krishi Vigyan Kendra (KVKs). *Mysore J. Agric. Sci.* 44 (1): 130-138.
- Puzari, N. N. 1992. Pre -service training of village level extension workers. *Agric. Ext. Rev.* 6:13.
- Rachna, Goel, R., and Sodhi, G. P. S. 2013. Evaluation of vocational training programmes organized on mushroom farming by Krishi Vigyan Kendra Patiala. *J. Krishi Vigyan* 2 (1): 26-29.
- Raghava, N. V. and Rao, P. P. 2013. Impact of front line demonstrations on groundnut production technology in Guntur district of Andhra Pradesh. *Agric. Updates* 8 (1&2): 283-290.
- Rajendran, P. 1978. A study of factors effecting the adoption of selected agricultural practices. M.Sc (Ag) Thesis, Kerala Agricultural University, Thrissur, 91p.
- Ramamurthy, S. K. 1973. A study of factors influencing the use of NPK complex fertilizers by farmers in Poonamalle block of Chingleput district in Tamil Nadu, M. Sc. (Ag) thesis, Tamil Nadu Agricultural University, Coimbatore, 63p.

- Ramsey, C. H., Polson, R. A. and Spencer, G. H. 1959. Values and adoption of practices, *Rural Sociology* 5 (1):24-27.
- Rathi, N. 2015. Innovations in adoption of indigenous knowledge of livestock management. *Int. J. Adv. Res. Comput. Sci. Software Eng.* 5 (1): 1009 - 1012.
- Rathod, P. K., Nikam T. R., Landge, S., Vajreshwari, S., and Amithatey (2011). Participation of rural women in dairy farming in Karnataka. *Indian Res. J. Ext. Edu.* 11 (2):31-35.
- Ray, G. L. and Mondal, S. 2011. *Research methods in social sciences and extension education*. Kalyani Publications. New Delhi, 330p.
- Reddy, J. K. and Reddy, B. G. 1972. Adoption of improved agricultural practices in Andhra Pradesh. *Indian. J. Ext. Educ.* 8 (182): 14-17.
- Reddy, P. B. H., Sasidar, P.V. K., and Gopal, P.V. S. 2012. Farmers training effectiveness and implication for scaling -up: the case of *Adarsha Rythus* in Andra Pradesh, *India. Indian J. Res. Ext. Edu.* 12 (3): 1-7.
- Rogers, E . M. and Shoemaker. F. F. 1971. *Communication of Innovation - A Cross Cultural Approach*. The Free Press, New York 335p.
- Rogers, E. M. 1983. *Diffusion of Innovations*. The Free Press, New York, 447p.
- Rogers, E. M. 1995. *Diffusion of Innovations: Modifications of a Model for Telecommunications*. Springer Berlin Heidelberg publishers. 17 (1): 25-38.
- Rogers, E. M. 2003. *Diffusion of Innovations* (3rd Ed.). The Free Press, New York, 447p.

- Sagar, V. M. 2012. Evaluation of training in Organisations: A proposal for an integrated model. *Int. J. Eng. Manag. Sci.* 3 (1): 77-84.
- Samanta, R. and Gowda M. 2003. Krishi Vigyan Kendra: the capacity builder of farmers. *Kisan World* 4: 41-43.
- Sanjeev, K. V. 1987. Training programmes of Kerala Agricultural University, Krishi Vigyan Kendras - An analysis. M. Sc. (Ag) thesis, Kerala Agricultural University, Thrissur, 126p.
- Santhi, P., Sathyavathimuthu., and Bhuvanewari, K. 2013. Employment generating technology transfer by Krishi Vigyan Kendra as a means for empowering rural women. *Am. Int. J. Res. Sci., Technol. Eng. Math.* 2 (2): 213 -219.
- Sasane, M. S., Tayde, V.V., and Deshmukh, P. R. 2012. Extent of adoption of recommended cauliflower production technology by the cauliflower growers. *Agric. Updates* 7 (3): 427- 429.
- Senthilkumar, K., Devaki, K., and Subramanian, R. 2014. Assessment of effectiveness of training programmes through perception of Krishi Vigyan Kendra trainees. *Indian Res. J. Ext. Edu.* 14 (1): 96-98.
- Shah, K. A., Tandel, B. M., Timbadiya, C. K., and Patel, N. N. 2013. Introduction of sweet corn cv. sugar 75 through front line demonstration in tribal area of Navsari district in Gujarat. *J Krishi Vigyan* 2 (1): 84-85.
- Shankara, M. H., Mamatha, H. S., Reddy, S, and Desai, N. 2014. An evaluation of training programmes conducted by Krishi Vigyan Kendra, Tumkur, Karnataka. *Int. J. Farm Sci.* 4 (2): 240-248.
- Sharma, K. C. and Singh, P. 2013. Constraints perceived by farmers in adoption of spices production technology in Rajasthan. *Agric. Updates* 8 (3): 407 - 411.

- Sharma, S. K. and Nair, G. T. 1974. A multivariate study of adoption of high yielding variety of paddy. *Indian J. Ext. Educ.* **10** (18): 30 - 35.
- Sindhu, S. N. 2002. Women entrepreneurs in agribusiness. M. Sc. (Ag) thesis, Kerala Agricultural University, Thrissur, 105p.
- Singh, D. 2015. Impact of front line demonstrations on productivity of carrot cv. Pusa Rudhira in Dholpur district of Eastern Rajasthan. *Agric. Updates* **10** (4): 358 - 361.
- Singh, D. K., Gautham, U. M. S., and Panday, S. N. 2007. Constraint analysis of technological awareness of the farmers. *Indian Res. J. Ext. Edu.* **7** (1): 60 - 62.
- Singh, H. C., Prakash, V., and Sing, R. L. 2013. Constraints experienced by trainers and trainees in KVKs. *Progressive Res.* **8** (2): 301 - 304.
- Singh, K. M. P. and Singh, R. P. 1974. Impact of national demonstration in the adoption of high yielding varieties of wheat. *Indian. J. Ext. Educ.* **10** (1 &2): 65 - 67.*
- Singh, N., Lal, H., and Narolia, G. P. 2013. Constraints in adoption of recommended technology of mustard cultivation. *Agric. Updates* **8** (4): 616-619.
- Singh, S. and Singh, M. K. 2014. Impact of Front Line Demonstrations on cabbage (*Brassica oleracea* var. *capitata* L.) yield improvement South Tripura. *Hortic. Flora Res. Spectrum* **3** (2): 158-162.
- Subhadra, M. R., Suresh, K. A., and George, R. P. 2009. Constraint analysis of farmers operating mixed farming in Kerala. *Agric. Sci. Digest* **29**(1): 48-50.

- Sunderswamy, B. and Duraiswamy, K. N. 1975. Characters of farmers in relation to adopting recommended practices of hybrid Sorghum. *Madras Agric. J.* **62** (10-12): 721-725.*
- Sunil, N. K. and Manjula. N. 2009. Impact of Krishi Vigyan Kendra training on adoption of vermicompost technology by participant farmers in North Karnataka. *Agricultural updates*, **4** (1-2): 48-50.
- Supe, S. V. 1969. Factors related to different degrees of rationality in decision making among farmers in Buldana district. Ph. D. thesis, Indian Agricultural Research Institute, New Delhi, 89p.*
- Surendran, G. 1982. Impact of operational research project on agricultural production. M.Sc (Ag) thesis, College of Agriculture, Vellayani, 110p.
- Tayade, R. V. 2010. Technological gap in cotton cultivation technology. M. Sc (Ag) thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri, 110p*
- Tendale, B. M., Shah, K. A., Nayaka, P., and Tandel, Y. N. 2014. Yield and impact analysis of training and FLDs regarding scientific cultivation of brinjal. *Agric. Updates* **9** (3): 288 - 291.
- Thapa, U., Prasad, P. H., Holmer, R., Linwattana, G., Nath, P., and Keatinge, J. D. H. (2012). Studies on evaluation for adoption of high value Cole crops in the plains of West Bengal. Shenmue, Taiwan, *Proceedings SEAVEG 2012, Chiang Mai, Thailand, 24-26* [e-journal]. Available: [http:// 203.64.245.61 / fulltexted/EB/2011-2015](http://203.64.245.61/fulltexted/EB/2011-2015) [3 Oct 2014]
- Thorat, K. S., Suryawanshi, D. B., and Ban., S. H. 2010. Adoption of MPKV released onion "Phule Samarth" by the farmers. *Mysore. J. Agric. Sci.* **44** (3): 619 - 622.

- Trivedi, G. 1963. Measurement and analysis of socio-economic status of rural families. Ph. D thesis, Indian Agricultural Research Institute, New Delhi.102p.
- Varma, S. K. and Velulla, S. 1991. Self employed women in Gujarat. *Social Welfare* 38 (2): 8 -10.
- Veerasekaran, R, and Suresh, S. 2000. A review of the problems and perspective of small scale industrial development during ninth five year plan (1997-2000). *Rural India*. 148-149pp
- Venkatachalam. L. 2003. *Infrastructure and Agricultural Development in Karnataka State*. Institute for Social and Economic change. Nagarbhavi, Bangalore, 84p. Available: isec.ac.in [03 April 2016]
- Venkataramaiah, P. 1983. Development of a socio economic scale for farm families in North Karnataka, Ph. D thesis. College of Agriculture, Dharwad, 105p.
- Walke, A. S. 2008, A study of technological gap in brinjal cultivation M. Sc (Ag.) Mahatma Phule Krishi Vidyapeeth, Rahuri.124p.*
- Wentling, T. L. 1992. Planning for effective training: A guide to curriculum development. FAO, Rome [on-line]. Available: [https://www.bookdepository.com / Planning-for-Effective-Training-Guide Curriculum Development Ti Wentling / 9789251032132](https://www.bookdepository.com/Planning-for-Effective-Training-Guide-Curriculum-Development-Ti-Wentling/9789251032132) [17 Feb. 2016].
- Wilkening, E. A. 1952. Acceptance of improved farm practices. *Afr. Exp. Statist. Bull.* 92: 128-131pp.
- Yahiya, M. K. 1995. Farm characteristics of farmers in Northern Nigeria: Implication for effective extension delivery to women in agriculture, In: Osuji and

Yahiya. M.K [eds]: *Women and Extension Service in Nigeria*. Ibadan
computer link International, 144 -147pp.

* Originals not seen

Appendices

Appendix - 1

EFFECTIVENESS OF TRAINING INTERVENTIONS OF KRISHI VIGYAN KENDRA, THRISSUR IN ADOPTION OF COOL SEASON VEGETABLES

INTERVIEW SCHEDULE – A

INDEPENDENT VARIABLES:

No.

Date:

Name of Panchayat :

1. Name and address of respondent :

1. Age:

2. Educational status:

Illiterate/can read only/can read and write/primary/ high school/higher secondary /
collegiate and above

3. Marital status : Single/ married/ divorcee/widow(er)

4. Size of family : less than 3 / 3 to 4 / 5 to 6 / above 6

5. Occupation of respondent:

Monthly paid employee/ Retired employee / NRI / Farmer / business

6. Experience:

I have started cultivating CSV from the year:..... and continued for next.....years

7. Economic status:

a. Land holding Area

(i) Garden land :

(ii) Total :

(iv) Area under CSV :

b. Annual income Rupees

(i) Main occupation :

(ii) Subsidiary occupation(if any) :

(iii) Total :

c. House type (owned or rented), if owned: Tick the appropriate one.

Tiled house

Terraced house

Electrified

Plastered

Double storied

8. Social participation

Sl. No.	Name of organization	Status		Frequency of participation		
		Member	Office bearer	Attend all meetings	Attended some meetings	Never attended any meetings
1.	Panchayat					
2.	Cooperative societies					
3.	Agrl. Development advisory committee					
4.	Discussion groups					
5.	Farmer clubs					
6.	Kudumbasree units					

9. Contact with extension agencies:

Sl. No.	Name of extension agent/agency	Frequency of contact					
		Two or more times a week	Once in a week	Once in a fortnight	Once in a month	Rarely	Never
1.	ATMA staff						
2.	Agricultural Officers						
3.	Agric. assistance						
4.	University scientists						
5.	KVK scientists						

10. Availability of inputs:

Sl. No.	Name of inputs	Available in time	Somewhat available	Not available in time
1.	Seedlings / seeds			
2.	Manures			
3.	Fertilizers			
4.	PP inputs			
5.	Labour			
6.	Credit			
7.	Implements			

11. Economic motivation

(Please give your opinion about following statements)

Sl. No.	Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	A farmer should work towards larger yields and economic profits					
2.	The most successful farmer is the one who makes the most profit					
3.	A farmer should try any new farming idea which may help him to earn more money					
4.	A farmer should grow vegetables for home consumption to avoid dependence rather than buying from market.					
5.	A farmer should aim at profit making also from farming enterprise.					

12. Risk orientation (Please give your opinion about following statements)

Sl. No.	Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Trying entirely a new crop involves high risk, but it is worthy.					
2.	It is good for a farmer to take risk when there is a possibility that the change will give a high level of success.					
3.	A farmer who is willing to take greater risk than the average farmer usually do better.					
4.	Even though cool season vegetables and onion are not traditionally practiced, it is worth trying to get profit and satisfaction.					
5.	Even though there are chances for adversities due to climate change, it is better to grow all CSVs especially for home consumption.					

13. Cosmopolitaness :

How often you visit nearby centres

Sl. No.	Name of canters	Once in a week	Twice in a week	Once in a month	Whenever possible	Never visit
1	Krishi bhavan					
2	Cooperative society					
3	Market					
4	KVK					

14. Innovation proneness:

When did you adopt cool season vegetable cultivation? If yes please select suitable statement from the following.

- (i) Started before getting any training by KVK due to my own interest
- (ii) Just after getting trained by KVK
- (iii) After seeing the results from my fellow farmer's cultivation
- (iv) After my innovative friends forced me to adopt
- (v) Never adopted cultivation

15. Production facilities:

Sl. No.	Statement	Yes	No
1.	Enough road and transport facilities helped me to attend training by KVK		
2.	Adequate sunlight is available for cultivation of CSVs.		
3.	Enough irrigation facilities are available for cultivation of CSV in my homestead.		
4.	Enough inputs (grow bags, etc.) are available for cultivation of CSV in my homestead.		
5.	Enough manures and plant protection inputs are available.		

16. Economics of cultivation of CSV:

Cost of cultivation (total) :

Labour charge :

Hire charge of land area:

(Rs/kg)Electricity charge:

Irrigation charge:

Cost of planting materials:

Cost of manures and fertilizers:

Cost of plant protection chemicals:

Other miscellaneous costs:

Cost of marketing, transportation:

Cost of post harvest operations and value addition:

Gross return:

CBR:

Benefit (total):

Yield: (kg)

Selling price:

Net return:

Profit :

Appendix - 2

EFFECTIVENESS OF TRAINING INTERVENTIONS OF KRISHI VIGYAN KENDRA, THRISSUR IN ADOPTION OF COOL SEASON VEGETABLES.

INTERVIEW SCHEDULE - B

DEPENDENT VARIABLES

1. Effectiveness of KVK Training:

Content of training	Extent of coverage		Utility		
	Adequate	Inadequate	Most useful	Useful	Not useful
Timeliness of training					
Seed and seed treatment					
Transplanting, sowing					
Soil testing					
Fertilizer and its application					
Plant protection inputs					
Weed control					
Harvest and post harvest operations					

2. Extent of adoption of cool season vegetables

1. Have you adopted practices of Cool Season Vegetables(CSV) if yes,
 - a) Name of the crop:
 - b) Variety of seeds used:
 - c) Area under CSV:
 - d) Year of adoption:

Sl. No.	Cultivation practices trained from KVK	FA	PA	D
1.	Season for cultivation of CSV is followed as advised by KVK (September to February)			
2.	Soil preparation as recommended by KVK			
3.	Planting method as advised by KVK			
4.	Site selection for cultivation of CSV advised by KVK			
5.	Manure and fertilizers application as recommended by KVK			
6.	Irrigating the crop as per the recommendation of KVK			

7.	Weed control is done as per the recommendation of KVK			
8.	Blanching is done (cauliflower) as per the advice of KVK			
9.	Post harvest handling methods as taught by KVK			
10.	Pest & disease management as per the advice of KVK			
11.	Harvesting maturity as taught by KVK			
12.	Harvesting methods as already taught by KVK			
13.	Storage of CSV			
14.	Drying of onion			
FA- Full Adoption, PA-Partial Adoption, D- Discontinued				

3. Constraints faced by respondents

Sl. No.	(Rate from 1 to 10 according to the intensity of constraint)	Rate
1.	Poor quality of onion seedlings	
2.	Lack of timely availability of seeds/seedling	
3.	Lack of availability of fertilizers and organic manure	
4.	Pest and diseases of the crop are out of control	
5.	Access to market of inputs for cool season vegetables is very poor	
6.	High cost of production compared to other vegetables	
7.	Weather condition and soil are not supporting	
8.	Technical support is not available when needed	
9.	Suitable plant protection materials are not available when required	
10.	Training programmes of KVK do not cover all aspects regarding cultivation of CSV	

ശീതകാല പച്ചക്കറി പരിശീലനത്തിൽ
 കൃഷിവിജ്ഞാന കേന്ദ്രം, ത്രിശ്ശൂർ-ന്റെ ഇടപെടലിന്റെ
 കാര്യക്ഷമത
 (ഫോറം - എ)

പഞ്ചായത്ത് :

1. പേര് :
2. വിലാസം :

3. വയസ്സ് :
4. വിദ്യാഭ്യാസ നില :
 - (1) നിരക്ഷരൻ (2) വായിക്കുകയും എഴുതുകയും ചെയ്യും
 - (3) പ്രാഥമിക വിദ്യാഭ്യാസം (4) ഹൈസ്കൂൾ
 - (5) ഹയർ സെക്കൻഡറി
 - (6) കോളേജും അതിനു മുകളിലേയ്ക്കും
5. വൈവാഹിക നില :
 - (1) അവിവാഹിതൻ (2) വിവാഹിതൻ
 - (3) വിവാഹ മോചിതൻ (4) വിധവ / വിഭ്യാരൻ
6. കുടുംബങ്ങൾ :
 - (1) 3 ൽ കുറവ് (2) 3 ഓ 4 ഓ
 - (3) 5 ഓ 6 ഓ (4) 6 ൽ കൂടുതൽ
7. തൊഴിൽ :
 - (1) മാസവരുമാനമുള്ള തൊഴിലാളി (2) വിരമിച്ചു
 - (2) പ്രവാസി (4) പ്രവാസി
 - (3) കൃഷിക്കാരൻ (5) വ്യാപാരി
8. കൃഷിയിലെ മുൻ പരിചയം :

..... വർഷത്തിൽ ശീതകാല പച്ചക്കറി കൃഷി തുടങ്ങുകയും, തുടർന്നുള്ള.....

വർഷങ്ങൾ അത് തുടങ്ങുകയും ചെയ്തു.

9. സാമ്പത്തിക നില :

(a) കൈവശഭൂമി : വിസ്തീർണ്ണം

(i) കൈവശഭൂമി :

(ii) ശീതകാല പച്ചക്കറി കൃഷിചെയ്യുന്ന ഭൂമി :

(iii) ആകെ ഭൂമി :

(b) വാർഷിക വരുമാനം : രൂപ

(i) പ്രധാന തൊഴിലിൽ നിന്ന് :

(ii) ഉപതൊഴിലിൽ നിന്ന് :

(iii) ശീതകാല പച്ചക്കറിയിൽ നിന്ന് :

(iv) ആകെ :

(c) വീട് : സ്വന്തം / വാടകയ്ക്ക്

(സ്വന്തമാണെങ്കിൽ അനുയോജ്യമായവയിൽ () അടയാളപ്പെടുത്തുക.

ഓടുപാകിയത് :

വാർപ്പ് വീട് :

വൈദ്യുതീകരിച്ചത് :

ചാന്ത് പൂശിയത് :

ഇരുനില :

10. സാമൂഹിക പങ്കാളിത്തം :

ക്രമ നമ്പർ	സംഘടനയുടെ പേര്	അംഗത്വം	ഔദ്യോഗിക ഭാരവാഹി	എല്ലായോ ഗങ്ങളിലും പങ്കെടുക്കുന്നുണ്ട്	ചില യോഗങ്ങളിൽ പങ്കെടുക്കുന്നുണ്ട്	ഒരു യോഗത്തിലും പങ്കെടുത്തിട്ടില്ല
1	പഞ്ചായത്ത്					
2	സഹകരണ സംഘം					
3	കാർഷിക വികസന ഉപദേശക സമിതി					
4	ചർച്ചാ സംഘം					
5	കർഷക ക്ലബ്ബുകൾ					

6	കുടുംബശ്രീ യൂണിറ്റുകൾ					
7	എക്സ്പെൻഷൻ ഏജൻ്റ്					

11. ഏജൻസിയുമായുള്ള സമ്പർക്കം :

ക്രമ നമ്പർ	ഏജൻസി/ ഏജൻ്റ്റിൻ്റെ പേര്	ആഴ്ചയിൽ രണ്ടോ അതിൽ അധികമോ പ്രാവശ്യം	ആഴ്ചയിൽ ഒരിക്കൽ	രണ്ടാഴ്ചയിൽ ഒരിക്കൽ	മാസത്തിൽ ഒരിക്കൽ	വല്ലപ്പോഴും	ഒരിക്കലുമില്ല
1	ആത്മ (Atma) അംഗങ്ങൾ						
2	കൃഷി ഓഫീസർമാർ						
3	കൃഷി അസിസ്റ്റന്റുമാർ						
4	സർവ്വകലാശാല ശാസ്ത്രജ്ഞർ						
5	കെ.വി.കെ. ശാസ്ത്രജ്ഞർ						
6	മറ്റൊരുകിലും (വ്യക്തമാക്കുക)						

10. നിക്ഷേപങ്ങളുടെ ലഭ്യത :

ക്രമ നമ്പർ	നിക്ഷേപം	ആവശ്യമായ സമയത്ത് ലഭ്യമാണ്	കുറച്ചൊക്കെ ലഭ്യമാണ്	ആവശ്യമായ സമയത്ത് ലഭ്യമല്ല
1	വിത്തുകൾ/തൈകൾ			
2	വളങ്ങൾ			
3	രാസവളങ്ങൾ			
4	രോഗകീട നിയന്ത്രണ വസ്തുക്കൾ			
5	ഭൂമി			
6	തൊഴിലാളികൾ			
7	സാമ്പത്തികസഹായം			
8	ഉപകരണങ്ങൾ			

11. താഴെ പറയുന്ന പ്രസ്താവനകളിൽ നിങ്ങളുടെ അഭിപ്രായത്തിനു നേരെ() അടയാളപ്പെടുത്തുക.

ക്രമ നമ്പർ	പ്രസ്താവന	ശക്തമായി യോജിക്കുന്നു	യോജിക്കുന്നു	ഉറപ്പില്ല	യോജിക്കുന്നില്ല	ശക്തമായി വിരോധിക്കുന്നു

1	ഒരു കർഷകൻ ഉൽപാദനം വർദ്ധിപ്പിക്കുന്നതിനും സാമ്പത്തിക ലാഭത്തിനും വേണ്ടിയാണ് ശ്രമിക്കേണ്ടത്					
2	ഏറ്റവും കൂടുതൽ സാമ്പത്തിക കലാഭമുണ്ടാക്കുന്നവനാണ് ഏറ്റവും വിജയിയായ കർഷകൻ					
3	കൂടുതൽ സാമ്പത്തിക ലാഭം ഉണ്ടാക്കാൻ ഉതകുന്ന ഏത് നവീന കൃഷിരീതിയും ഒരു കർഷകൻ പരീക്ഷിക്കേണ്ടതാണ്.					
4	മാർക്കറ്റിൽ നിന്നും വാങ്ങുന്നത് ഒഴിവാക്കാൻ ഒരു കർഷകൻ തന്റെ വീട്ടാവശ്യങ്ങൾക്കുള്ള പച്ചക്കറികൾ സ്വയം കൃഷി ചെയ്യേണ്ടമാണ്.					
5	ഒരു കാർഷിക സംരംഭത്തിന്റെ ലക്ഷ്യം ലാഭമുണ്ടാക്കുക എന്നത് കൂടിയായിരിക്കണം.					

12. നഷ്ട സാധ്യതയുള്ള പരിഷ്കരണങ്ങൾ :

ക്രമ നമ്പർ	പ്രസ്താവന	ശക്തമായി അംഗീകുന്നു	അംഗീകരിക്കുന്നു	ഉറപ്പില്ല	അംഗീകരിക്കുന്നില്ല	ശക്തമായി വിരോധിക്കുന്നു
1	തികച്ചും പുതിയ വിളകൃഷിചെയ്യുന്നത് നഷ്ട സാധ്യത ഉള്ളതാണ് , എന്നാൽ അത് ഗുണകരമാണ്					
2	കൃഷിയിൽ വിജയ സാധ്യത കൂടുതലാ					

	<p>നെങ്കിൽ കർഷകൻ ആ വെല്ലുവിളി ഏറ്റെടുക്കുന്നത് നല്ലതാണ്</p>					
3	<p>സാഹസം ഏറ്റെടുക്കാൻ തയ്യാറുള്ള കർഷകൻ ശരാശരി കർഷകനേക്കാൾ മെച്ചമുണ്ടാക്കുന്നു</p>					
4	<p>ശീതകാല വിളകളും സവോളയും പരമ്പരാഗതിമായി കൃഷി ചെയ്യാറില്ലെങ്കിലും സംതൃപ്തിയും സാമ്പത്തിക ലാഭവും കിട്ടാൻ ഈ കൃഷി ഗുണകരമാണ്.</p>					
5	<p>കാലാവസ്ഥ വ്യതിയാനങ്ങൾ പ്രതികൂലമായി ബാധിക്കാൻ സാധ്യതയുണ്ടെങ്കിലും ശീതകാല പച്ചക്കറികൾ കൃഷിചെയ്യുന്നത് നല്ലതാണ്. പ്രത്യേകിച്ച് വീട്ടാവശ്യങ്ങൾക്ക്.</p>					

13. താഴെ പറയുന്ന കേന്ദ്രങ്ങൾ സന്ദർശിക്കുന്നതിന്റെ ആവൃത്തി :

ക്രമ നമ്പർ	സ്ഥാപനം	ആഴ്ചയിൽ ഒരിക്കൽ	ആഴ്ചയിൽ രണ്ട് പ്രാവശ്യം	രണ്ടാഴ്ചയിൽ ഒരിക്കൽ	മാസത്തിൽ ഒരിക്കൽ	സാധിക്കുമ്പോഴൊക്കെ	ഒരിക്കലുമില്ല
1	കൃഷിഭവൻ						
2	സഹകരണ സംഘം						
3	മാർക്കറ്റ്						
4	കെ.വി. കെ.						
5	മറ്റേതെങ്കിലും (പ്രസ്താവിക്കുക)						

14. നിങ്ങൾ ശീതകാല പച്ചക്കറി കൃഷി തെരഞ്ഞെടുത്തത് എപ്പോൾ?

- (i) എന്റെ സ്വന്തം താൽപര്യത്താൽ കെ. വി. കെ. യിൽ നിന്ന് ഒരു പരിശീലനവും ലഭിക്കുന്നതിനു മുമ്പ്.
- (ii) കെ. വി. കെ. യുടെ പരിശീലനം ലഭിച്ച ഉടനെ:

- (iii) എന്റെ സഹകർഷകന്റെ പ്രയത്ന ഫലം കണ്ടതിന് ശേഷം.
- (iv) നവീന കൃഷി രീതികൾ അവലംബിക്കുന്ന എന്റെ സുഹൃത്തുക്കളുടെ നിർബന്ധപ്രകാരം.
- (v) ഒരിക്കലും സ്വീകരിച്ചിട്ടില്ല.

15. അടിസ്ഥാന സൗകര്യങ്ങൾ :

ക്രമ നമ്പർ	പ്രസ്താവന	ഉണ്ട്	ഇല്ല
1	മതിയായ റോഡ് - വാഹന (ഗതാഗത) സൗകര്യങ്ങൾ കെ.വി.കെ.യിൽ പരിശീലനത്തിനെത്താൻ എന്ന സഹായിച്ചു.		
2	ശീതകാല പച്ചക്കറി കൃഷിക്ക് ആവശ്യമായ ജലസേചന സൗകര്യങ്ങൾ പുരയിടത്തിൽ ലഭ്യമാണ്.		
3	ശീതകാല പച്ചക്കറി കൃഷിചെയ്യാൻ ആവശ്യമായ സൂര്യപ്രകാശം ലഭിക്കുന്നുണ്ട്		
4	ശീതകാല പച്ചക്കറി കൃഷിക്കു ആവശ്യമായ ഗ്രോബാഗ് പോലുള്ള സാമഗ്രികൾ ലഭ്യമാകുന്നുണ്ട്.		
5	മതിയായ വളങ്ങളും സസ്യ സംരക്ഷണ സാമഗ്രികളും ലഭ്യമാണ്.		

ഫോം -ബി

1. കെ. വി. കെ. പരിശീലനത്തിന്റെ കാര്യക്ഷമത

ക്രമ നമ്പർ	പരിശീലനത്തിന്റെ ഉള്ളടക്കം	പര്യാപ്തം	അപര്യാപ്തം	വളരെ ഉപകാരപ്രദം	ഉപകാരപ്രദം	ഉപയോഗകരമല്ല
1	പരിശീലന സമയത്തിന്റെ അനുയോജ്യത					
2	വീണ്ടും വീണ്ടും പരിചരണവും					
3	പഠിച്ചുനടൽ, വിത്തുവിതകൾ					
4	മണ്ണ് പരിശോധന					
5	വളവും വളപ്രയോഗവും					
6	സസ്യ സംരക്ഷണ വസ്തുക്കൾ					
7	കള നിയന്ത്രണം					
8	വിളവെടുപ്പും ശേഷമുള്ള പ്രവർത്തനങ്ങളും					

2. ശീതക്കാല പച്ചക്കറി കൃഷി പ്രാവർത്തികമാക്കുന്നതിന്റെ വ്യാപ്തി.

I നിങ്ങൾ ശീതക്കാല പച്ചക്കറി കൃഷി പ്രാവർത്തികമാക്കിയിട്ടുണ്ടോ? ഉണ്ടെങ്കിൽ

- a) വിളയുടെ പേര്
- b) ഉപയോഗിച്ച വിത്ത് ഇനം
- c) കൃഷിഭൂമിയുടെ വിസ്തീർണ്ണം
- d) കൃഷി തുടങ്ങിയ വർഷം

ക്രമ നമ്പർ	കെ.വി.കെ.യിൽ നിന്നും കിട്ടിയ പരിശീലനം	പൂർണ്ണമായും സ്വീകരിച്ചു	ഭാഗികമായി സ്വീകരിച്ചു	ഒട്ടും സ്വീകരിച്ചിട്ടില്ല
1	കെ.വി.കെ.യുടെ നിർദ്ദേശപ്രകാരമുള്ള സമയം തെരഞ്ഞെടുത്തു.			
2	കെ.വി.കെ.യുടെ നിർദ്ദേശപ്രകാരമുള്ള മണ്ണ് പാകംപ്പെടുത്തൽ			

3	കെ.വി.കെ.യുടെ നിർദ്ദേശ പ്രകാരമുള്ള നടീൽ രീതി			
4	കെ.വി.കെ.യുടെ നിർദ്ദേശ പ്രകാരമുള്ള സ്ഥലം തെരഞ്ഞെടുക്കൽ			
5	കെ.വി.കെ.യുടെ നിർദ്ദേശ പ്രകാരമുള്ള വളപ്രയോഗം			
6	കെ.വി.കെ.യുടെ നിർദ്ദേശ പ്രകാരമുള്ള ജലസേചനം			
7	കെ.വി.കെ.യുടെ നിർദ്ദേശ പ്രകാരമുള്ള കള നിയന്ത്രണം			
8	കെ.വി.കെ.യുടെ നിർദ്ദേശപ്രകാരമുള്ള ബ്ലാൻചിങ്ങ് (കോളിഫ്ളവർ)			
9	വീളവെടുപ്പിന് ശേഷമുള്ള എല്ലാ പ്രവർത്തനങ്ങളും കെ.വി.കെ.യുടെ നിർദ്ദേശ പ്രകാരമാണ് ചെയ്യാറ്			
10	കെ.വി.കെ.യുടെ നിർദ്ദേശപ്രകാരമുള്ള കീട, രോഗ പരിപാലനം			
11	കെ.വി.കെ.യുടെ നിർദ്ദേശപ്രകാരമുള്ള വീളയുടെ പാകത			
12	കെ.വി.കെ.യുടെ നിർദ്ദേശപ്രകാരമുള്ള വീളവെടുപ്പ് രീതി			
13	വീളവെടുപ്പിന് ശേഷമുള്ള സോർട്ടിംഗ്, ഗ്രേഡിങ്ങ്, പാക്കിങ്ങ്, സ്റ്റോറേജ് തുടങ്ങിയ നിർദ്ദേശപ്രകാരം ചെയ്യുന്നു.			
14	സവോളയുടെ ഉണക്കൽ പ്രക്രിയ			

3. കർഷകൻ നേരിട്ട പരിമിതിയുടെ തീവ്രതയനുസരിച്ച് 1 മുതൽ 10 വരെ തോത് നിശ്ചയിക്കുക.

1. തൈകളുടെ ലഭ്യത കുറവ്.
2. നിർദ്ദേശിക്കപ്പെട്ട രീതികൾ അവലംബിച്ചാലും കീടങ്ങളേയും രോഗങ്ങളേയും നിയന്ത്രിക്കാൻ പറ്റുന്നില്ല.
3. നടീൽ വസ്തുക്കളും കീടനാശിനികളും ആവശ്യമുള്ള സമയത്ത് ലഭ്യമാകുന്നില്ല.
4. മറ്റു പച്ചക്കറികളേക്കാൾ ഉത്പാദന ചിലവ് കൂടുതലാണ്.

5. ശീതകാല പച്ചക്കറി കൃഷി ചെയ്യാൻ ആവശ്യമായ ഭൂവിസ്തൃതിയില്ല.
6. മാർക്കറ്റിൽ കൃഷിക്ക് ആവശ്യമായ സാമഗ്രികൾ ലഭിക്കാറില്ല.
7. ആവശ്യമുള്ളപ്പോൾ സഹായം ലഭിക്കുന്നില്ല.
8. മതിയായ ജൈവവളം ലഭ്യമല്ല.
9. കാലാവസ്ഥയും മണ്ണും അനുകൂലമല്ല.
10. കെ. വി. കെ. യുടെ പരിശീലനം ശീതകാല പച്ചക്കറി കൃഷിയുടെ എല്ലാ മേഖലകളേയും സ്പർശിക്കുന്നില്ല.

Appendix - 4

i) Garret ranking: Percent position Table

Constraints rank	$100(R_{ij}-0.5)/N_j$	Percent position
1	$100(1 - 0.5)/N_j$	5
2	$100(2 - 0.5)/N_j$	15
3	$100(3 - 0.5)/N_j$	25
4	$100(4 - 0.5)/N_j$	35
5	$100(5 - 0.5)/N_j$	45
6	$100(6 - 0.5)/N_j$	55
7	$100(7 - 0.5)/N_j$	65
8	$100(8 - 0.5)/N_j$	75
9	$100(9 - 0.5)/N_j$	85
10	$100(10 - 0.5)/N_j$	95

ii) Calculated Garrett Score

Constraints	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Total
C1	656	840	1323	696	676	864	714	252	319	18	6358
C2	1640	630	882	754	936	576	588	396	232	18	6652
C3	1230	1050	567	928	1144	528	462	396	261	18	6584
C4	246	630	756	1218	676	720	546	504	348	144	5788
C5	82	420	693	522	832	1200	714	828	290	36	5617
C6	2624	1750	630	812	260	336	378	396	203	0	7389
C7	574	350	630	812	728	816	1260	288	174	162	5794
C8	328	1610	1260	580	260	432	210	612	464	198	5954
C9	2214	770	756	348	468	144	42	180	435	558	5915
C10	246	350	63	290	260	144	126	468	754	1008	3709

iii) **Garret value for each percent position from Hendry Garrett table**

Rank	Percent position value	Garrett Value (from Garrett ranking conversion table)
1	5	82
2	15	70
3	25	63
4	35	58
5	45	52
6	55	48
7	65	42
8	75	36
9	85	29
10	95	18

iv) **Average score and ranking**

Constraints	Total	Average score (Total/120)	Rank
C1	6358	52.98	4
C2	6652	55.43	2
C3	6584	54.86	3
C4	5788	48.23	7
C5	5617	46.81	9
C6	7389	61.57	1
C7	5794	48.28	8
C8	5954	49.61	5
C9	5915	49.29	6
C10	3709	30.91	10

Appendix – 5

Summary of MLR for adoption level

Parameter Estimates								
adoptioncode ^a	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
1	Intercept	-.562	5.265	.011	1	.915		
	gender	-.457	.664	.473	1	.492	.633	.172 2.327
	age	.350	.467	.560	1	.454	1.419	.568 3.546
	education	-.109	.244	.200	1	.655	.897	.556 1.447
	Marital status	.386	.430	.806	1	.369	1.471	.633 3.420
	Family size	.000	.310	.000	1	.999	1.000	.544 1.835
	occupation	-.257	.281	.835	1	.361	.774	.446 1.341
	experience	-.640	.497	1.659	1	.198	.527	.199 1.396
	Social participation	-.295	.145	4.161	1	.041	.744	.560 .989
	Land hold	.323	.484	.444	1	.505	1.381	.534 3.567
	income	-.239	.280	.728	1	.394	.788	.455 1.363
	House type	.003	.181	.000	1	.985	1.004	.704 1.431
	Extension agency	-.005	.067	.007	1	.935	.995	.873 1.134
	Input availability	.098	.070	1.972	1	.160	1.103	.962 1.264
	Economic motivation	-.034	.067	.257	1	.612	.967	.848 1.102
	Risk orientation	-.071	.079	.792	1	.374	.932	.797 1.089
	cosmopolitaness	.024	.073	.105	1	.746	1.024	.888 1.181
	innovativeness	.674	.338	3.960	1	.047	1.961	1.010 3.807
	infrastructure	.398	.412	.931	1	.335	1.488	.664 3.338
2	Intercept	-4.429	32.959	.018	1	.893		
	gender	15.129	.000	.	1	.	3.718E6	3718077.276 3718077.2
	age	-2.874	1.634	3.094	1	.079	.056	.002 1.389
	education	-.116	.853	.019	1	.892	.890	.167 4.737
	Marital status	.259	3.190	.007	1	.935	1.296	.002 673.101
	Family size	-1.227	1.483	.685	1	.408	.293	.016 5.361
	occupation	-1.199	1.042	1.325	1	.250	.301	.039 2.322

experience	.234	1.989	.014	1	.906	1.264	.026	62.364
Social participation	-.185	.636	.085	1	.771	.831	.239	2.891
Land hold	.995	2.173	.210	1	.647	2.704	.038	191.280
income	-.239	1.196	.040	1	.842	.787	.075	8.213
House type	.007	.734	.000	1	.992	1.007	.239	4.248
Extension agency	.140	.264	.281	1	.596	1.150	.686	1.929
Availability of inputs	.079	.276	.082	1	.774	1.082	.630	1.859
Economic motivation	-.889	.466	3.638	1	.056	.411	.165	1.025
Risk orientation	-.047	.299	.025	1	.874	.954	.531	1.712
cosmopolitaness	-.067	.360	.034	1	.854	.936	.462	1.896
innovativeness	-2.055	2.154	.910	1	.340	.128	.002	8.736
infrastructure	1.225	2.609	.220	1	.639	3.403	.020	565.664
a. The reference category is: 1.00.								

Abstract

**EFFECTIVENESS OF TRAINING INTERVENTIONS OF KRISHI
VIGYAN KENDRA (KVK), THRISSUR IN ADOPTION OF COOL
SEASON VEGETABLES**

By

SABIRA M. P.

(2014 - 11 - 222)

Abstract of the thesis

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(Agricultural Extension)

Faculty of Agriculture

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Effectiveness of training interventions of Krishi Vigyan Kendra, Thrissur in adoption of cool season vegetables

Abstract

Krishi Vigyan Kendra (KVK) Thrissur, established in 2004 under Kerala Agricultural University, is conducting several On Farm Trials (OFT), Front Line Demonstrations (FLD), and trainings from 2008 in popularizing the cultivation of Cool Season Vegetables (CSV). This empirical study was carried out to evaluate the effectiveness of training interventions of KVK, Thrissur, assess the extent of adoption of CSV in the coastal areas of Thrissur district namely Mathilakom and Perinjanam panchayats, and to elucidate the major constraints faced by the respondents in adoption of CSVs.

Demographic indicators and socio-personal characteristics of the respondents in the study area was collected and analysed. Out of 120 respondents, a greater percentage of respondents (86.70 %) were married females. As younger generations are attracted towards the lucrative jobs in foreign countries, 56.70 per cent of the respondents were found to be in the age group of 51 and above. About 81 per cent of the respondents were farmers by occupation with high school education and above. There were no illiterate respondents. 56.66 per cent of the respondents had medium experience level. In case of annual income, about 57 per cent of the respondents belonged to high income group. Most of the respondents (85.80 %) had less than one acre of land with terraced (62.50 %) and double storied houses (18.30 %) followed by tiled houses (17.50 %).

High levels of contact with extension agents and economic motivation were noticed among 41.60 and 62.50 per cent of the respondents respectively. Nearly three fourth of the respondents (72.55 %) exhibited medium levels of risk orientation and social participation (73.30 %); while around two third had medium level of cosmopolitaness (62.50 %).

About 54.1 per cent of the respondents opined that the inputs required for cultivation of CSV was available in time in the locality. Majority of the respondents were early adopters (62.50 %) followed by early majority.

The content of the training interventions was adequate, according to 62.50 per cent of the respondents. While the contents included in the training interventions were very useful for 21 per cent of the respondents, it was found to be useful for 72.30 per cent. About three-fourth of the respondents (73.3%) had partially adopted the cultivation practices. An overwhelming majority of the respondents have got enlightened from the training interventions and they were very effective for around 21 per cent of the respondents and effective for nearly 70 per cent of the respondents.

Adequacy of contents showed positive and significant correlation with age, education status, occupation, social participation and cosmopolitaness. Utility of the content had significant and positive relationship with input availability, social participation, extension contact, risk orientation, house type, occupation and annual income. Multinomial Logistic Regression (MLR) showed that the independent variables, income (66.3 2%), input availability (54.00 %) and risk orientation (46.72%) were the three variables that explained more about the utility of the contents. Economic motivation, social participation and innovative proneness explained the adoption of CSV at 49.16 per cent, 42.66 per cent and 66.22 per cent respectively. For majority of the respondents (69.20%), the training interventions were effective; and for about 21 per cent, they were very effective. Age and economic motivation are the prime variables to be considered for transforming the adopters from medium to high level.

The items underlying the major factor 'outreach behaviour' were social participation, extension agency contact and cosmopolitaness. The items under second major factor 'facilitating environment' included input availability and production facilities. The major three constraints identified were, high cost of production, poor availability of seedlings in time and lack of availability of organic manure.

The study revealed that the training interventions of KVK, Thrissur in adoption of CSV in the coastal areas of Thrissur District was effective. The study brought out the fact that with the cooperation of farmers in Mathilakom block; KVK, Thrissur had successfully battled the odds to embrace the production of cabbage, cauliflower and onion with increasing success. Regarding the adoption of cool season vegetables, KVK can still improve by helping the trainees to overcome some of the constraints that they perceived as barriers which block them in achieving their goal. Training interventions in seedling production and persuading the farmers in commercial production of CSV are some of the suggestions proposed to make cool season vegetables an attractive and more lucrative venture and also attract the youth towards this endeavour.