ADOPTION OF ORGANIC FARMING TECHNOLOGIES IN BANANA AND VEGETABLE CROPS IN KASARAGOD DISTRICT

by

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THESIS

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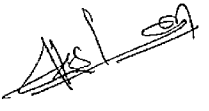
2015

DECLARATION

I, hereby declare that this thesis entitled **"ADOPTION OF ORGANIC FARMING TECHNOLOGIES IN BANANA AND VEGETABLE CROPS IN KASARAGOD DISTRICT"** is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society



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Certified that this thesis entitled **"ADOPTION OF ORGANIC FARMING TECHNOLOGIES IN BANANA AND VEGETABLE CROPS IN KASARAGOD DISTRICT"** is a record of research work done independently by Mr Akshay Sasidharan under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him

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But thanks be to God, who gives us the victory through our Lord Jesus Christ. Therefore, my beloved brethren, be steadfast, immovable, always abounding in the work of the Lord, knowing that, your labour is not in vain in the Lord.

- 1 Corinthians 15:57,58

Akshay Sasidharan

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Introduction

1. INTRODUCTION

There is a trade off, it is argued, between pursuing development and safeguarding the environment Recent experience has shown that methods of agricultural production other than the conventional methods need to be explored, as a matter of necessity Modern agricultural production heavily depend upon chemical inputs have ensured us food security But, as the old saying goes every coin has an opposite side, the other side of this modern agriculture is forcing us to compromise on various fronts including quality It is obvious that the ecosystem is unable to sustain high productivity and yields are noticeably falling Vital biological processes and pathways that are essential for continuous survival of any agro ecological landscape is ignored, broken down and unimaginatively altered with appalling results in conventional cultivation methods

The Green Revolution beginning from mid-1960s was an intensive movement It is because of this milestone movement the country spectacularly increased production of cereals and managed to create a surplus The exigency of feeding a hungry nation was enough to justify the methods employed in the Green Revolution The core philosophy behind the Green Revolution was enhanced productivity by a combination of High Yielding Varieties, finance, mechanization and intensive application of inputs including irrigation, fertilizers and chemical plant protectants It seemed that we had conquered the famous 'Malthusian Scourge' which predicted that geometric population growth would inevitably outstrip food production, leaving society destitute and hungry

But much of our "conquest" of the Malthusian challenge is a temporary stopgap, not yet an ultimate solution We have not yet adopted a truly sustainable method of feeding the growing population since the great agronomic successes, including the Green Revolution itself, have come at huge and irreversible environmental costs (Subbarao, 1999)

The surplus dumping of nitrogen based fertilizer has resulted in the contamination of water bodies leading to eutrophication, marine dead zones, and the massive destruction of vulnerable and vital marine ecosystems Moreover, the

nitrogen inputs, while essential for food production, are also a source of nitrous oxide emissions, one of the three main greenhouse gases leading to manmade climate change Agricultural practices such as monoculture production are leading to reduced biodiversity, a loss of genetic diversity, and a vulnerability to new pests and invasive species

But all these problems pale before the most insidious blowback of conventional input intensive cultivation- the health hazard posed by the ubiquitous presence of poisonous residues from application of pesticides, fungicides and herbicides that has managed to find its way to every nook and corner of the food web (Horrigan *et al* , 2002)

In the quest to tackle such challenges, organic agriculture assumes most important part in finding answers to both sustainability issues and better health to cultivators and consumers Organic agriculture is panacea to the ever worsening condition of our ecosystem (Ramesh *et al* , 2005)

Much like the Pan Indian situation demanding a renewed attitude to organic agriculture, the Kerala situation too warrants more detailed studies on enhancing the practice and appeal of organic farming

Banana and vegetables are the major annual crops taken up by farmers in Kerala next to paddy and so is the situation m Kasaragod Banana is a crop which requires large amount of fertilizers to attain good yield Heavy crop loss accompanied by pest and diseases in vegetables has enticed the farmers to unload poisonous chemical pesticides on the crop (Ngowi *et al* , 2007)

Over past two decades, endosulfan has been aerially sprayed on cashew plantations in Kasaragod district Media attention created by this pesticide disaster and its consequences in the community, put Kerala on the wrong spotlight marring all other achievements in agricultural front Realizing the fact that organic farming would provide solutions to the alarming environmental damages and bring positive social effects like generation of rural employment, improved household nutrition and local food security, Government took a bold step in 2010, to declare Kasaragod as the first organic district With support from KAU the State Department of Agriculture drafted a road map for implementing organic farming

in a phased manner It is a pilot project to be completed in 2016 and role model for other districts to follow and make Kerala state completely organic in the near future It is against this backdrop that the present study has been taken up in Kasaragod (Government of Kerala, 2008)

1 2 OBJECTIVES OF THE STUDY

1 Assess the extent of awareness, knowledge and adoption of organic farming technologies

2. Analyse the attitude of farmers towards organic farming programme

3. Examine the constraints in the adoption of organic farming technologies as perceived by the farmers

4. Examine the constraints perceived by the extension functionaries in the implementation of organic farming programmes

5 Analyse the sustainability of cluster based approach of organic farming

6 Identify the role of KAU in promoting organic farming

1 3 SCOPE OF THE STUDY

Kasaragod district was selected as first organic district of Kerala on a pilot basis This study would provide the required feedback on the present status, requirements, gaps etc for adopting / implementing organic agriculture which would help the planners and policy makers to device appropriate strategies for promotion of organic farming in Kerala as envisaged in the Organic Farming policy of Government of Kerala

1 4 LIMITATIONS OF THE STUDY

The study formed a part of master's research programme of the student investigator and it had all the limitations of time, money and other resources Hence the study was limited to a few grama panchayaths of Kasaragod district only Moreover the study had not attempted to analyse many other independent variables which may have influence on the dependent variables Further the study was fully based on the perceived opinions of the respondents in which there was a chance of personal bias / prejudice However atmost care has been taken to make the study objective

Review of Literature

2. REVIEW OF LITERATURE

Organic farming is now widely accepted all over the world due to the negative consequences of the conventional farming and the sustainability of organic farming One of the objective of this chapter is to develop an understanding about organic farming technologies in banana and vegetable crops The chapter is organized in the following

2 1 Definition of organic farming
2 2 Promoting organic farming in Kerala – A Government initiative
2 3 Promoting organic farming in Kerala – A government initiative
2 4 Principles of organic farming
2 5 Need for organic farming
2 6 PGS – group certification/ social certification of small farmers
2 7 Factors associated with organic conversion
2 8 Profile characteristics of the organic farmers
2 9 Extent of awareness about organic farming practices and schemes
2 10 Extent of knowledge about organic farming practices
2 11 Attitude towards organic farming
2 12 Extent of adoption of organic farming practices in banana and vegetable cultivation
2 13 Constraints in the adoption of organic farming practices
2 14 Perception and constraints of extension functionaries towards organic farming

2 1 DEFINITION OF ORGANIC FARMING

IFOAM (2005) defines organic agriculture as a production system that sustain the health of the soils, ecosystems and people It relies on ecological process biodiversity, and cycles adapted to local conditions, rather than the use of inputs with adverse effects Organic agriculture combines tradition,

innovation and science to benefit the shared environment and promote fair relationships and good quality of life for all involved

2 2 PROMOTING ORGANIC FARMING IN KERALA–A GOVERNMENT INITIATIVE

Kerala state drafted an organic farming policy in the year 2008 Farmers in Kerala were already engaging in organic production by the time of this announcement, one official estimate claims that close to 9,000 farmers within Kerala were certified orgamc for export (Yadav, 2009) The vision of this policy was to Make Kerala's farming sustainable, rewarding, and competitive, ensuring poison-free water, soil and food to every citizen As part of this, Kasaragod was declared as the first organic district in Kerala

Objectives of the organic farming policy (GoK, 2008) are, to make farming sustainable, remunerative and respectable, to enhance natural soil fertility and productivity, to ensure soil and water conservation, to ensure agricultural bio-security and food and nutritional security, to create and ensure domestic market for organic products controlled by the farmers, to avoid the use of agrochemicals and other hazardous material and, to ensure chemical – free water, soil, air and food ensure seed, food and sovereignty promote biodiversity based ecological farming, to ensure quality control in organic inputs and agricultural produce, to enable human health promotion by providing safe agricultural products and commodities and the conservation and extension of traditional knowledge related to agriculture For achieving these objectives 24 point strategic action plan on different aspect of organic farming were prepared List of strategies is given below

Strategy 1- Ensure seed sovereignty of the farmers and the State
Strategy 2- Implementation of organic farming policy in a phased manner
Strategy 3- Compact Area Group approach in organic farming
Strategy 4- Strengthen soil and ensure water conservation measures

Strategy 5-	Promote a mixed farming approach for livelihood security and ecological sustainability
Strategy 6-	Conserve and improve agro-biodiversity and undomesticated biodiversity
Strategy 7-	Launch a state-wide intensive campaign on organic farming in the form of a popular movement "JaivaKeralam"
Strategy 8-	Ensure availability of quality organic manure to the farmers
Strategy 9-	Ensure farm inputs for organic farming
Strategy 10-	Capacity Building for farmers, implementing officers, agencies, and local self- government members
Strategy 11-	Develop Model Sustainable Organic Farms in the State
Strategy 12	Ensure and improve the health and wellbeing of the tribal through special tribal agriculture programmes
Strategy 13-	Establish Producer Companies promoted by organic farmers
Strategy 14-	Establish storage and transportation facilities
Strategy 15-	Promote farm level processing, value addition and encourage the use of organic farm produce in food industry
Strategy 16-	Develop diverse channels for marketing of organic produce
Strategy 17	Develop a simple certification process in the State for all organic farmers
Strategy 18-	Provide financial incentives for promoting organic farming
Strategy 19-	Encourage the use of renewable energy sources
Strategy 20-	Introduce organic farming in education institutions
Strategy21-	Reorient Research, Education and Extension
Strategy 22-	Phase out Chemical Pesticides and Fertilizers from the farming sector
Strategy 23 -	Integrate the programmes and activities of various departments, local self- governments and organizations
Strategy 24-	Organizational set-up for promotion of organic farming

2.2.1. World and National Scenario in Organic Farming

The first documented use of the term "organic farming" was by Lord Northbourne in his London-published 1940 book Look to the Land (Paull, 2008) According to the latest FiBL - IFOAM survey on certified organic agriculture worldwide, it is practiced in 164 countries (up from 162 in 2011) there were 37 5 million hectare of organic agricultural land in 2012 including conventional areas The countries with largest area of organic agricultural land include Australia (12 2 m ha) and Europe (11 2 m ha) Latin America has 6 8 m ha followed by Asia (3 2 m ha), North America (3 m ha) and Africa (1 1 m ha) The country with highest agricultural land is Australia (12 m ha)

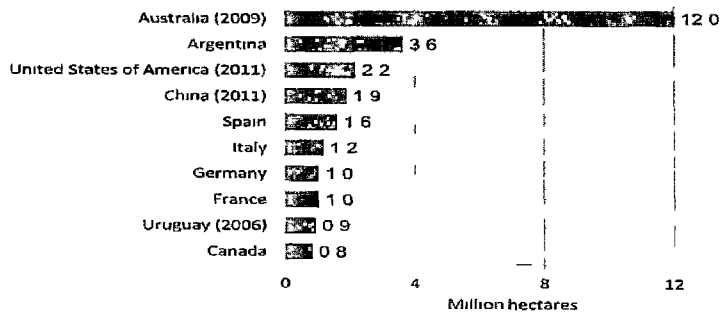


Figure 1 Top ten countries with largest area of organic agricultural land (FiBL – IFORM survey 2014)

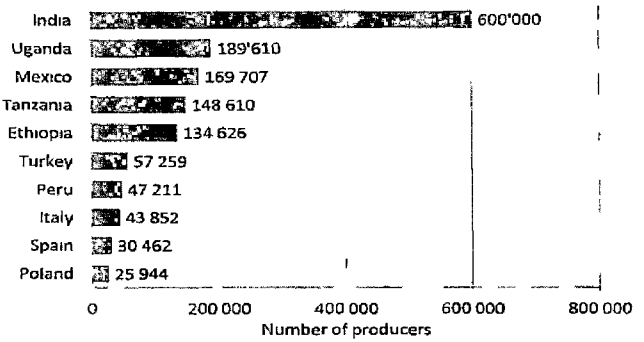


Figure 2 Top ten countries with largest number of organic producers (FiBL – IFORM survey 2014)

2.2.1.1. Scenario of Organic Farming in India

In India, organic farming has grown many fold and number of initiatives at the government and non-Government levels have given it a firm direction Prime Minister of India, Sri Narendra Modi put forward the idea of transforming North Eastern states to organic taking Sikkim as a model In India almost 5 3 lakh hectares of land is under organic cultivation, which is 0 3% of the total agricultural land, which includes 44926 certified farms (APEDA, 2010 - 2011) India is the country with largest number of organic producers which accounts about six lakhs (The world of organic statistics and emerging trends, 2014)

2 3 PRINCIPLES OF ORGANIC FARMING

Four basic principles of natural farming were developed by Masanobu Fukuoka in his book "One-straw Revolution" published in 1985, which are

1 No ploughing
2 No chemical fertilizers
3 No weeding and
4 No plant protection

According to Francis Blake (1987) the principles of organic agriculture are (1) Organic agriculture aims to be in harmony rather than in conflict with natural systems The powers of nature are harnessed and developed to their fullest extent, rather than dominated (2) It adopts an approach that minimizes the use of non-renewable forms of energy (3) Organic food aims to be of optimum nutritional value (4) The organic world strives to be localized Local markets, decentralized systems of distribution and processing are sought (5) Organic agriculture does not pollute the environment

The principles of organic farming lie in the maintenance of soil fertility through careful husbandry, the recycling of agricultural wastes, avoidance or reduction of external inputs and the use of natural forms of pest management and weed control (Goldsmith and Hildeyard 1996)

The principles of organic Agriculture were established and approved by the General Assembly of International Federation of Organic Agriculture Movements (IFOAM) in September, 2005 The principles were developed by an intensive two year participatory process The aim of the principles is both to inspire the organic movement and to describe the purpose of organic agriculture to the world

The four principles of organic agriculture as recommended by IFOAM are as follows

1 The Principle of health Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible
2 The Principle of Ecology Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them
3 The Principle of Fairness Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities

4 The principle of care Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment

Shiva *et al*, (2006) observed that Organic Farming is based on principles of agro-ecology These include

1 Improvement and maintenance of agro-ecosystem based on conservation of soil, water and biodiversity
2 Preventing exploitation and pollution of natural resources
3 Reduction in consumption of non-renewable energy
4 Production of nutritious and high quality products
5 Conservation of indigenous knowledge and traditional farming systems
6 Protection of freedom and independence of farmers with respect to seed sovernity and other inputs and markets
7 Diversity and Decentralization

2 4 NEED FOR ORGANIC FARMING

Organic farming is the need of the hour in the present day context of serious threat to our ecology and environment Great harm is being caused due to large scale pollution of our soil, water and air which have resulted in degradation and loss of these natural resources and a declining trend has set in the productivity of our soils

Chemical agriculture with a heavy dependence on fertilizer and pesticides is affecting the quality and safety of produce and well-being of humanity For a sound future, organic farming offers a dynamic interaction between soil, plants, animals, humans, ecosystems and environment (Daniel, 1996)

In India the demand for organic produce increases year after year, particularly in international trade market Organic produce will help us to avoid the dumping of thousands of tonnes of agrochemicals every year, and will give us

residue-free food, save environment from pollution and provide better living standards (Sujit, 2003)

According to Naves *et al* (2008), organic agriculture offers the opportunity to accept the challenge of maximization of the use of the nitrogen and carbon through biological process available in nature Both of these chemical elements, which are very important for vital process of biogeochemical cycles, receive special attention in organic management of soil Those elements are responsible for the most important components of the human and animal food (carbohydrates, proteins, vitamins etc) and of organic substances that keep the soil alive

Organically managed farms recorded lower productivity and yield losses but there was an overall improvement in soil quality parameters, indicating better soil health It is economically feasible to practice organic farming when the farmers are able to get premium price for their produce and with the reduced cost of cultivation by not depending upon the purchased off-farm inputs Low productivity in organic farming highlights need in the current international and national research activities (Ramesh *et al*, 2010)

2 5 PGS – GROUP CERTIFICATION/ SOCIAL CERTIFICATION OF SMALL FARMERS

The International Federation of Organic Agriculture Movements (IFOAM) defines "Participatory Guarantee Systems" as locally focused quality assurance systems They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange

Certification provides believability for consumers looking for organic produce It is also really helpful to farmers, as they are able to fetch a higher rate for their produce, thereby strengthening their economic security

Organic third party certification is well beyond their reach, both in terms of cost and technical ability / understanding necessary to meet a strict organic

standard from the start Organic participatory guarantee systems (PGS) help farmers to overcome these problems through peer-review and social control as a substitute for a third party certification (Zanasi and Venturi, 2008)

PGS is a new way for small producers to access local markets and work together toward sustainable and locally appropriate organic farming practices, local market development, community social cohesion, developing farmer's networks, and even promoting trust for the PGS beyond the boundaries of the local community (Zanasi and Venturi, 2008) However, PGS is more than just a certification and goes well beyond trade and business standards, as it is based on strong civil society (Fonseca *et al*, 2008), serving as a bottom-up development mechanism for small-scale rural poor By recognizing the merits of the traditional practices of local farmers it helps to maintain important cultural farming practices and local customs (Darlong, 2008), safeguarding agro-biodiversity conservation, sustainable conservation and ecological farming practice and offering livelihood security to rural poor

As on October 2014, 36 farmer groups comprising of 465 farmers were certified under PGS by the Fair Trade Alliance Kerala (Organic News, 2014)

2 6 FACTORS ASSOCIATED WITH ORGANIC CONVERSION

The farmers gave the following reasons for conversion and these were graded according to the frequency in the descending order Their motives, however, could vary from pure profitability to sound ecological principles (Balachandran, 2004)

1 Concern for human health 2 Self-dependence and freedom in farming, emotional and philosophical reasons 3 Decreasing farm income due to escalating costs of external inputs labour, fertilizer etc 4 Increasing pest infestations and crop disease, depleting health of the soil 5 Influence of other organic farmers, Naturopathy and Fukuoka 6 Increasing risks, concern for environment 7 Preservation of traditions 8 Long-term sustainable agriculture

The literature associated with reasons for adoption and non-adoption of organic farming is fairly extensive Darnhofer *et al* (2005) have identified a spectrum of five types of farmers in that regard, ranging from "committed conventional" to "committed organic" producers

"Committed conventional" farmers are defined as growers who do not see organic farming as more environmentally friendly than conventional production, do not believe the health claims made for organic foods and do not perceive that organic production is technically and/or economically feasible

Growers who are labeled as "pragmatic conventional" farmers, do not have an ideological stance opposing organic farming, but perceive conversion as entailing profound changes in their farm organization which they are not eager to implement without tangible economic benefits Darnhofer *et al* (2005) noted that these growers are likely to be more open to conversion once "technological uncertainties have been resolved" and once the market for organic products has been established

The next group consists of "environment-conscious but not organic" farmers This group consists of "self-declared organic producers who are not registered, who tend to have strong views regarding the perceived disadvantages of certification, and/or who want to remain independent of the regulations" The research has found that many of the farmers falling into this category are farmers with largely organic methods, but that use some conventional practices based on philosophical or pragmatic reasons

The group of farmers whose motivation for organic conversion is largely economic falls under the category of "pragmatic organic" farmers,

Finally, "committed organic" farmers are described as "deeply rooted in the founding philosophy of organic farming, which is based on the rejection of synthetic fertilizers and pesticides, while seeking closed nutrient cycles and improved soil health" Darnhofer *et al* (2005) noticed that unlike pragmatic

orgamc farmers, "economic considerations are secondary and these farmers are willing to risk foregoing some of their income "

According to the study conducted by Howlett *et al* (2002), on motivation for conversion, benefits most frequently mentioned by the farmers were better prices for produces and greater income from them Environmental concerns about less environmental pollution was the next most frequently mentioned Other benefits identified included less work, market security and safer/ healthier food

The international research literature on organic agriculture identifies farming related and personal motives falling into four broad categories These are husbandry related motives, financial motives, personal concerns, and general concerns (Padel, 2001)

Table1 Motivations to convert to organic production

Farming related motives	Personal motives
Husbandry and technical reasons animal health problems, soil fertility and erosion problems	Personal health own and family health problems, ergonomic reasons
Financial motives solving existing, financial problems, securing the future of the farm, saving costs, premium marketing	General concern stewardship, food quality, environmental conservation, rural development

Source Padel (2001)

Lund *et al* (2002) find differences in values between the pioneers of organic farming and later entrants of organic farming in Norway The pioneers expressed a more eco-centric view, emphasising a holistic perspective, whereas economic reasons appeared more important for later entrants

Vartdal (1993) classifies organic farmers in Norway as Anthroposophists (influenced by bio-dynamic agriculture and Rudolf Steiner with strong commitment to his ideas), Ecosophists (motivated by green ideas, the environmental and back to the land movement) and Reformists ('normal' farmers with a pragmatic approach to organic agriculture)

Loganandhan (2002) ranked the motivational factors of organic farmers in the study Socio- economic implications of organic farming in Tamil Nadu

Sl No	Motives	Rank
1	Environmental motives	I
2	Financial motives	II
3	Soil health oriented motives	III
4	Motivation by significant others	IV
5	Quality of output related motives	V
6	Motivation by media (books, magazines, radio and T V)	VI
7	Philosophical motives	VII

2 7 PROFILE CHARACTERISTICS OF ORGANIC FARMERS

Adoption of any agricultural practice depends on the socio-psychological characteristics of the farmers (Sherief, 2002)

2.7.1. Age

As stated by Ogunyemi (2005), age is a slackening factor for organic farming since the older farmers may not have enough energy to effectively carry out some labor-intensive activities in organic farming Also, the adoption of any innovation on orgamc farming may not be as high as expected, as adoption can vary inversely with age

Solomon (2008) reported that the mean age of oil palm growers was 51 years, older people were more involved in organic farming activities than the younger ones

Chouichom *et al,* (2010) revealed that the average age of organic rice farmers were 48 years and was higher than of non- organic farmers

In the study conducted by Oyesola *et al* (2011) majority (90%) of the respondents are between the ages of 40 and 70 years, with the mean age of 53 8 years and the youth comprised only 10 per cent about the farmers perception about organic farming

Majority (70 %) of the organic vegetable growers of North Eastern Thailand belongs to above 50 years of age and 25 percent of the respondents belong to below 50 years of age and young farmers are not interested in agricultural jobs (Mondal *et al*, 2014)

Fifty per cent of organic farmer belonged to old aged category and 42 per cent belong to middle aged category (Anupama 2014)

2.7.2. Educational Status

Jaganathan (2004) revealed that educational status of the vegetable growers had positive and significant relationship about knowledge and adoption of organic farming practices and majority of the respondents (52%) had secondary level education

Solomon (2008) stated that the majority of present day farmers had some formal education

Patel (2008) revealed that moderate number (38 57%) of respondents studied up to high school level followed by middle school education in the study of production and marketing management behavior of organic vegetable growers

Majority (80 6%) of the farmers had formal education and 20% of the respondents had no formal education in the study about the farmer's perception about organic farming (Oyesola *et al*, 2011)

100 per cent of the organic farmers were literate 49 per cent of the farmers have attended high school and 25 per cent of them had college education (Anupama, 2014)

2.7.3. Experience in Organic Farming

Jaganathan (2004) reported that 47 per cent of the respondents were having medium level of experience in vegetable cultivation

Jayawardhana (2007) revealed that 38 per cent of the respondents were having more than 25 years of experience in coconut cultivation

Elakkia (2007) reported that a large proportion of the respondents (43 %) possess high level of farming experience followed by (34 %) and medium (23 %) level of farming experience

Study of production and marketing management behavior of organic vegetable growers conducted by Patel (2008) revealed that around fifty per cent (57 86%) of respondents had less than three years' of experience in organic farming However one fourth of the farmers had (23%) the experience in organic farming for more than six years

Sidram (2008) observed that majority of respondents (82 %) had low experience, while only 17 per cent of the respondents had high experience in organic pigeon pea cultivation in the study analysis of organic farming practices in pigeon pea

Hanjabam (2013) found that majority of the farmers (76 7%) were having more than 25 years of farming experience Farmers with less than 10 years of

experience were negligible because of the reason that farming has been the primary occupation

Majority of the farmers (54%) had more than 25 years of farming experience, while 39 per cent of the respondents had experience between 11-25 years, 5 per cent had experience between 6-10 years and only 2 per cent had farming experience of less than 5 years (Anupama, 2014)

2.7.4. Area Under Organic Farming

Balachandran (2004) reported that the majority of organic farmers, i e , about 53 per cent are small & marginal farmers with land holdings up to 2 00 acres, as compared to 44 per cent with holdings above 2 00 acres up to 25 00 acres

Kumar (2012) reported that majority (80 83 %) of the farmers had banana area up to five acres followed by 17 50 per cent with five to ten acres and only 1 67 per cent of the banana growers had more than ten acres

2.7.5. Livestock Possession

Sherief (1998) reported that majority of the homestead farmers had low level of livestock possession

Jaganathan (2004) revealed that nearly three fourth of the respondents had medium level of livestock possession

Jayawardhana (2007) observed that nearly three fourth of the respondents had medium level of livestock possession

Elakkia (2007) reported that majority (53 %) of the farmers possess considerably high number of livestock in their households, followed by medium (33 %) and low (14 %)

Anupama (2014) reported that majority (70%) of the farmers had medium level of livestock component along with agriculture and 30 per cent of the respondents' belonged to low category

Organic farming was the backbone of the Indian economy and cow was worshipped (and is still done so) as a God The cow, not only provided milk, but also provided dung, which was used as fertilizers (Organic Facts, 2006)

2.7.6. Trainings Attended

Sidram (2008) reported that majority of respondents participated in training (70 %), extension group meeting (67 %), field days (60 %) and field visits (56 %) in the study analysis of organic farming practices in pigeon pea

2.7.7. Market Perception

Suthan (2003) reported that 54 67 percent of the farmers had medium market perception

Jaganathan (2004) found that 55 per cent of the respondents had medium level of market perception and respondents' awareness and attitude towards the organic farming practices had a positive and significant relationship with market perception

Jayawardhana (2007) opined that 62 per cent of the respondents had medium level of market perception

Elakkia (2007) reported that majority (60 %) of the farmers had medium level of market perception, followed by high level (22 %) and low level (17 %)

Sidram (2008) noticed that majority of the farmers sold their produce at prevailing price (71 67%), in regulated market (90 00%) through commission agents (77 50%) in organic pigeon pea cultivation

Seventy three per cent of the respondents had medium level of market perception followed by low (16%) and high (11%) levels of market perception (Anupama 2014)

2.7.8. Environmental Orientation

Loganandhan (2002) reported that 54 per cent of the farmers switched to organic farming mainly due to environmental care or awareness about environmental safety and ill effects of hazardous practices followed in modern farming

Mondal *et al* (2014) reported that 47 per cent of the respondents believed that chemical pesticide can be used at a critical stage for organic vegetable cultivation Another 37 percent of farmers did not know that chemical pesticide should not be used in organic vegetable cultivation

2.7.9. Information Seeking Behaviour

Researcher has shown that organic practitioners prefer information that is developed specifically for the organic community rather than for the agricultural community as a whole (Padel 2001)

Beena (2002) reported that information seeking behaviour was found to be medium for the vast majority (88 33 %) of the respondents Only 11 67 per cent of the respondents belonged to low group

Twenty four per cent of the farmers felt that influence of and motivation especially by success stories through media like books, magazines, radio and T V programmes on organic farming, played a considerable role in changing their farming activities (Loganandhan, 2002)

Khaledi et al (2007) indicated in his research that farmers do not have enough information about organic farming, and that organizations which are

connected to the organic farming sector can provide them with appropriate information

Jayawardhana (2007) revealed that 51 per cent of the respondents had medium level of information seeking behaviour

Sidram (2008) reported that 45 per cent of the respondents had medium level of information seeking behaviour in organic pigeon pea cultivation

Hanjabam (2013) observed that majority of the respondents belonged to medium category with respect to information seeking behavior

Kumar (2012) reported that 59 per cent of the sampled banana growers had medium level of information seeking behaviour followed by low 22 per cent and high 19 per cent

Majority (72%) of the respondents belonged to medium category followed by high (17%) and low (11%) with respect to information seeking behaviour (Anupama, 2014)

2 8 EXTENT OF AWARENESS ABOUT ORGANIC FARMING PRACTICES AND SCHEMES

Ramshetwad *et al* (2002) observed that banana growers were found to be aware about various diseases and pests of banana and their symptoms as well as the mechanical and cultural method of control They had inadequate knowledge about chemical control measures

Wasanik and Bhaskar (2004) through their study entitled 'Awareness and Adoption of Eco-friendly Cotton Cultivation Practices' revealed that 50 80 per cent of the farmers were 'fully' aware about the use of vermicompost for restoring soil fertility, followed by 46 20 per cent about tillage management practices for improving soil productivity and 43 10 per cent about crop rotation for maintaining soil fertility

2 9 EXTENT OF KNOWLEDGE ABOUT ORGANIC FARMING PRACTICES

As decision makers, organic farmers tent to fall into one of two categories, innovators or early adopters Characteristics of each of these categories include a need for knowledge to make decision (Padel, 2001)

Twenty nine percent of the respondents had low level of knowledge where as 35 percent and 32 percent of the respondents had medium and high level of knowledge regarding the recommended chilly cultivation practices (Lekshmi, 2002)

Fayas (2003) revealed that majority of the vegetable growers (75 60%) had medium level of knowledge in vegetable cultivation

Jaganathan (2004) opined that majority of the vegetable growers (70%) had medium level of knowledge followed by high (18%) and low (12%) levels of knowledge about organic farming practices in vegetable cultivation

Rabari (2006) reported that majority (73 34%) of the tomato growers had medium level of knowledge regarding the tomato crop practices, while 15 33per cent and 11 33per cent of them had low level and high level of knowledge regarding package of practice of tomato crop respectively

Elakkia (2007) reported that 46 per cent of the organic vegetable farmers possess high level of knowledge on the selected organic farming practices, followed by 30 per cent with medium knowledge level and the rest 23 per cent of the respondents with low level of knowledge on organic farming practices

Tippeswamy (2007) reported that major propotion of the coconut growers (61 88%) had medium knowledge level about plant protection measures, while 28 75 per cent of them had high knowledge More than 40 per cent of the farmers had the knowledge of bordeaux paste to control the bud rot disease

Study conducted by Sidram (2008) revealed that majority of the respondents (63 %) had medium level of knowledge about organic pigeon pea farming practices With regard to individual organic farming practices, majority of the respondents had knowledge about recommended seed rate (81 %), recommended sowing time (98 %), application of FYM (100%), vermicompost (100%) and jeevamruth (98%), summer ploughing (100%), crop rotation (96 %),pheromone traps (98 %), NPV (100%) and NSKE (100%)

Husain (2010) reported Most of the farmers were having medium level of knowledge about various indigenous horticultural practices The mean value of the knowledge scores of the farmers was 49 19 per cent Regarding knowledge of indigenous horticultural practices on banana it was found that 42 59 per cent indigenous horticultural practices were known to 50 per cent and above of the farmers showing average performance 68 42 per cent of indigenous horticultural practices in amaranth, 28 per cent of indigenous horticultural practices in vegetable cow pea and 56 25 per cent of indigenous horticultural practices in bitter gourd were known to more than 50 per cent of the farmers

Oyesola *et al* (2011) stated that majority (65%) of the respondents were highly knowledgeable about orgamc farming followed by low level of (35%) knowledge in the study about farmer's perception about organic farming in Nigeria

Kumar (2012) reported that 76 00 per cent of the respondents had correct knowledge about chemical fertilizers application in the study knowledge and adoption of chemical fertilizers and pesticides by cole crop growers

Bite (2012) revealed that majority (75 50 per cent) of the coconut growers had 'medium' knowledge about resource sustaining agriculture practices While 15 00 per cent of them had 'high' knowledge and few (9 50 %) of them had 'low' knowledge about resource sustaining agriculture practices

Pawar (2013) revealed that 71 00 per cent of the mango growers had medium knowledge, while 18 00 and 'low' and 'high' knowledge level about eco-friendly management practices respectively

Rani and Selvaraj (2013) observed that more than one half (53 %) of the *Bt* cotton growers under irrigated condition had 'high' level of knowledge about cultivation aspects followed by 26 and 20 per cent with low and medium level respectively

Chandrakanth (2014) reported that majority(78 33%) of the cotton growers had adequate level of knowledge followed by 11 26 per cent and 10 41 per cent of them belong to inferior and superior level of knowledge respectively regarding eco-friendly sustainable cotton cultivation

Mondal *et al* (2014) showed that 45 percent of respondents had a medium level of knowledge and 55 percent of respondents had a low level of knowledge while there were no organic vegetables growers who had a high level of knowledge

2 10 ATTITUDE TOWARDS ORGANIC FARMING

Organic farming brings a modern and scientific attitude to the traditional farming that our ancestors used to perform (Abdollahi, 2008)

Sanderson (2004) showed that attitudes are affected by a set of variables on knowledge and socio-structural factors such as, community pressure, family concern, ethical principles and values

Patel *et al* (2006) reported that nearly three fifth (57 %) of the respondents had neutral attitude towards integrated pest management technology in pigeon pea, followed by favorable and unfavorable attitude with 25 per cent and 17 per cent of the pigeon pea growers respectively

Dipeolu *et al* (2006) and Tratnik and Zutinic (2009) stated that m general farmers had positive attitude about organic vegetable production

The majority (60 %) of the respondent has a favourable attitude towards organic farming in the study about farmer's perception about organic farming, while only (39 %) of the respondents have an unfavourable attitude (Oyesola *et al*, 2011)

Mondal *et al* (2014) reported that majority of the respondents (60%) had a positive attitude towards orgamc farming and that organic farming will decrease production costs by reducing input purchases

2 11 EXTENT OF ADOPTION OF ORGANIC FARMING PRACTICES IN BANANA AND VEGETABLE CULTIVATION

According to the Innovation Theory (Rogers, 2003) the adoption of an innovation depends on the attributes of the innovation, social norms and communication channels which are used as information sources to reduce uncertainty about the innovation

Sivakumar (2001) reported that the recommended dose of pesticides or fertilizers were adopted by none of the farmers The study shows that the farmers had a tendency towards the adoption of chemical pesticides for the pest management in vegetables in his study of eco-friendly pest management in snakegourd

Lekshmi (2002) ieported that half of the respondents (48 %) belongs to medium level of adoption 23 per cent and 28 per cent belongs to low and high levels of adoption in the study adoption of recommended practices for chilli cultivation and problems faced by the growers of selected district of Punjab

Thiagarajan and Ramachandran (2001) reported that more than two fifth (43 33 %) of the respondents had low level of adoption regarding bio-fertilizer

practices in paddy, followed by 31 67 per cent and 25 per cent of them had high and medium level of adoption respectively

Ramesh and Shanta (2001) reported that the farmers extent of adoption level was higher in all the organic farming especially in water management, land preparation and storage practices Majority of them had adopted the organic farming practices in paddy crop

Rabari (2006) observed that slightly more than three fifth of the tomato growers (63 34%) had medium level of adoption, while slightly more than one fifth (23 33%) and 13 33per cent had high and low level of adoption

Tippeswamy (2007) observed that over one-forth (28%) of the farmers fully adopted the application of bordeaux paste to control bud rot and more than 51 per cent did not adopt the application of bordeaux paste in the study of plant protection measures in coconut cultivation

Husain (2010) reported that majority (65 36 %) of the farmers were in the medium adoption level category followed by 20 47 per cent of the farmers in the high category The mean adoption score was found to be 38 97, which meant that the farmers adoption of indigenous horticultural practices was nearly 40 per cent In banana 35 19 per cent, amaranth 36 84 per cent, vegetable cow pea 20 per cent of the indigenous horticultural practices were adopted by more than 50 per cent of the farmers

Kumar (2012) reported that nearly three fourth of the respondents (72 67%) adopted recommended dose of chemical fertilizers, followed by 63 33 per cent of the respondents were adopted the correct concentration of pesticides in cole crop cultivation

Verma *et al* (2012) reported that majority (55 %) of the respondents had medium level of overall adoption, followed by low level of overall adoption category which comprises of 37 per cent of the respondents While only 8 per

cent of the respondents were found high level of overall adoption category about organic farming practices in paddy cultivation by the tribal farmers of Chhattisgarh

Chandrakanth (2014) reported that majority(70 83%) of the cotton growers belong to moderate adoption, while 16 25 per cent and 12 95 per cent of them were in higher and lower adoption of eco-friendly cotton cultivation categories respectively

2 12 CONSTRAINTS PERCEIVED BY THE FARMERS IN THE ADOPTION OF ORGANIC FARMING TECHNOLOGIES

Sriram (1997) reported that a vast majority of the respondents (92 50 %) ranked labour scarcity as the first and foremost constraint while following ecofriendly agricultural practices, followed by lack of assured irrigation (87 50%) and the lack of technical guidance on the use and application of bio-control agents (56 56%)

Shiraj (2001) stated that labourers' scarcity was regarded as the most pressing constraint Inability to attend the training was regarded as the major communication constraint Among personal constraint the inability to identify bio agents was ranked first followed by the difficulty in the use of organic manures High cost of labour was considered as the major constraint in the socio - economic category Among the technical constramt increased time and labour that was demandanded by the eco- friendly cultivation practices was ranked first

Bairathi *et al* (2002) discloses that the most important constraint perceived by the trainees in the adoption of organic farming was ' short life of bio cultures' which was ranked by 95 per cent of the respondents followed by non availability of culture in time and non availability of seed/ variety resistant to diseases/ insect nematodes (90 % each) and 75 per cent of the trainees perceived socio- economic problems of adopting organic farming

Loganandhan (2002) classified the problems perceived by the organic farmers in continuing organic farming under the following heads Socio - economic problems, socio-ecological problems, socio-personal problems, and technological problems Twenty eight per cent of the farmers had no problem in practicing organic farming The constraints were ranked and long transition period ranked first followed by yield reduction in initial period (II), difficulty in convincing family members (III), unavailability of traditional varieties (IV), chemically contaminated neighbouring fields (V), incompatibility in today's agro business oriented markets (VI), scarcity of labourers (VII), difficulties in maintenance of cattle (VIII), no specific price for organic products (IX), unable to introduce in larger areas (X), lack of information regarding organic farming (XI)

All the organic vegetable growers expressed the problems of non-availability of labour and lack of research support for providing rationality of traditional organic practices Similarly high percent (97 86%) of farmers highlighted the problems like limited and irregular power supply Cent per cent of farmers expressed problems in marketing such as, fluctuation in prices of the commodities, lack of minimum support price and inaccurate weighing instruments used by vegetable venders (Patel 2008)

Badodiya *et al* (2011) reported various constraints faced by the farmers on the Adoption of Organic Farming Practices and found that high cost of inputs ranked first followed by difficult methods for preparation (II), lack of inputs and raw materials (III), poor financial conditions (IV), non-availability of loans in time (V), lack of proper trainings at grass root level (VI), non-availability of appropriate literature (VII)

2 13 PERCEPTION AND CONSTRAINTS OF EXTENSION FUNCTIONARIES TOWARDS ORGANIC FARMING

Agricultural extension workers have a role to play in the uptake of organic farming practices (Yadav *et al* , 2013)

Agricultural extension experts in general do not have positive attitudes toward organic farming This attitude of extension functionaries may negatively affect in extending orgamc farming methods to farmers (Shiri *et al* , 2014)

Agricultural extension workers could be supplied with more information about organic farming and perhaps specialist orgamc agriculture extension workers would facilitate the faster uptake of organic farming (Shiri *et al* , 2014)

The reason for negative attitude of agricultural extension workers toward organic farming can be lack of knowledge toward organic farming (Wheeler, 2005)

In another study, Wheeler (2008) concluded that a greater level of knowledge of the agricultural experts about sustainable agriculture would enhance positive outcomes toward that system

It can be inferred that agricultural extension workers are a significant source that can provide farmers with information regarding orgamc farming However, the experts transmit the information to the farmers according to their own attitude (Shiri *et al* , 2014)

Methodology

3. METHODOLOGY

In accordance with the objectives of the study the research methodology adopted is presented under the following heads

3 1 Research design
3 2 Locale of the study
3 3 Selection of respondents
3 4 Identification of organic farming practices in banana and vegetable cultivation
3 5 Operationalisation and measurement of independent variables
3 6 Operationalisation and measurement of dependent variables
3 7 Constraints in the adoption of organic farming practices as perceived by the banana and vegetable farmers
3 8 Constraints perceived by the extension functionaries in the implementation of the organic farming schemes of the Department of Agriculture
3 9 Role of Kerala Agricultural University in the promotion of organic farming at Kasaragod district
3 10 Sustainability of organic clusters in the promotion of organic farming
3 11 Methods used for data collection
3 12 Statistical tools used for analysis

3 1 RESEACH DESIGN

According to Kerlinger (2004), research design is the plan, structure, and strategy of investigation conceived so as to obtain answers to research questions and to control variance

A direct survey approach for recording the primary data from the respondents at field level, was adopted based on the ex post- facto design According to Singh (2006), an ex post- facto research is one in which the investigators attempt to trace an effect that has already occurred to its probable causes

Ex- post facto research is a systematic enquiry in which the scientist does not have direct control over the variables because their manifestation have already occurred or because they are inherently not manipulative (Kerlinger, 2004)

3 2 LOCALE OF THE STUDY

3 2.1. Selection of the district

The Government of Kerala has started implementing organic agriculture policy in Kerala Accordingly the Government had declared Kasaragod as the first organic district of the state Hence it was selected for the study

3.2.2. Description of the study area

Kasaragod is located at northernmost end of Kerala state It is bounded on the north and the east by Dakshina Kannada and Coorg districts of Karnataka State, on the south by Kannur district and on the west by the Lakshadweep Sea The district lies between latitude 12° 02' 25N" and 12° 47' 35N" and longitude 74° 25' 54E" and 75° 25' 25E" The district has a total area of 1961 sq km Based on physical features, the district falls in to three natural division viz the low land bordering the sea, the mid land consisting of the undulating lateritic hills and the forest high land on the extreme east

3.2.2.1 Climate

The region enjoys a tropical to sub-tropical climate with an average maximum and minimum temperature of 37°C and 17°C respectively The district receives the highest amount of rainfall in the State with the annual average rainfall measuring 3500 mm

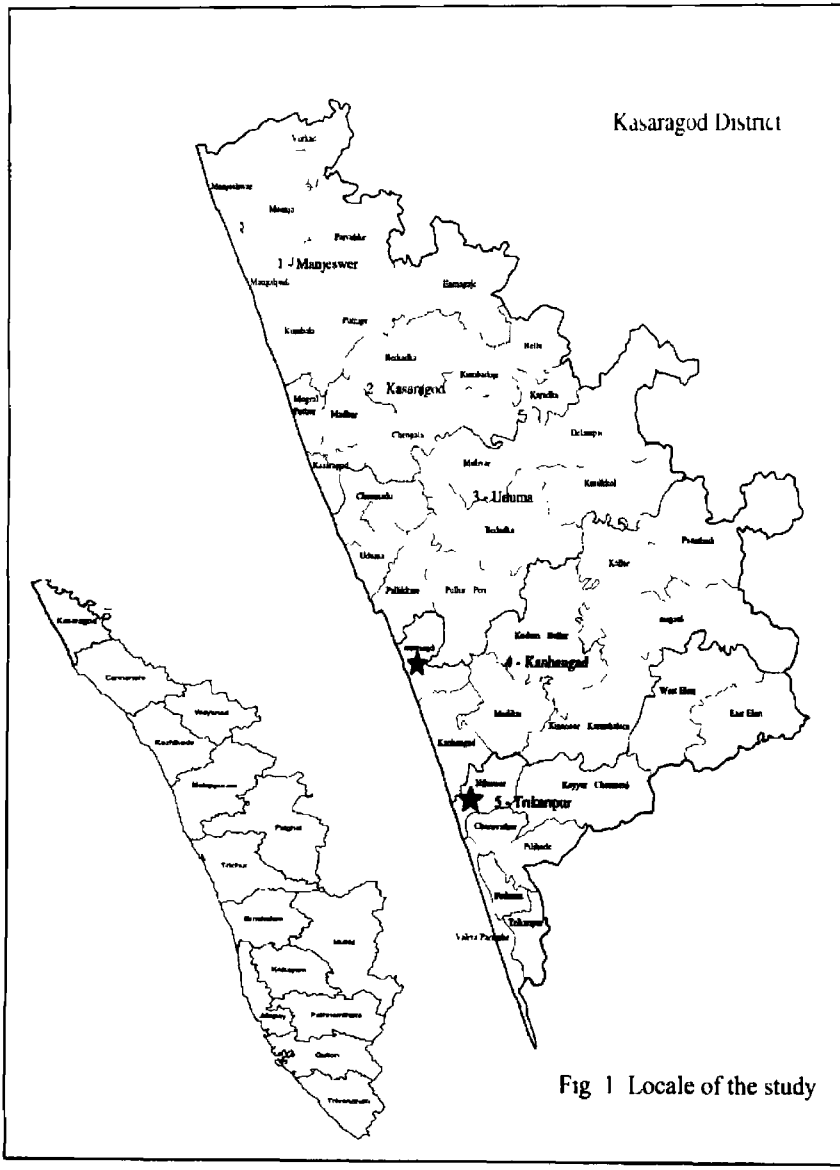


Fig 1 Locale of the study

3.2.2.2. Demography

Kasaragod district accounts for 5 13 per cent of the total area of the State As per 2011 Census, the district has a total population of 13 02 lakh out of which 6 26 lakh are males and 6 75 lakh are females with a sex ratio of 1079 1000 The literacy rate is 89 95 per cent The rural and urban population is estimated to be 7 97 lakh and 5 05 lakh respectively with an overall population density of 604 per/sq km (Government of India, 2011)

3.2.2.3. Agro ecology

Based on the physiographic conditions, the district can be divided into low land, midland and high land The high land lies on the western slope of the Western Ghats The important crops grown in this area include rubber, pepper, and coconut The low land runs along the sea coast and is almost level in topography Paddy and coconut are the major crops cultivated in this area The area lies between the high land and low land is the midland, which is characterized by an undulating terrain The midland is a very important tract for agriculture

The National Bureau of Soil Survey and Land Use Planning (NBSS & LUP), Bangalore has divided Kasaragod district into five distinct Agro Ecological Units (AEUs) as follows

1 Northern Coastal Plain
2 Kaipad lands
3 Northern laterites
4 Northern foot hills
5 Northern high hills

3.2.2.4 Soil

Soil is the basic resource for the agricultural production process Soil health is to be maintained for the sustainable development of agriculture About three fourth of the total geographical area of Kasaragod district is under sloppy area with 10-35 percent slope Hence soil erosion is a severe problem in these areas Besides slope, other factors such as undulating topography, high rainfall, deforestation, unscientific cultivation practices etc also contribute to the degradation of soil (Prabhakaran, 2012)

3.2.2.5 Water resources

Kasaragod district has eight important rivers, viz Manjeswaram, Uppala, Shiriya, Kumbla, Mogral, Chandragiri, Nileshwaram and Karyangode, which are the major surface water resources of the district

3.2.2.6 Bio-diversity

Conservation of bio-diversity is a pre requisite for the sustainable development of a region Forest constitutes a vital component in the biodiversity In Kasaragod district, area under forest is very meager, accounting only 5,625 hectare out of the total geographical area of 1,96,133 hectare Studies have shown that there are about 62 sacred groves (locally called *'Kavu'*) spread over 18 grama Panchayats in Kasaragod district These sacred groves have rich diversity of flora and fauna (Prabhakaran 2012)

3.2.2.7. Land use pattern

The total geographic area of the district is 1,96,133 hectares Forest accounts only 2 82 per cent of the total geographic area Land put under non-agricultural use is 13 47 per cent and barren and uncultivable land is 3 97 per cent Net area sown accounts for 71 27 per cent of the total geographic area of the

district Total cropped area is 72 76 per cent and the area sown more than once is only 1 49 per cent (Department of Economics and Statistics, Kerala, 2014)

3.2.2.8. Crops cultivated

A wide range of crops and cropping patterns exist in the district in tune with the varied agro climatic zones Paddy, coconut, areca nut, cashew, rubber, pepper, banana and vegetables are the major crops grown in the district It is reported that the area under vegetable cultivation accounts for 1,024 hectares and banana is cultivated in 2,283 hectares (Farm guide 2014)

3 3 SELECTION OF CROPS

Since this is a study undertaken during a transition stage from conventional to organic agriculture, it was decided to select annual or seasonal crops which has direct bearing on the health of people Accordingly banana and vegetables in consultation with the experts of KAU and the Department of Agriculture, Kerala

3 4 SELECTION OF THE RESPONDENTS

Banana and vegetable growers practicing organic cultivation under organic clusters of the Krishibhavan (local agricultural extension development office) constituted the sampling frame Kasaragod district is divided into six development blocks from which, two blocks each having maximum area in vegetable and banana crops under organic farming were selected Accordingly, Kanhanghad and Nileshwar blocks having higher vegetable cultivation, were selected for sampling organic vegetable growers While Kanhanghad and Parappa blocks were selected for sampling organic banana growers

Based on higher area under organic vegetable cultivation, Ajanoor and Nileshwar grama panchayaths of Kanhanghad and Nileshwar blocks respectively were selected From each of these grama panchayath 30 vegetable growers were identified Similarly KodomBellur and Madikkai grama panchayaths were

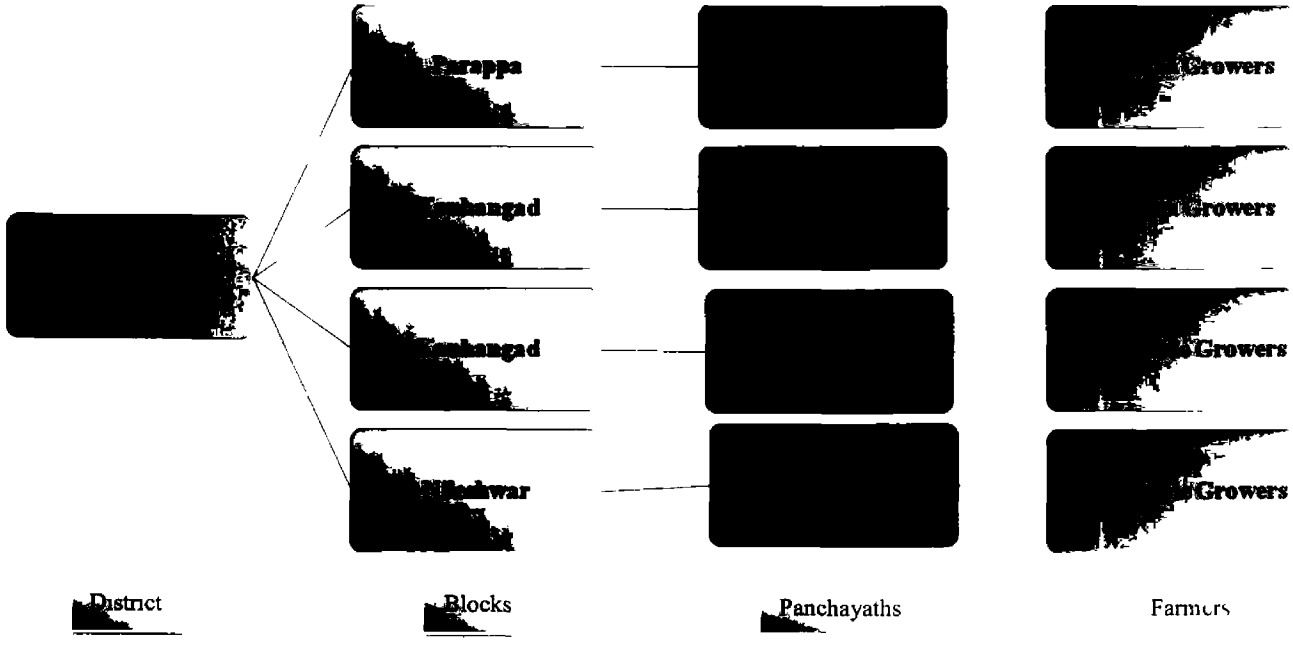


Figure 3 Selection of respondents for the study (Total farmers 120)

identified from Parappa and Kanhanghad blocks respectively based on the higher organic banana cultivation in these grama panchayaths 30 organic banana farmers coming under organic clusters were randomly selected Thus, the total sample size constituted 120 farmers (figure 3)

3.3 IDENTIFICATION OF ORGANIC FARMING TECHNOLOGIES

Based on The Adhoc Package of Practices Recommendations for Organic Farming published by Kerala Agricultural University, review of literature and discussion with experts from various fields of agriculture, 40 organic farming practices/technologies in banana and 30 organic farming practices/technologies in vegetable cultivation were listed The items were subjected to relevancy rating by experts consisting of scientists in Agricultural Extension, Olericulture, Soil Science and Agricultural Chemistry, Agricultural Entomology, Plant Pathology, and other related fields from College of Horticulture, Vellanikkara, College of Agriculture, Vellayani and Banana Research Station Kannara These scientists were asked to indicate the degree of relevance of these organic farming practices on a three point continuum viz most relevant, relevant, least relevant with scores of 3, 2 and 1 respectively

The total score of all the judges for each organic farming practice was calculated and the mean value was worked out The overall means of all the organic farming practices separately for vegetables and banana were also computed The organic farming practices which were having a mean value more than the overall mean were selected Accordingly 18 organic farming practices in banana and 23 practices m vegetables were selected for the study (see Appendix)

The mean value of the organic farming practices were used for calculating the adoption index of the vegetable and banana growers

3.4 OPERATIONALIZATION AND MEASUREMENT OF INDEPENDENT VARIABLES

Based on the review of relevant literature nine independent variables pertinent to the study were identified The variables selected and the measurement techniques used are presented below

List of independent variables and its measurements

Variables	Scales
Age	Based on census report (2011) GoI
Educational status	Method used by Anupama (2014)
Experience in organic vegetable/banana cultivation	Scoring procedure followed by Chinchu (2011)
Area under organic vegetable/banana cultivation	Scoring procedure followed by Jaganathan (2004) with slight modification
Livestock possession	Method followed by Anupama (2014)
Trainings attended	Scoring procedure followed by Jayawardana (2007) with slight modification
Market perception	Scoring procedure followed by Hanjabam (2013)
Environmental orientation	Scale developed by Sreevalsan (1995) with slight modification
Information seeking behavior	Scoring procedure followed by Anupama (2014)

3 4.2 Age

Age was operationalized as the number of calendar years completed by the respondent at the time of investigation The respondents were classified into three categories namely young middle and old based on the census report (2011) of Government of India

Classification of respondents based on age

Category	Age (in years)	Score
Young	< 35 years	1
Middle	35-55	2
Old	> 55 years	3

3.4.3 Educational status

Educational status was operationalized as the level of literacy possessed by an individual respondent, where in illiterate was an individual who did not know to read and write, primary school education was referred to as the formal schooling up to fourth standard, high school education was referred to as the education from sixth to tenth, higher secondary school education meant the education from eleventh to plus two level and collage education was referred to as the education for degree / diploma after schooling The scoring procedure followed by Anupama (2014) was used

Classification of respondents based on educational status

Sl No	Category	Score
1	Illiterate	1
2	Primary school	2
3	High school	3
4	Higher secondary school	4
5	College education	5

3.4.4 Experience in organic vegetable / banana cultivation

It was defined as the number of years the respondent had been engaged in orgamc vegetable/ banana cultivation The scoring procedure followed by Chinchu (2011) was used with slight modification for this study

Classification of respondents based on experience in organic vegetable/ banana cultivation

Sl No	Experience	Score
1	≤ 1 year	1
2	1 to <3	2
3	3 to 5 years	3
4	Above 5 years	4

3.4.5 Area under organic vegetable/banana cultivation

It was measured as the extent of area in hectare under vegetable/ banana cultivation which rely on the principles of organic farming The scoring pattern followed by Jaganathan (2004) was used

Classification of respondents based on area under organic vegetable/banana cultivation

Sl No	Size of holding	Score
1	Up to 0 1 Ha	1
2	0 1 to 0 2 Ha	2
3	0 2 to 0 4 Ha	3
4	0 4 Ha to 0 8 Ha	4
5	Above 0 8 Ha	5

3.4.6 Livestock possession

Livestock possession referred to the number of animals possessed by an individual farmer The present value of each livestock was calculated and added to get the total value and was categorized into following intervals as given by Anupama (2014)

Classification of respondents based on their livestock possession

Value (Rs)	Score
≤ 5000	1
5001-10,000	2
10,001 – 15,000	3
15,001- 20,000	4
≥ 20,000	5

3.4.7 Trainings attended

This was defined as the number of trainings related to organic farming undergone by the respondent during the last three years The scoring procedure followed by Jayawardhana (2007) was used, with slight modifications

Classification of farmers based on number of trainings attended

Sl No	Trainings undergone	Score
1	No training	0
2	Less than eight trainings	1
3	More than eight trainings	2

3.4.8 Market perception

Market perception was defined as the capacity of the respondents to foresee the market trend to sell the produce for higher returns The scale followed by Hanjabam (2013) was used with slight modification The method consisted of scoring the responses obtained to selective questions presented to the respondents to elicit their perception of the market of the produce The questions and the scoring procedure were as follows

1 Do you think the farmer will be able to sell vegetables at higher price/demand if he adopts organic farming practices?

a Yes (1) b No (0)

2 Do you find it difficult to sell the produce in the local market?

a Very difficult (0) b Difficult (1) c Easy (2) d Very easy (3)

3 How much price the orgamc produce will fetch compared to those produced under conventional methods?

a Low (0) b Same (1) c High (2)

3.4.9 Environmental orientation

This was operationalized as the degree to which a farmer had concern about his environment

The scale developed by Sreevalsan (1995) was used for the study with slight modification The scale consisted of eight statements and the respondents were asked to state their agreement or disagreement to each of the statement and scores of one and zero were assigned for agree and disagree respectively The responses were summed up to obtain the environmental orientation score The score range was between eight and zero

Scale used for measuring environmental orientation of the respondents

Sl No	Statement	Agree	Disagree
1	Indiscriminate use of pesticides causes environmental hazards		
2	Man is exploiting the earth too much		
3	Man has to be greatly concerned about environmental issues like soil pollution, air pollution, water pollution etc		
4	There is truth in what environmental activist claim and we should lend our support to them		
5	The present trend is to reduce the use of chemical control measures Now do you agree that older method of farming were more safer than the present ones		
6	Agricultural produce obtained without use of chemicals are more tastier and healthier		
7	Agro chemicals can be used during emergency situations		
8	Recommended dose of agro chemicals in correct quantity shall be used		

3.4.10 Information seeking behavior

Information seeking behaviour was operationalized as the sources from which organic farmers get technological information regarding the organic vegetable / banana cultivation

The scoring procedure followed by Anupama (2014) was used with slight modification The scores for frequency of use of the sources for seeking information ranged from 3 to 1 for 'frequently', 'occasionally' and 'rarely' in the order of sequence

Classification of farmers based on information seeking behaviour

Sl. No.	Source	Frequently (3)	Occasionally (2)	Rarely (1)
1	Radio			
2	Television			
3	Newspaper			
4	Magazines			
5	Agrl Literatures			
6	KIOSKs			
7	Mobile Phone			
8	E - extension			
9	Krishibhavan			
10	Fellow growers			
11	Any other			

3.5 OPERATIONALIZATION AND MEASUREMENT OF DEPENDENT VARIABLES

Keeping the objectives in view, four dependent variables were selected for the study, after thorough review of literature and discussion with experts The variables selected and the measuring techniques used are listed below

List of dependent variables and its measurements

Sl. No.	Variable	Scale used
1	Awareness about the selected organic farming practices and programmes	Scale followed by Jayawardhana (2007)
2	Knowledge about the organic farming practices	Measured by using teachers made test used by Nachiappan and Srinivasamurthy(1976)
3	Attitude towards organic farming	Scale developed by Jaganathan (2004)
4	Adoption of organic farming practices	Scoring procedure followed by Sriram (1997)

3.5.2 Extent of awareness about organic farming practices

Awareness which is of a cognitive behaviour was operationalized as the level or extent to which the respondents were familiar with the organic farming practices and programmes As mentioned the scale followed Jayawardhana (2007) was used in the study for measuring the extent of awareness The scale consisted of 15 statements on organic farming practices and programmes The respondents were advised to mark the degree of awareness about each 15 statement in a two point scale, the points being "aware" and "not aware" and to these, scores of 1 and 0 were given respectively The awareness scores for all the statements were summed up to get the overall awareness scores of the respondent Awareness index was calculated using the formula

$$\text{Awareness Index} = \frac{\text{Score obtained by the respondent}}{\text{Maximum Possible score}} \times 100$$

3.5.3 Extent of knowledge about organic farming practices

English and English (1961) defined knowledge as a body of information possessed by an individual which is in accordance with the established fact

Teacher made test was used by Jaganathan (2004), to calculate the knowledge level of respondents practicing organic cultivation of vegetable Teacher made test was employed to study the knowledge level of respondents practicing organic agriculture in coconut based homestead farming (Jayawardhana, 2007)

In the current study, knowledge of the respondent regarding orgamc farming practices in banana and vegetable were evaluated using two teacher made tests developed for the purpose

For this the researcher had collected various organic farming practices / techniques in vegetable and banana from The Adhoc Package of Practices Recommendations for Organic Farming of Kerala Agricultural University, 2009 And by relevant literature, based on this 25 questions each in banana and vegetables were formulated Based on discussion with experts addition / deletion / modification was made based on which 23 questions each in banana and vegetable were identified During the pretesting of the interview schedule these were administered to 30 non sample respondents and screening of the questions was done and finally the test consisted of 12 questions in banana and 12 questions in vegetables The test were administered to the respondent farmers a score of "one" was assigned to correct answers and "zero" for wrong answers The sum of the scores obtained for all items indicated the knowledge level of the respondents the maximum possible score was 12 and the minimum was 0

The knowledge level of the respondents were analyzed by adopting the teacher made test devised by Nachiappan and Srinivasamurthy (1976) using the following formula

$$\text{Knowledge Index} = \frac{\text{Actual score obtained}}{\text{Maximum score allotted}} \times 100$$

3.5.4 Attitude towards organic farming

The term attitude refers to the degree of positive or negative effect towards a psychological object The scale devised by Jaganathan (2004) to measure the attitude of farmers towards organic farming practices was used for this study with slight modifications The scale consisted of sixteen statements The response to each statement was noted on a three point continuum as agree, undecided and disagree with scores of 3, 2 and 1 respectively for positive statements The score was reversed for negative statements The scores obtained for each item were summed up to get the attitude score of a farmer The maximum score was 48 and the minimum score was 16 The list of attitudinal statements used is given in Appendix

3.5.5 Extent of adoption of organic farming practices

Adoption refers to the degree to which a farmer had actually followed an organic farming practice Adoption index was used to measure the extent of adoption of organic farming practices in banana and vegetable cultivation and the procedure followed by Sriram (1997) was employed for this with slight modification The farmer's responses were collected on a three point scale namely adopted, partially adopted and not adopted and scores of 2, 1 and 0 were assigned respectively to each category The adoption index was worked out using the following formula

$$\text{Adoption index} = \frac{\text{Respondent's total score}}{\text{Total possible score}} \times 100$$

Respondents total score = total number of practices adopted by a farmer, multiplied by the respective practice weightage

Total possible score = total number of practices recommended multiplied by the respective practice weightage

3.6 CONSTRAINTS OF FARMERS IN THE ADOPTION OF ORGANIC FARMING PRACTICES

Based on the review of literature and discussion with experts the constraints faced by the vegetable and banana growers in adopting organic farming practices were collected The important constraints in the adoption were finally selected based on the interaction with non sample respondent and these constraints were enlisted in the interview schedule

The response to each constraint was obtained on a three point continuum namely most important, important and least important and correspondingly scores were given as 3, 2 and 1 respectively In order to rank the constraint, the total scores for each constraint was calculated and ranked based on the corresponding scores The constraints used in the study is listed in Appendix

3.7 CONSTRAINTS OF EXTENSION FUNCTIONARIES IN IMPLEMENTATION OF ORGANIC FARMING

Based on literature review and consultation with extension functionaries and scientists, the constraints faced by the extension functionaries in the implementation of the organic farming policy were collected The important constraints were finally selected and included in the interview schedule

The response of the respondents to each constraint was collected on a three point continuum viz most important, important and least important with scores 3, 2 and 1 respectively The total score obtained by constraint was calculated and the constraint was ranked based on corresponding scores The list of constraints is given in Appendix

3.8 ROLE OF KERALA AGRICULTURAL UNIVERSITY IN THE PROMOTION OF ORGANIC FARMING AT KASARAGOD DISTRICT

Initiatives of Kerala Agricultural University for the promotion of organic farming were collected from officials of different Research Stations and Educational Institutions of Kerala Agricultural University For this, informal interview method was adopted Further the relevant records, files and documents were also reviewed

3.9 SUSTAINABILITY OF ORGANIC CLUSTERS IN THE PROMOTION OF ORGANIC FARMING

Information regarding the sustainability of the clusters was collected from farmers as well as extension functionaries Initially the information collected from the farmers, the scale consisted of 15 statements Each statement was noted on a three point continuum namely always, sometimes and never with a score of 3, 2 and 1 respectively The score obtained for each item was summed up to get the total score of the farmer The maximum score was 45 and the minimum score was 15

Information regarding the performance of the cluster was collected from the extension functionaries An open ended questionnaire was given, to mark the advantages, limitations and the opportunities of the cluster The lists of statements were given in the appendix

3.10 METHODS USED FOR DATA COLLECTION

A draft interview schedule was prepared based on the objectives set and the methodology designed for the study, after perusal of relevant literature and discussion with extension functionaries and experts from other related fields Following their suggestions and instructions, a well-structured interview schedule

was finalized in English and later on translated to Malayalam for collecting data from the respondents

A pre-testing of the schedule was carried out by administering it to 30 farmers of Kasaragod district in a non-sample area On the basis of this modifications were made and the final interview schedule was prepared (Appendix) The respondents were interviewed with the help of schedule and the answers obtained from the respondents were entered in the schedule in the appropriate columns The respondents were interviewed individually in the local language

3.11 STATISTICAL TOOLS USED

The data collected from the respondents were scored, tabulated and analyzed using suitable statistical methods

Mean, percentage analysis, spearman's rank correlation, and path analysis, were employed to meet the objectives of the study A brief description of the tools used is given below

Mean

The arithmetic mean scores for all the variables were worked out to make suitable comparisons wherever necessary

Percentage Analysis

Percentage analysis was done to make classification of the respondents wherever necessary

Spearman's rank correlation

Spearman's rank correlation was used to identify and test the strength of relationship between the constraints faced by vegetable and banana growers

Path Analysis

Path analysis was done to find out the direct and indirect influence of the selected characteristics and to know the extent of determination of these characteristics on awareness, knowledge, attitude and adoption of organic farming technologies

Result and Discussion

4. RESULTS AND DISCUSSION

The findings of the study are presented in this chapter The results are discussed and the inferences are drawn in the light of the objectives set forth The chapter is organized as follows

4 1 Profile characteristics of vegetable and banana growers
4 2 Awareness about selected organic farming practices
4 3 Knowledge about organic farming practices
4 4 Attitude towards organic farming
4 5 Adoption of organic farming practices
4 6 Sustainability of cluster based approach in promoting organic farming
4 7 Effects of independent variables on the extent of awareness, knowledge, attitude and adoption
4 8 Role of Kerala Agricultural University in promoting organic farming
4 9 Constraints perceived by the farmers in the adoption of organic farming practices
4 10 Constraints perceived by the extension functionaries in the implementation of the organic farming programmes

4 1 PROFILE CHARACTERISTICS OF VEGETABLE AND BANANA GROWERS

Knowledge about the socio- economic and psychological characteristics of the respondents would assist the investigator to interpret the data in the right direction For this purpose, nine variables were selected and included in the study The profile characteristics of the farmers are discussed below

4.1.1. Age

Age was operationalized as the number of calendar years completed by the respondent at the time of investigation Categorization of farmers according to their age is presented in the Table 1

Table 1. Distribution of vegetable and banana growers according to their age

(n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
Young (<35)	3	5	1	2
Middle age (35-55)	35	58	41	68
Old age (>55 years)	22	37	18	30

From Table 1, it was observed that majority of the vegetable growers (58 %) belonged to middle age category followed old age category (37 %) and less than five percent belonged to young age group

In the case of banana growers, it is observed that, majority (68 %) of the farmers belonged to middle age category followed by old aged category (30 %) Only 2 percent belonged to young age group

However the findings is in opposition with the earlier studies of Husain (2010) and Anupama (2014) This may be because in this study the respondents were sampled from a selected group, who were the members of orgamc clusters

4.1.2. Educational status

Educational status was operationalized as the level of literacy possessed by the farmer Categorization of farmers according to their educational status is presented in the Table 2

Fig 3 Distribution of vegetable and banana growers according to their age

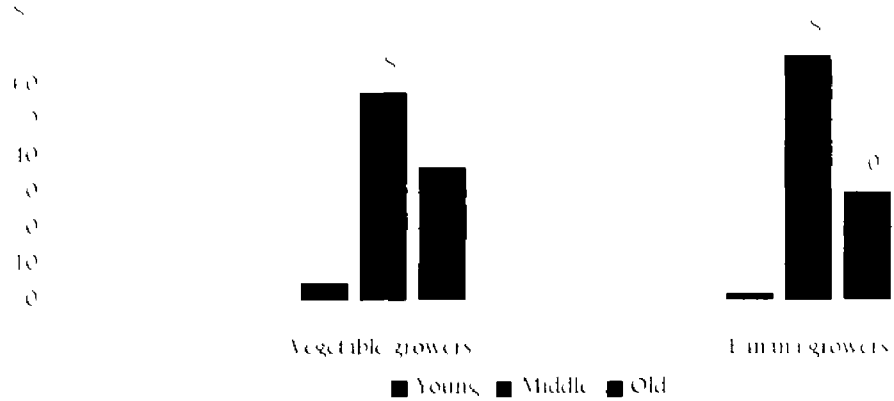


Fig 4 Distribution of vegetable and banana growers according to their education

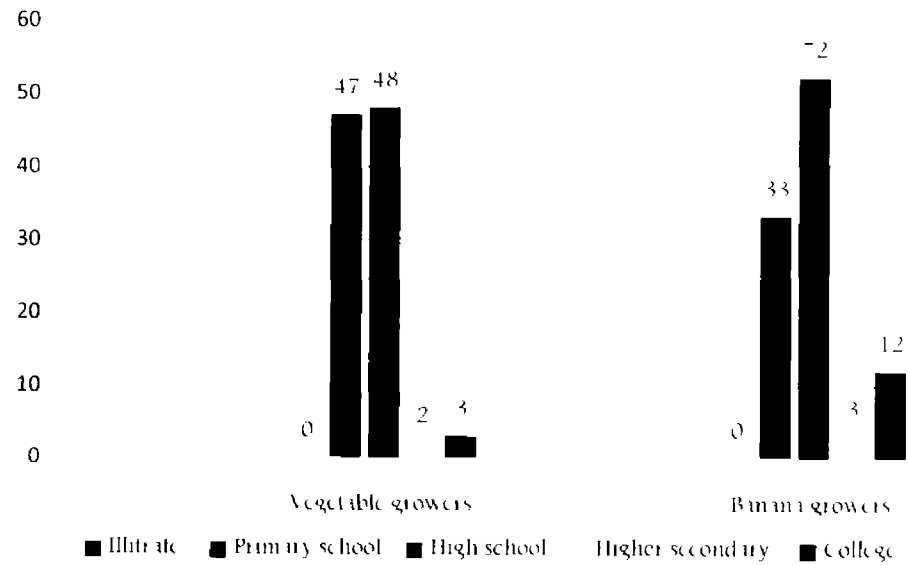


Table 2. Distribution of vegetable and banana growers according to their educational status (n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
Illiterate	0	0	0	0
Primary school	28	47	20	33
High school	29	48	31	52
Higher secondary	1	2	2	3
College education	2	3	7	12

The data from Table2 revealed that all farmers under this study were hteiate and had formal education It is seen that 48 per cent of the vegetable farmers and 52 per cent of the banana growers had high school level education and another 47 per cent and 33 per cent had primary school education respectively Exactly 3 per cent of the vegetable growers and 12 per cent of the banana growers had college level educations The literacy iate of Kerala state is 93 90 per cent and that of Kasaragod district is 90 09 per cent as per 2011census report (GoI 2011) Thus the results are almost in concordance with the existing literacy rate in Kerala

4.1.3. Experience in organic farming

Experience in organic farming is defined as the number of years the farmer had been engaged in organic vegetable/ banana cultivation Categorization of farmers according to their experience in organic farming is depicted in Table 3

Table 3. Distribution of vegetable and banana growers according to their experience in organic farming (n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
< 1 year	3	5	3	5

1 < 3 years	25	42	28	47
3 to 5 years	9	15	5	8
>5 years	23	38	24	40

It is seen from the Table 3, that 42 per cent of the vegetable growers and 47 per cent of banana growers had less than 1 to 3 years of experience in organic farming However, 32 per cent vegetable farmers and 40 per cent in banana farmers were having 5 years or more than 5 years of experience in organic farming practices Another 15 per cent of vegetable farmers and 8 per cent of the banana farmers had 3 to 5 years of experience in organic farming While 95 per cent of farmers had more than 1 year of experience in organic farming, only 5 per cent of the farmers studied had less than a year of experience

Farmers who had 3 or more years' experience in organic farming and strictly adhering to organic practices could be categorized into purely organic farmers and those farmers who had experience less than three years were under conversion period and could be categorized into mixed farmers practicing both conventional and organic practices together Thus 53 per cent and 48 per cent respectively of the vegetable and banana growers under study were pure organic farmers, while rest 47 and 52 per cent of them respectively were in the conversion / transition period

Government of Kerala declared the State Organic Farming Policy in 2008 However, government's initiative to promote organic farming was first implemented in Kasaragod district by the Department of Agriculture in 2012-2013 in selected panchayats This could be one of the reasons that majority of farmers had less than 5 years of experience in organic vegetable and banana cultivation On the other hand there were committed farmers who had completely excluded the use of chemicals and follow organic practices on philosophical or pragmatic reasons These farmers having more than 5 years of experience and their activities were deeply rooted in the founding philosophy of organic farming For them economic consideration was secondary These farmers were willing to take risk

Fig 5 Distribution of vegetable and banana growers according to their experience in organic farming

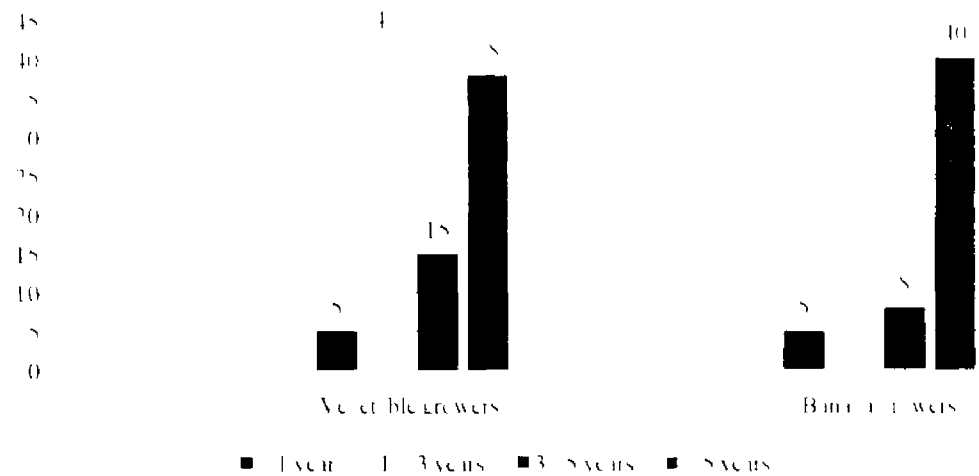
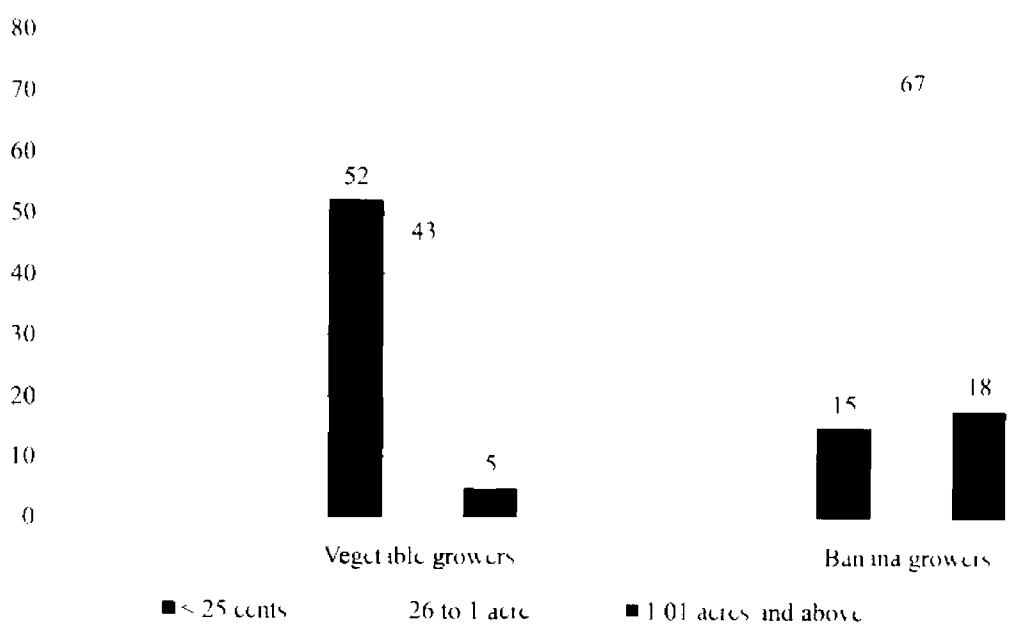


Fig 6 Distribution of vegetable and banana growers according to their area under organic farming



foregoing some of their income The findings of Fayas (2003), Sasankan (2004) Jayawardhana (2007) and Anupama (2014) shows that majority of the farmers had more than 10 years of experience

4.1.4. Area under organic farming

It was measured as the extent of area in hectare under vegetable/ banana cultivation relaying on the principles of organic farming This character was studied to know the extent of organic vegetable and banana cultivation The results of the findings are presented in the Table 4

Table 4. Distribution of vegetable and banana growers according to their area under organic farming

(n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
Low (up 0 1 Ha)	31	52	9	15
Medium (0 1 - 0 4 Ha)	26	43	40	67
High (more than 0 4 Ha)	3	5	11	18

It is clear from table 4 that more than half (52 %) of the vegetable farmers had up to 0 1 Ha area under organic vegetable cultivation and 43 per cent of the respondents had area between 0 1 to 0 4 Ha Only 5 per cent of the respondents had more than 0 4 Ha of land under organic vegetables

Majority (67 %) of the banana farmer's had 0 1 to 0 4 Ha area under organic banana Further 18 per cent of the banana farmers had more than 0 4 Ha area under organic banana, while 15 per cent of the respondents had less than 0 1 Ha under organic banana cultivation

A comparative analysis of the area of farmers under organic banana and vegetable cultivation showed that the area was more for banana This was quiet logical and the results were justified

4.1.5. Livestock possession

Livestock possession referred to the number of animals possessed by an individual farmer Categorization of farmers according to then livestock possession is depicted in Table 5

Table 5. Distribution of vegetable and banana growers according to their livestock possession (n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
No livestock possession	25	42	17	28
Low	8	13	10	17
High	27	45	33	55

A perusal of Table 5, reveals that 45 per cent of the vegetable growers had high livestock components and 13 per cent of the respondents had low livestock component It is interesting to note that 42 per cent had no livestock component, at all

In the case of banana cultivation, more than half (55 %) of the respondents were having high livestock component While 17 per cent of the farmers were found to have low livestock possession Here 28 per cent of the farmers did not possess livestock component

It may be noticed that high and low categorization of livestock component was based on the monetary value assigned to each animal component the farmers possessed Farmers having ruminant (cows, buffalos) animals naturally fell into the high livestock category, further livestock is considered to be an integral part of organic farming, still a good share of farmers were there in the 'no livestock possession' category, in the case of both organic banana and vegetable cultivation

Fig 7 Distribution of vegetable and banana growers according to their livestock possession

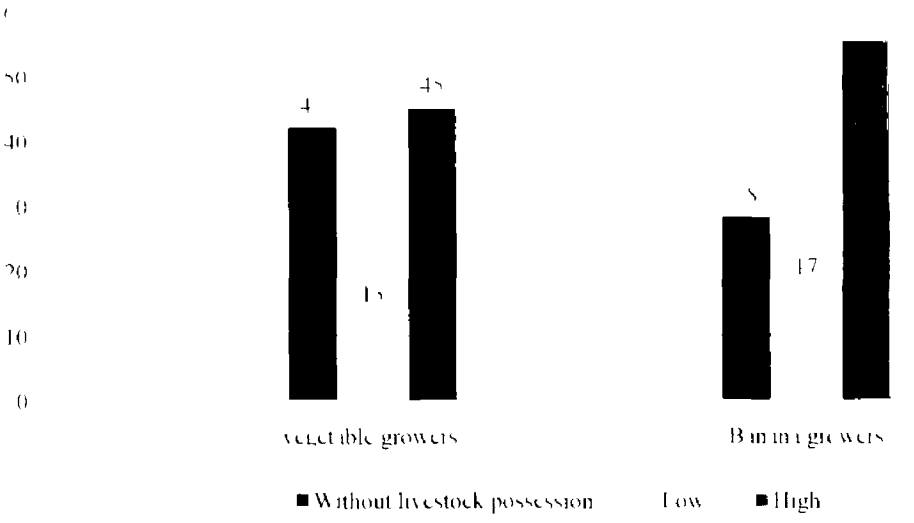
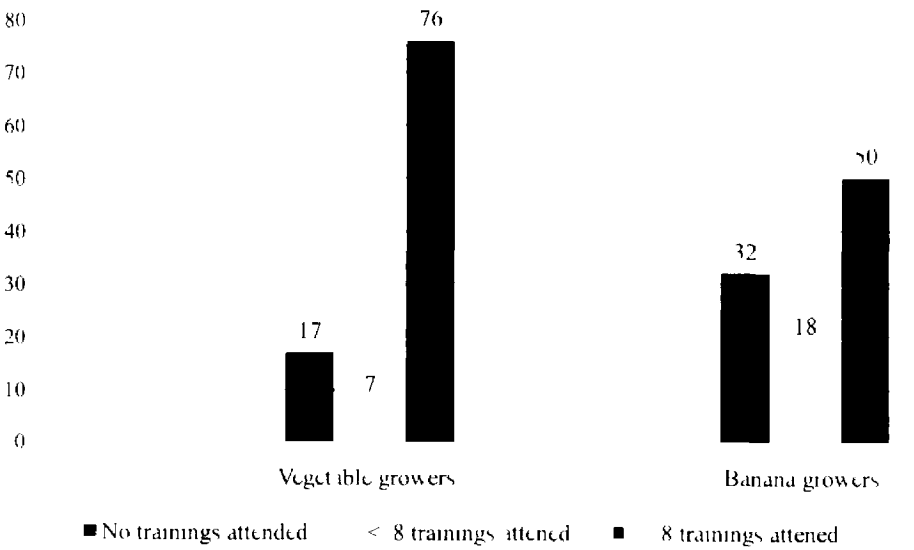


Fig 8 Distribution of vegetable and banana growers according to training attended



A possible factor determining this situation is the availability of time, labour and resources that had to be spent for the livestock Majority of the farmers who did not possess livestock either sold their livestock due to high maintenance cost or due to fragmented holdings Maintaining livestock requires additional cost, extra care, labour and time Good shares of respondent farmers were in transition to organic farming as discussed in 4 1 3 (Table 3) This could be a possible reason for them to avoid livestock The finding of Jaganathan (2004), Jayawardhana (2007) and Anupama (2014) shows that majority of the farmers had medium livestock component

4.1.6. Training attended

Trainings attended was defined as the number of trainings related to organic farming undergone by the respondent during the last three years Results of the findings are presented in the Table 6

Table 6 Distribution of vegetable and banana growers according to training attended (n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
No trainings attended	10	17	19	32
Occasional participation (< 8 trainings)	4	7	11	18
Regular participation (> 8 trainings)	46	76	30	50

The data furnished in Table 6, revealed that three fourth (76%) of the vegetable farmers had regularly attended trainings on organic vegetable production, while, 7 per cent had attended the trainings occasionally Among the vegetable farmers 17 per cent had not attended any training on organic farming

With regard to banana cultivation, half of the respondents (50%) had regularly attended trainings, while 18 per cent of the farmers had attended trainings occasionally Here 32 per cent for the respondents had never attended any training on organic farming

The Department of Agriculture, Kerala and other Agricultural Extension Agencies had given trainings to farmers on different aspects of organic farming, to make the farmers aware about the socio-economic and environmental benefits of organic farming, during the initial stages of the implementation of the Organic Farming Policy in Kasaragod district Trainings were given to the members of the organic clusters and attendance was not compulsory This may be a reason for the variation in the participation of training programmes by majority of the farmers

4.1.7. Market perception

Market perception was defined as the capacity of the respondents to foresee the market trend to sell the produce for higher returns Results of the findings are presented in the Table 7

Table 7. Distribution of vegetable and banana growers according to their market perception

(n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
Low (score between 0 to 3)	49	82	52	87
High (score between 4 to 6)	11	18	8	13

It is seen from the Table 7, that majority (82%) of the organic vegetable growers had low market perception with respect to organic products While high market perception was observed in 18 % of the farmers

Fig 9 Distribution of vegetable and banana growers according to their market perception

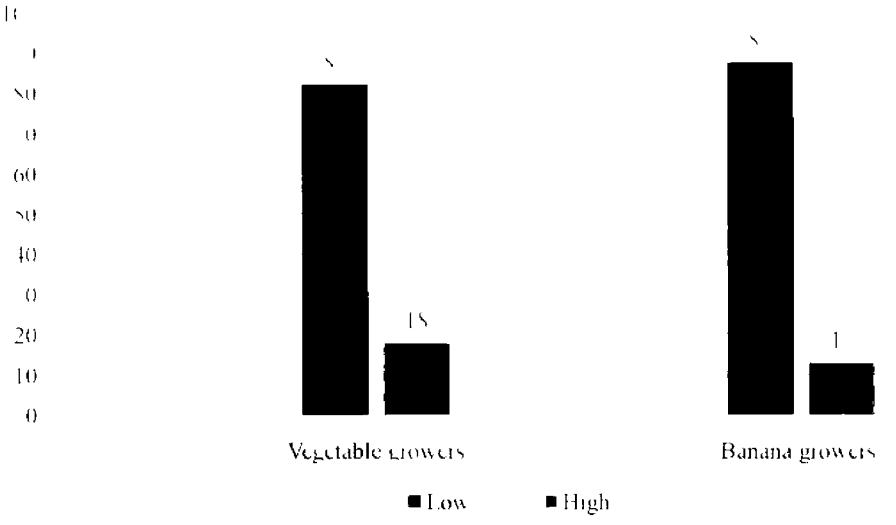
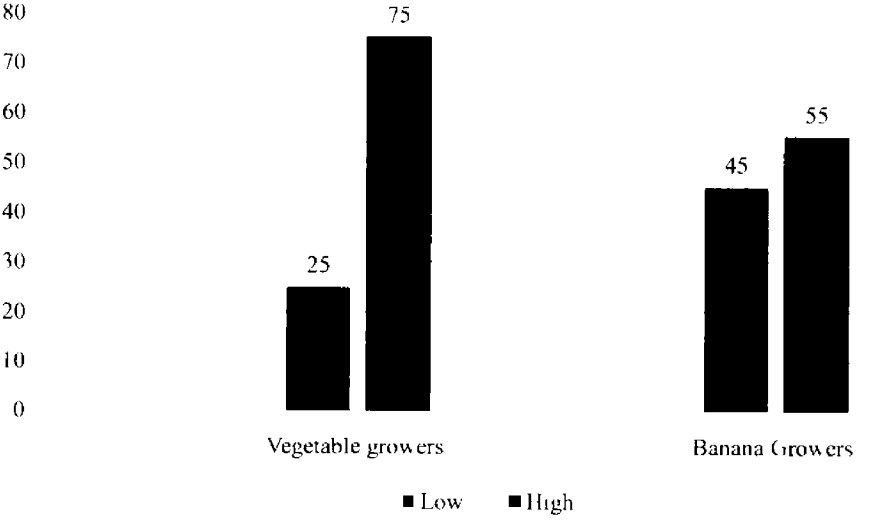


Fig 10 Distribution of vegetable and banana growers according to their environmental orientation



Similarly among organic banana growers, 87 per cent belonged to low category, whereas 13 per cent belonged to high category with respect to market perception

It can be seen from Table 6, that majority of the organic vegetable growers belong to low category with respect to market perception This means that they perceive difficulty in marketing their organic produces at remunerative price as compared to those produced by conventional farming

However 18 per cent fell into high category perceived that it was possible for them to market their produce at premium price without much difficulty As mentioned earlier a good share of farmers were in transition to organic farming did not have much experience in it This may be one of the reasons for their low market perception Moreover the unavailability of enough number of eco-shops / organic produce sales outlets might be forcing the farmers to sell the products along with produces made through conventional farming

4.1.8. Environmental orientation

Environmental orientation was operationalized as the degree to which a farmer had concern about his environment Results of the findings are presented in the Table 8

Table 8. Distribution of vegetable and banana growers according to their environmental orientation (n=60)

Category	Vegetables		Banana	
	Frequency	%	Frequency	%
Low	15	25	27	45
High	45	75	33	55

A perusal of Table 8, reveals that majority of the vegetable farmers (75%) had high environmental orientation, whereas one fourth (25 %) of the farmers had low environmental orientation

In case of banana, 55 per cent of the farmers had high environmental orientation and 45 per cent had low environmental orientation with regard to organic banana cultivation

Since membership in organic clusters was voluntary and the respondent farmers were voluntarily joined the clusters for undertaking organic farming, it is logical that majority of them would be having high environmental orientation

A detailed analysis of the responses of the farmers on various items used for assessing environmental orientation revealed that majority of the organic vegetable and banana growers were strictly against the use of pesticides or agro chemicals even at emergency situations at recommended dose They opined that most of the pests and diseases could be controlled using organic plant protection methods, and even otherwise it was better to suffer losses than to use chemicals

However, one fourth of the vegetable growers perceived that there was nothing wrong in using pesticides or agro chemicals at emergency situations, at recommended dose, as organic plant protection measures were not sufficient for the effective control of pest, diseases and nutrient deficiencies

45 per cent of the banana growers had supported this view Lack of availability of good quality suckers and high prevalence of pseudostem weevil attack in the region forced banana farmers to hold this view

Further, the health hazards reported to be caused by endosulphan might have created fear among the farmers and made them more environment oriented In the context of the present Organic Farming Policy implemented in the district of Kasaragod, Government of Kerala had started imparting training programmes

with special reference to organic farming, which might also have resulted in their high environmental orientation

4.1.9. Information seeking behaviour

Information seeking behaviour was operationalized as the sources from which organic farmers get technological information regarding the organic vegetable/banana cultivation Categorization of farmers according to their Information seeking behaviour is depicted in Table 9

Table 9. Distribution of vegetable and banana growers according to their information seeking behaviour

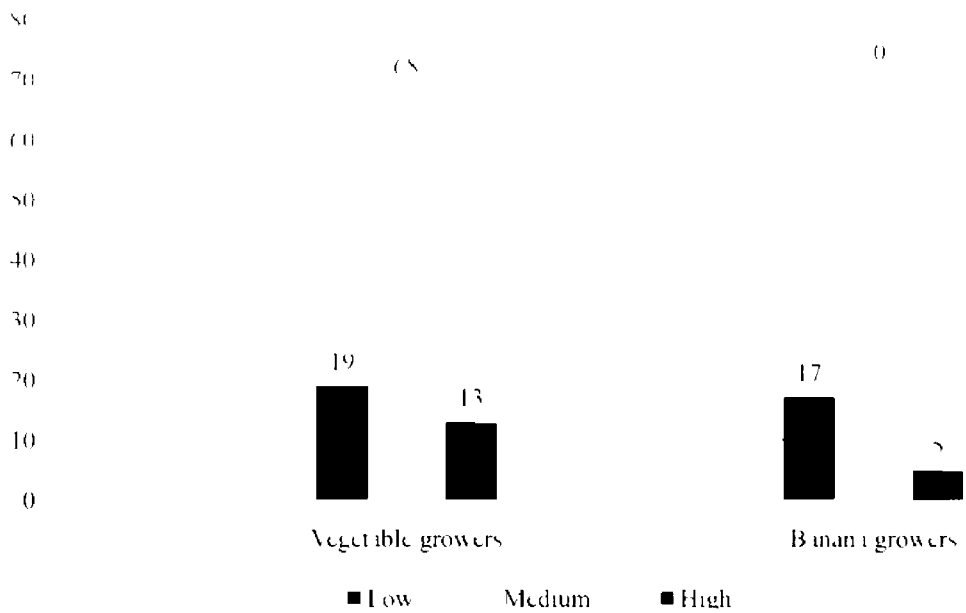
(n=60)

Category	Vegetables			Banana		
	Score range	Frequency	%	Score range	Frequency	%
Low	<14 33	11	19	<13 41	10	17
Medium	14 33-19 09	41	68	13 41-19 18	42	70
High	>19 09	8	13	>19 18	8	13
Mean =16 71		SD= 2 37		Mean=16 3		SD=2 88

Table 9, shows that majority (68 %) of the organic vegetable farmers had medium level of information seeking behaviour in organic vegetable cultivation Followed by low (19 %) and 13 per cent had low and high information seeking behaviour respectively

In case of organic banana farmers 70 per cent belonged to the medium category, 17 per cent belonged to the low category and 13 per cent belonged to the high category with respect to information seeking behavior in organic banana cultivation

Fig 11 Distribution of vegetable and banana growers according to their information seeking behaviour



This was because the farmers were having regular contact with agricultural officers and other extension workers, organic cluster members and had regular access to other agricultural magazines and television programmes Most of the farmers were actively participating in trainings programmes and exposure visit organized by the Krishibhavans This might be the reason that majority of the farmers had medium level of information seeking behaviour Similar results have been obtained by Beena (2002), Jayawardhana (2007) and Hanjabam (2013)

4 2 AWARENESS ABOUT SELECTED ORGANIC FARMING PRACTICES

Awareness which is of a cognitive behaviour was operationalized as the level or extent to which the respondents were familiar with the organic farming practices and programmes Results on the awareness of organic farming practices and programmes in banana and vegetable cultivation are presented in Table 10

Table 10 Distribution of vegetable and banana growers according to their awareness about organic farming practices and programmes (n=60)

Category	Vegetables			Banana		
	Score range	Frequency	%	Score range	Frequency	%
Low (<Mean-SD)	<47 40	11	18	<53 55	10	17
Medium (Mean ± SD	47 40-88 37	40	67	53 55-87 33	45	75
High (>Mean + SD)	>88 37	9	15	>87 33	5	8
Mean=67 77 SD=20 4				Mean = 70 44 SD=16 89		

As evident from Table 10, 67 per cent of the vegetable growers had medium level of awareness about organic farming technologies Almost an equal percent of farmers fell in the low (18%) and high (15%) category

It is also observed that majority (75%) of the banana growers had medium level of awareness 17% had low awareness and a minority of 8 per cent had high awareness with regard to organic farming practices and programmes

As part of the organic farming policy, the Kerala State Department of Agriculture had organized various training programmes and exposure visits to create awareness and sensitize farmers, about different aspects of organic farming Further because of the alleged endosulphan tragedy, farmers were well aware about the undesirable consequences of pesticides Moreover, Kasaragod district was declared as organic district and this restrict their accessibility to agrochemicals, which in turn might have prompted the farmers generate awareness about organic agricultural practices and programmes

Organic farming in Kasaragod district is promoted through organic clusters formed under Krishibhavan During the initial years of these programmes, the main thrust was put on giving awareness among farmers about organic farming, its principles and practices This may be the reason for majority of the farmers having medium level of awareness A similar result was reported by Jaganathan (2004) and Jayawardhana (2007)

Awareness level varies from individual to individual Awareness level of 15 organic farming practices and programmes in vegetable cultivation was assessed and furnished in the Table 11

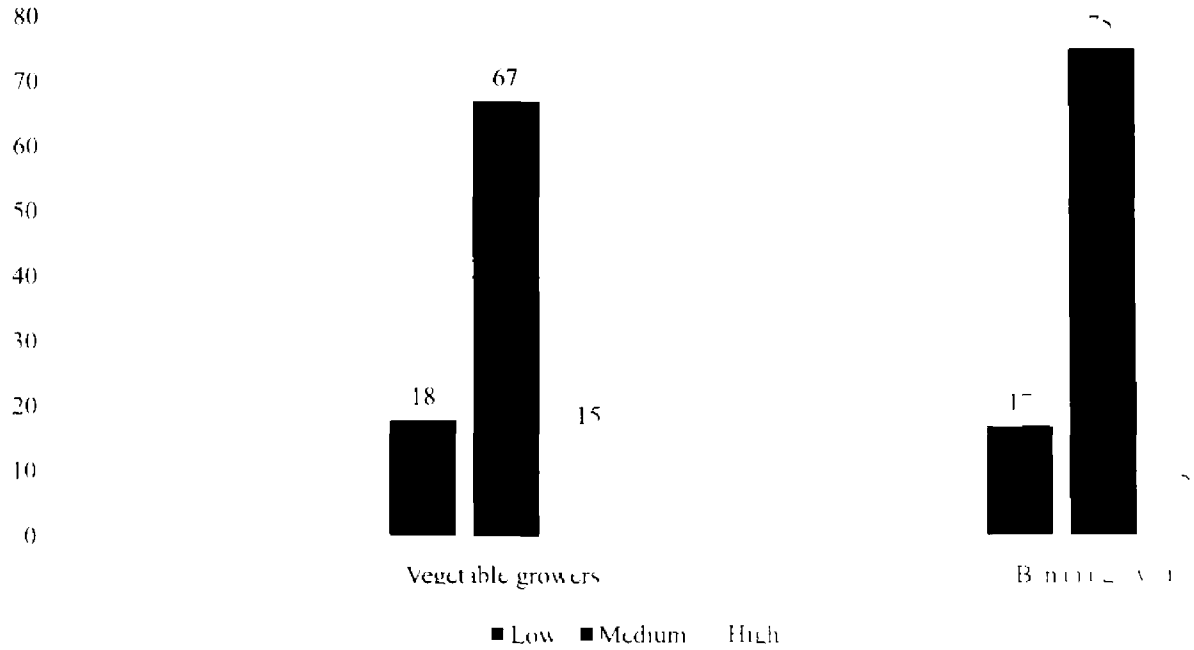


Fig 12 Distribution of vegetable and banana growers according to their awareness

Table 11. Practice wise extent of awareness of vegetable farmers about the organic farming practices and programmes

Sl. No.	Statement	Aware %	Unaware %
1	Kasaragod district is declared as the first organic district in Kerala	100	0
2	Red and yellow labeled plant protection chemicals were banned	97	3
3	Different schemes and subsides of the Department of Agriculture	95	5
4	Bio control agents and its applications (*Pseudomonas*, *Beauveria*, *Verticillium* etc)	93	7
5	Botanical pesticides (neem based products)	97	3
6	Eco shops are functioning for the marketing of the produce	82	18
7	Animal husbandry is an important component in organic farming	93	7
8	Proper harvest and postharvest handling of organic products	22	78
9	Preparation of Fish amino acid	43	57
10	Certification of organic products	53	47
11	Burning of crop residues is not permitted	25	75
12	Conservation of natural enemies is one of the important practice in organic farming	77	23
13	Different types of composting methods	85	15
14	PGPR mix I and II	10	90
15	Preparation of panchagavya	58	42

From Table 11, it is evident that all the farmers were aware that "Kasaragod was declared as the first organic district in Kerala" In the initial years wide publicity in local channels and media were given and promotional activities like seminars, workshops, group discussions, exposure visits were organized by both governmental and non-governmental organizations in creating awareness

While 97 per cent organic farmers each were aware of "banning of red (extremely toxic) and yellow (highly toxic) labeled plant protection chemicals" and the presence of "botanical pesticides (neem based products)" Similarly most of the farmers had awareness about "different schemes and subsides of the Department of Agriculture" (95 %), "bio control agents and its applications

(Pseudomonas, *Beauveria*, *Verticellium* etc)" (93 %) and "the importance of animal husbandry component in organic farming" (93 %) Different types of composting methods (85 %) and the presence of eco shops for the marketing organic products (82 %)

Practices like conservation of natural enemies, different types of composting methods and Government programmes like eco shops for the marketing of organic produces were known to farmers to the extent of 85 to 76 per cent

It may be seen that 58 and 53 per cent of the farmers were aware about preparation of panchagavya and the certification of organic produce respectively

The respondent's awareness about proper harvest and postharvest handling of organic products and preparation, fish amino acid were 21 per cent and 43 per cent respectively

It can be observed from Table 11, that 75 per cent of the farmers were unaware that burning of crop residues was not permitted in organic farming So the farmer have to be sensitized that the nutrient and the moisture status of the soil can be ensured and soil of sloppy region can be protected by mulching with crop residues Majority of the farmers thinks that burning of crop residues will provide ash which supplies potash and more over it kills the soil borne pathogens

New technologies like PGPR have not reached to the farmer's level because of the unavailability and inaccessibility of such products in the local market (Plant Growth Promoting Rhizobacteria mix I and II) PGPR is a promising organic growth promoting substance developed and supplied through different institutes of KAU Due to the limited supply of PGPR mix farmers in Kasaragod district, were less aware about this organic growth promoting substances Farmers who have used PGPR mix have favorable and positive attitude towards this product Production of organic inputs like PGPR, Biocontrol agents is limited and could cater to the demand of the farmers of the state

Awareness level of 15 organic farming practices and programmes in banana cultivation was assessed and furnished in the Table 12

Table 12. Practice wise extent of awareness about the organic farming practices and schemes in banana cultivation

Sl. No.	Statement	Aware	Unaware
1	Kasaragod district is declared as the first organic district in Kerala	100	0
2	Red and yellow labeled plant protection chemicals were banned	95	5
3	Different schemes and subsides of the Department of Agriculture	95	5
4	Bio control agents and its applications (Pseudomonas, *Beauveria*, Verticelliumetc)	93	7
5	Botanical pesticides (neem based products)	97	3
6	Eco shops are functioning for the marketing of the produce	65	35
7	Animal husbandry is an important component in organic farming	98	2
8	Leaf axial filling with *Beauveria* or neem cake is an important management practice for the control of pseudostem weevil	77	23
9	Nanma and Menma products which are extracted from the tapioca leaves for the control of pseudostem weevil	30	70
10	Certification of organic products	85	15
11	Mulching the basin with paddy straw improve the bunch yield	18	82
12	Conservation of natural enemies is one of the important practice in organic farming	73	27
13	Different types of composting methods	87	13
14	PGPR mix I and II	3	97
15	Compost can be made from banana leaves and stalks	53	47

From Table 12, it could be inferred that all the banana growers were aware of the fact that 'Kasaragod district is declared as the first organic district in the state'

Most of the farmers have good contact with Agricultural Officers and other supporting staffs As a result of this 97 per cent of the respondents know about 'botanical pesticides (neem based products)' While 95 per cent of the organic banana growers each were aware of 'banning of red and yellow labeled plant protection chemicals' and 'different schemes and subsides of the Department of Agriculture' Furthermore organic cluster also plays an important role as most of these information are passed through the formal and informal contact with officials

It could be observed that 98 per cent of the respondents were aware that 'animal husbandry is an important component in organic farming' and 'biocontrol agents and its applications (Pseudomonas, *Beauveria*, Verticelliumetc)' (93 %) and the application of 'botanical pesticides (neem based products)' in crop protection'(97 %)

Majority of the banana farmers were aware on practices like 'different types of composting methods'(87%), 'conservation of natural enemies for pest control'(73%), 'leaf axial filling with *Beauveria bassiana* or neem cake'(77%) is one of the ecofriendly effective management practice for the control of pseudostem weevil, 'certification of organic products'(85%) It was also noted that Eight per cent of the respondents were either completely certified or in the process of getting a certification This will set a model for other farmers to follow in future

More than half of the respondents were aware about 'composting of banana stalks and leaves' (53%) Compost made from banana waste is one of the cost effective method in organic manure production and it is a rich source of potassium and 'eco shops are functioning for the marketing of the produce' (65 %)

'Nanma and Menma are bio pesticides developed from tapioca leaves for the control of pseudostem weevil' by CTCRI Sreekaryam 30% of the respondents

were aware about this product Some of the farmers have used this product and have very good opinion about this product

KAU has recommended 'mulching of banana basins with paddy straw' and the 'application of PGPR I and II' for increasing the yield However very few farmers were aware about these technologies which indicates that there is a necessity to give wide publicity for these technologies

4 3 KNOWLEDGE OF VEGETABLE AND BANANA GROWERS ABOUT ORGANIC FARMING PRACTICES

Knowledge enables farmers to understand completely about the recommended technologies Classification of farmers based on their knowledge was presented in the Table 13

Table 13. Distribution of vegetable and banana growers according to their knowledge about organic farming practices(n=60)

Category	Vegetables			Banana		
	Score range	Frequency	%	Score range	Frequency	%
Low (<Mean SD)	<20 61	10	17	<24 76	6	10
Medium (Mean ± SD	20 61-61 05	42	70	24 76 69 12	44	73
High (>Mean +SD)	>61 05	8	13	>69 12	10	17
Mean = 40 83		SD= 20 22		Mean=46 94		SD=22 17

Table 13, reveals that majority of the vegetable growers (70%) had medium level of knowledge about organic vegetable cultivation About 17 per cent of the farmers had low level knowledge, where13 per cent of the respondents had high level of knowledge about organic vegetable production

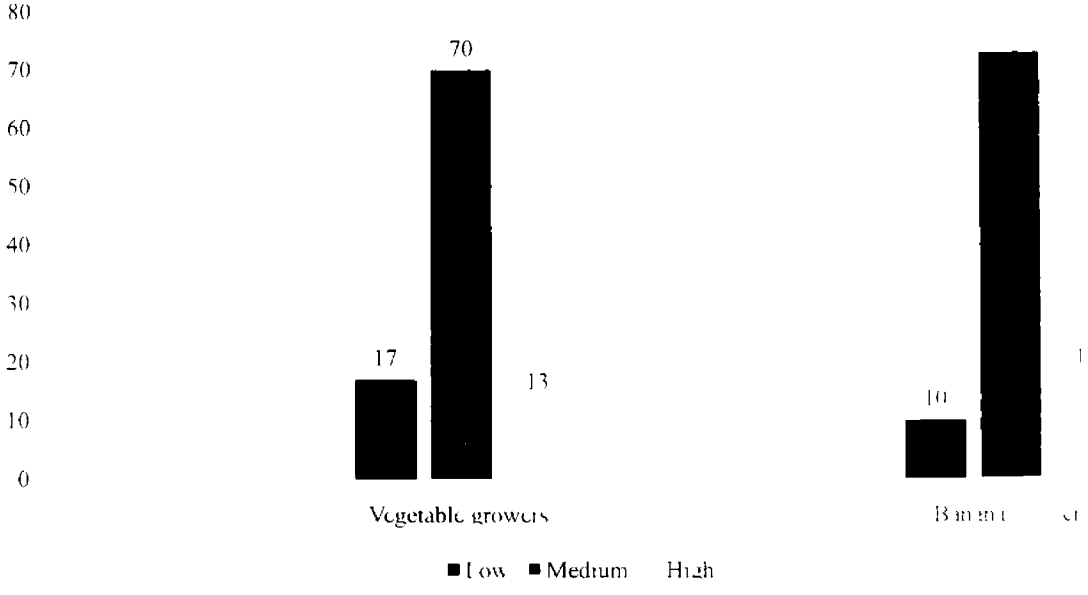


Fig 13 Distribution of vegetable and banana growers according to their knowledge about organic farming practices

In banana cultivation it was noticed that majority (73 %) of the respondents had medium level of knowledge about organic banana cultivation About 17 % had high level of knowledge and only 10% had low level of knowledge about organic banana cultivation

Thus it is observed that about three fourth of the organic farmers had medium level of knowledge on organic farming technologies The awareness about organic farming technologies might have develop interest in gathering more information Training and exposure visits organized by the Krishibhavans might also have played a vital role in imparting knowledge High literacy rate and exposure to different information sources may also have broadened the knowledge on organic farming technologies This finding is in line with the findings of Jaganathan (2004) and Jayawardhana (2007) Husain (2010) and Anupama (2014)

4 4 ATTITUDE OF VEGETABLE AND BANANA GROWERS TOWARDS ORGANIC FARMING

The term attitude refers to the degree of positive or negative effect towards a psychological object Categorization of farmers according to their attitude towards organic farming is depicted in Table 14

Table 14. Distribution of banana and vegetable growers based on their attitude towards organic farming(n=60)

Category	Vegetables			Banana		
	Score range	Frequency	%	Score range	Frequency	%
Un favourable	<42 67	7	12	<36 32	11	18
Favourable	42 67-47 65	43	72	36 32-45 34	39	65
Most favourable	>47 65	10	16	>45 34	10	17
Mean = 45 16		SD=2 67		Mean=40 83		SD=4 51

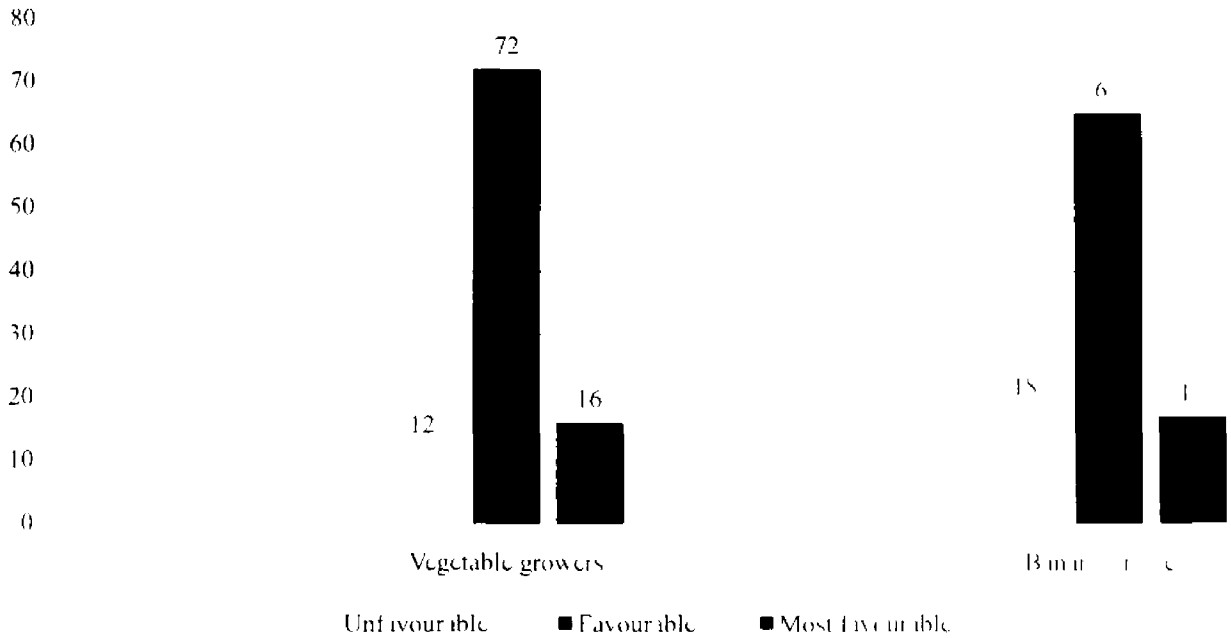


Fig 14 Distribution of vegetable and banana growers based on their attitude towards organic farming

From Table 14, it is observed that majority of the vegetable growers (72%) and banana growers (65 %) had favourable attitude towards organic farming practices Both the vegetable and banana farmers were almost evenly distributed in the unfavourable and highly favourable category with respect to attitude towards organic farming

Members of the organic clusters, formed under the krishibhavans, got trainings on different aspects of organic farming at different stages In some clusters committed innovative farmers, capable of handling classes for other farmers acted as trainers Demonstration plot at farmer's fields, trainings and exposure visits also, helped the farmers to develop favourable attitude towards organic farming It may be noted that a few farmers, already in the process of certification, had already motivated others to follow These may be the reasons that 72 per cent of the vegetable farmers and 65% of the banana farmers fall in the favourable attitude category On the other hand a small section of the farmers were having unfavourable attitude towards organic farming practices because of the setbacks they faced during the previous years Similar results was reported by Jaganathan (2004) and Jayawardhana(2007)

4 5 ADOPTION OF ORGANIC FARMING PRACTICES BY BANANA AND VEGETABLE GROWERS

Adoption refers to the degree to which a farmer had actually followed an organic farming practice Adoption index was used to measure the extent of adoption of organic farming practices in banana and vegetable cultivation Results on the adoption of organic farming technologies are presented in the Table 15

Table 15. Distribution of banana and vegetable growers based on their adoption of organic farming practices (n=60)

Category	Vegetables			Banana		
	Score range	Frequency	%	Score range	Frequency	%
Low (<Mean-SD)	<42 16	5	8	<62 16	8	13
Medium (Mean ± SD	42 16 63 36	48	80	62 16-87 21	43	72
High (>Mean +SD)	>63 36	7	12	>87 21	9	15
Mean =5 76	SD=10 59			Mean=74 68	SD=12 52	

It was seen from Table 15, that majority (80%) of the vegetable growers had medium level of adoption whereas 12 % had high level of adoption and only 8% had low level of adoption of organic farming practices

With regard to adoption of organic farming practices in banana cultivation, 72 per cent of the banana growers belonged to medium category followed by 15 per cent in high category and 13 per cent in low category

Organic Farming Policy of the Department of Agriculture, Government of Kerala, implemented in Kasaragod district may have a direct effect on the adoption of organic farming technologies in banana and vegetable crops Majority of the respondents had medium level of adoption, and it clearly shows the direction of development of organic farming and the attitudinal change of the farmers to work with nature rather than to fight with it Farmers were aware about the harmful effects of agrochemicals and the promotional activities done by the Department and this might have boosted up the acceptance of organic farming amongst farmers The findings are in line with the findings of Jaganathan (2004), Jayawardhana (2007) and Husain (2010)

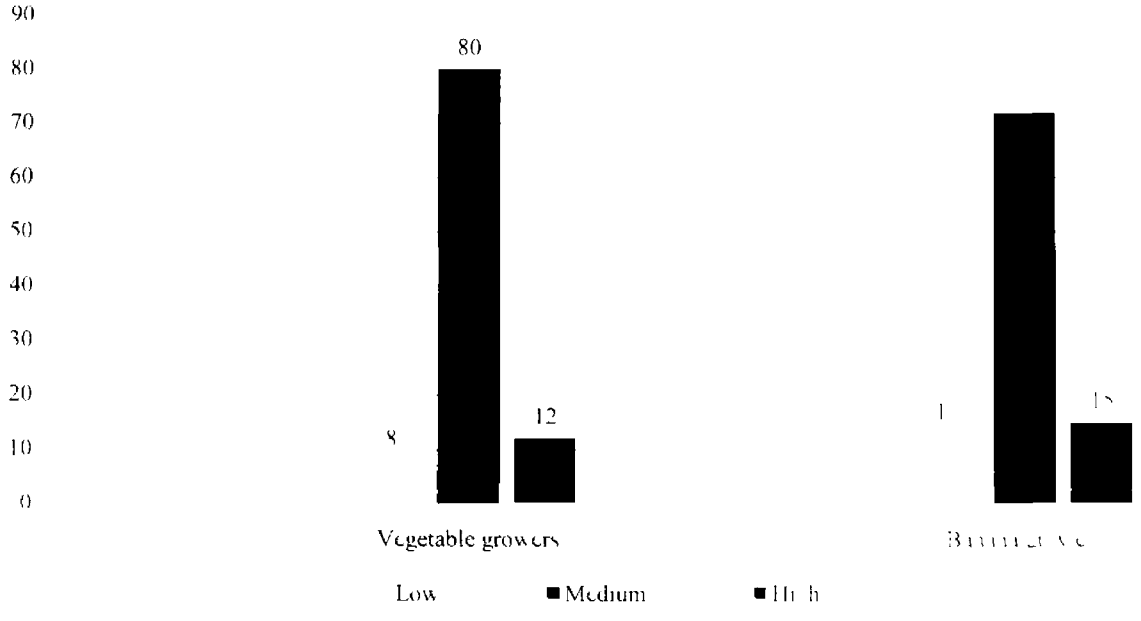


Fig 15 Distribution of banana and vegetable growers based on their adoption of organic farming practices

Table 16 Practice wise extend of adoption of organic farming technologies by vegetable growers.

Adoption level varies from individual to individual and technologies Adoption level of 23 organic farming technologies in vegetable cultivation was assessed and furnished in the Table 16

Sl No.	Vegetable practices	Adopted %	Partially adopted %	Not adopted %
1	Summer ploughing	38	7	55
2	In situ incorporation of crop residues	5	28	67
3	Raising green manure and incorporation	18	35	47
4	Resistant / tolerant variety	97	3	0
5	Seed treatment/ seedling dip with bio control agents	13	15	72
6	Application of FYM	78	22	0
7	Application of panchagavya	17	12	71
8	Application of green leaf manure	80	18	2
9	Application of vermicompost / compost	25	5	70
10	Application of poultry manure	50	27	23
11	Application of cow urine based formulations	68	22	10
12	Application of bio fertilizers in soil	10	20	70
13	Irrigation at critical stages	97	3	0
14	Crop rotation	66	27	7
15	Mulching	90	8	2
16	Weeding	98	2	0
17	Monitoring of pest and diseases	100	0	0
18	Collection and destruction of pests (egg, larvae, pupae) and disease affected plants	98	0	2
19	Use of light traps	2	2	96
20	Use of fruitfly trap	10	25	65
21	Use of pheromone traps	14	8	78
22	Use of botanical pesticides	27	65	8
23	Conservation of natural enemies	5	18	77

"Monitoring of pest and diseases" is one of the important pest and disease surveillance measures was adopted by all the respondents

Organic farming practices like "selection of resistant / tolerant variety", "irrigation at critical stages", "mulching", "weeding", "collection and destruction of pests (egg, larvae, and pupae) and disease affected plants" were adopted by more than 90 per cent of the farmers

'Application of FYM' and 'application of green leaf manure' were adopted by 78 per cent and 80 per cent of the farmers respectively These manures contain appreciable amounts of plant nutrients

It was observed that 50 to 66 per cent of the respondents adopted the practices like "crop rotation", "use of cow urine based formulations" and the "use of poultry manure"

"Summer ploughing", "use of vermicompost/compost" and the "use of botanical pesticides" were adopted by 25 to 38 per cent of the respondents

"In situ incorporation of crop residues", "raising green manure and incorporation", "seed treatment/ seedling dip with bio control agents", "application of panchagavya", "application of bio fertilizers in soil", "use of light traps", "use of fruitfly trap", "use of pheromone traps", "conservation of natural enemies" were adopted by few farmers

Adoption level of 18 organic farming technologies in banana cultivation was assessed and furnished in the Table 17

Table 17. Practice wise extent adoption of organic farming technologies by banana growers.

Sl. No.	Banana practices	Adopt %	Partially adopt %	Non adopt %
1	In situ incorporation of crop residues	67	18	15
2	Application of green leaf manure	78	22	0
3	Selection of good quality suckers	92	8	0
4	Suckers dip in cow dung slurry and ash and shade dry	80	20	0
5	Resistant / tolerant variety	92	3	5
6	Sucker treatment with bio fertilizers	32	25	43
7	Application of FYM	82	13	5
8	Application of vermicompost / compost	24	3	73
9	Timely irrigation	100	0	0
10	Desuckering	78	20	2
11	Raising green manure and incorporation	35	37	28
12	Crop rotation	28	55	17
13	Weeding	88	12	0
14	Monitoring of pest and diseases	100	0	0
15	Collection and destruction of pests (egg, larvae, pupae) and disease affected plants	98	2	0
16	Introduction of bio control agents	20	33	47
17	Use of botanical pesticides	38	37	25
18	Leaf axil filling of *Beauveria* or neem cake for the control of pseudostem weevil	37	25	38

Water-loving banana plants need plenty of water to produce bountiful bunches of fruit Rainfall will be enough to water banana plants on monsoon times, but in warm sunny weather, irrigation is very important From the table it could be observed that 100 per cent of the respondents were following practices like "timely irrigation" and "monitoring of pest and diseases" Monitoring of overall plant health ensure the quality of crop yield Monitoring of pest and diseases is one of the best practices for integrated pest and disease management Pseudo stem weevil is the severely affecting pest of banana Infestation starts

from 2-3 months on wards Regular monitoring and timely precautionary measures helps to control it completely Furthermore limited effective control measures for pest and diseases management in organic farming lead farmers to adopt this method

"Selection of good quality suckers", "resistant/ tolerant variety", "weeding", "collection and destruction of pests (egg, larvae, and pupae) and disease affected plants" were adopted by 88 to 98 per cent of the respondents

Organic farming practices like "dipping suckers in cow dung slurry and ash then shade dry", "application of FYM", "application of green leaf manure and de-suckering" were adopted by 78 to 88 per cent of the respondents

Only 20 to 38 per cent of the respondents adopted "sucker treatment with bio fertilizers", "application of vermicompost / compost", "raising green manure and incorporation", "crop rotation", "Introduction of bio control agents", "use of botanical pesticides", "leaf axil filling of *Beauveria* or neem cake" for the control of pseudo stem weevil

Many farmers experienced the effect of neem cake applied in the pit before planting and leaf axial application for the control of rhizome and pseudo stem weevil Farmers had noticed the insect repellent effect of botanical pesticides like tobacco decoction, neem oil etc

4 6 SUSTAINABILITY OF CLUSTER BASED APPROACH IN PROMOTING ORGANIC FARMING

Table 18. Distribution of banana and vegetable growers based on sustainability of cluster based approach in organic farming

Category	Vegetables		Banana	
	Frequency	Percentage	Frequency	Percentage
Low (less than mean)	5	8	24	40

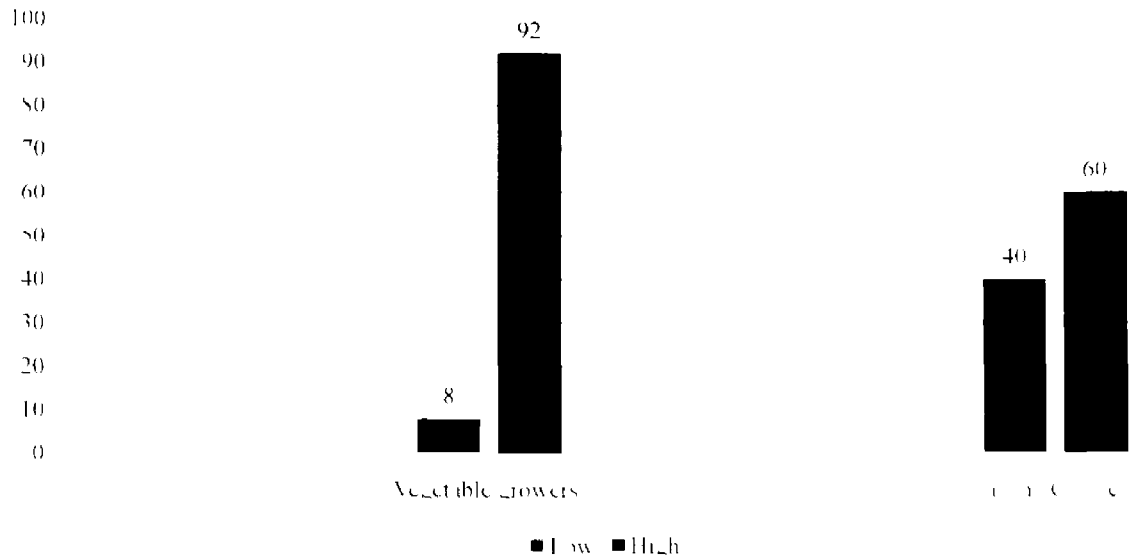


Fig 16 Distribution of banana and vegetable growers based on sustainability of cluster based approach in organic farming

High (greater than mean)	55	92	36	60
Mean = 44			Mean = 39	

Ninety two per cent of the vegetable grower's perceived high sustainability of cluster based approach of organic farming Only 8 per cent of the respondents had suggested low level of sustainability of the organic vegetable clusters

In organic banana clusters, 60 per cent of the respondents had perceived high level of sustainability of the cluster, whereas 40 per cent of the cluster members opinioned low sustainability

Organic Farming Policy is implemented through the organic clusters formed under krishibhavans The main activities of the clusters were, purchase and distribution of organic inputs, regular meetings with cluster members and extension functionaries and to solve field level problems with the help of members At present the organic clusters are functionally effective satisfying the requirements of majority of its members That is the reason why majority of the respondents had positive opinion about the sustainability of the clusters

4 7 EFFECTS OF INDEPENDENT VARIABLES ON THE EXTENT OF AWARENESS, KNOWLEDGE, ATTITUDE AND ADOPTION

Path analysis was done to find out the direct and indirect effects of characteristics contributing on the extent of awareness, knowledge, attitude and adoption of organic farming technologies by vegetable and banana cultivators Nine independent variables selected through 'judges rating' average, *viz* , age(X_1), educational status(X_2), experience in organic farming(X_3), area under organic farming(X_4), livestock possession(X_5), trainings attended(X_6), market perception(X_7), environmental orientation(X_8) and information seeking behavior(X_9) The results of path analysis are explained from Table 20 to Table 26

Scale of path coefficients was given below which shows the value of direct and indirect effects and its corresponding rate of scale

Table 19. Scale of path coefficients

Sl. No.	Value of direct and indirect effects	Rate of scale
1	0 00 to 0 09	Negligible
2	0 10 to 0 19	Low
3	0 20 to 0 29	Moderate
4	0 30 to 0 99	High
5	More than 1 00	Very high

(Source Panse *et al*, 1967)

4.7.5. Effects of selected characteristics on the dependent variables in organic vegetable cultivation

The variables which had shown significant correlation with dependent variables on organic vegetable growers were subjected to path analysis and the respective path coefficients, direct and indirect effects were presented in Table 20

Table 20. Correlation matrix of profile characteristics on dependent variables on organic vegetable cultivation

variables	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1								
X2	-204	1							
X3	-223	219	1						
X4	-006	079	135	1					
X5	041	125	099	191	1				
X6	206	108	173	160	158	1			
X7	067	156	180	163	062	075	1		
X8	.257*	183	233	074	118	190	141	1	
X9	105	.345*	041	- 145	076	034	026	110	1

		*							
Awareness	170	.289*	185	205	.287*	.334*	154	224	.360*
Knowledge	233	.462*	.260*	204	066	.370*	.381*	216	.497*
Attitude	178	087	152	065	102	137	157	.335*	040
Adoption	-014	.397*	183	.381*	.307*	196	.332*	193	.311*

4.7.1 Effects of selected independent variables on the awareness

The direct and indirect effect of selected characteristics on the awareness about the organic farming practices and programmes of organic vegetable growers are presented in table 20 and in figure ( )

Table 21 Direct (diagonals) and indirect effect (off diagonals) of the independent variables contributing to the awareness of organic vegetable cultivators

	X_2	X_5	X_6	X_9	Y
X_2	**0.1340**	0 0255	0 0300	0 0993	0 289**
X_5	0 0167	**0.2047**	0 0436	0 0218	0 287**
X_6	0 0144	0 0321	**0.2778**	0 0095	0 334**
X_9	0 0462	0 0155	0 0091	**0.2880**	0 359**

Residual = 0 7062

X_2 Educational status

X_5 Livestock possession

X_6 Trainings attended

X_9 Information seeking behaviour

Y Awareness of organic vegetable cultivators

The results of path analysis as attributed in Table 16, indicates that out of nine variables selected, education, livestock possession, trainings attended and

information seeking behavior had positive and direct significance on the awareness of organic vegetable cultivators

Detailed perusal of the table shows that maximum direct effect was attributed by information seeking behaviour followed by trainings attended, livestock possession and education in the decreasing order of significance However, the direct effect of independent variables indicates that the rate of scale was moderate for information seeking behaviour (0 2880), trainings attended (0 2778), and livestock possession (0 2047), whereas low for educational status (0 1340)

The residual effect of path analysis here is 0 7062 which was slightly high indicating that the awareness of organic vegetable cultivators could not be explained completely with the selected characteristics But among the selected factors livestock possession, trainings attended and Information seeking behaviour are the important variables observed from the results of path analysis

Awareness about the organic farming technologies are the prerequisite for its adoption During the initial years of implementation of the organic farming programmes in Kasaragod district, government focused on giving awareness trainings to farmers concerning various aspects and a major portion of fund was channeled for this purpose Majority of the farmers had regularly attended the trainings concerning organic vegetable production This may be the reason that trainings attended had moderate direct effect on the awareness of the organic vegetable growers

Farmers seek more information with regard to organic farming prior to its adoption They seek information about organic farming mainly from krishibhavans and other sources such as exposure visits to various farmers and agricultural institutes, other farmers of the organic cluster and mass media This may be the reason that information seeking behaviour had moderate direct effect on the awareness of the organic vegetable growers

With regard to livestock possession organic farming is a cow centric farming system and farmers who possess livestock component along with their farms were well aware about the organic inputs such as cow dung, cow urine based formulations and its direct effect on soil properties and plant growth Livestock provides cheapest source of quality organic inputs This might be the reason that livestock possession had moderate direct effect on the awareness of the organic vegetable growers

Educational status of the farmer had more indirect effect that direct effect on the awareness of the organic vegetable growers Indirect effect was channeled through livestock possession, trainings attended and information seeking behaviour

4 7 2. Effects of selected characteristics on the knowledge

Table 22 Direct (diagonals) and indirect effects (off diagonals) of the independent variables contributing to the knowledge of organic vegetable cultivators

	X_2	X_6	X_7	X_8	Y
X_2	**0.2437**	0 0330	0 0483	0 1358	0 461**
X_6	0 0263	**0.3064**	0 0232	0 0129	0 369**
X_7	0 0380	0 0229	**0.3097**	0 0102	0 381**
X_8	0 0840	0 0101	0 0080	**0.3937**	0 496**

Residual =0 4612

X_2 Educational status

X_6 Trainings attended

X_7 Market perception

X_8 Environmental orientation

Y knowledge of organic vegetable cultivators

Table 21, which shows the results of path analysis indicates that the independent variables namely education (X_2), trainings attended (X_6), market perception (X_7), environmental orientation (X_8) had positive and direct insignificance on the knowledge of organic vegetable cultivators

On detailed analysis of the table it is clear that environmental orientation had the maximum direct influence on knowledge of farmers followed by market perception, trainings attended and educational status of the farmers

The direct effect of independent variables on the independent variable indicates that the rate of scale was high for market perception (0 3097), trainings attended (0 3064) and environmental orientation (0 3937) Whereas the direct effect of educational status (0 2437) was only moderate

The residual effect of path analysis was 0 461, which indicates that the effects of selected characteristics on the knowledge of organic vegetable growers were high and the variation in knowledge was due to other unexplored factors

Knowledge level of the farmer increases with trainings attended Trainings on organic vegetable production helped farmers in imparting the knowledge about production, protection and other socio- environmental advantages of organic farming This may be the reason that trainings attended had high direct effect on the knowledge of the organic vegetable growers

Market perception had high direct effect on the knowledge of the organic vegetable growers

Media reports about the alleged endosulphan tragedy made the farmers more conscious about environment Moreover the periodic reports released by KAU regarding the pesticide residues on vegetables throw light on the producers as well as on the consumers mind about the deadly chemicals used This may be the reason that environmental orientation had high direct effect on the knowledge of the organic vegetable growers

All the respondent farmers were literate Educated farmers can acquire deep knowledge about organic farming through trainings and exposure visits This may be the reason that educational status had moderate direct effect on the knowledge of the organic vegetable growers The indirect effects were mainly found to be routed through environmental orientation, market perception and trainings attended This findings is similar with the findings of Elakkia (2007)

4.7.3. Effects of selected characteristics on the adoption

Table 23 Direct (diagonals) and indirect effects (off diagonals) of the independent variables contributing to the adoption of organic farming technologies by vegetable cultivators

	X_2	X_4	X_5	X_7	X_9	Y
X_2	**0 2405**	0 0252	0 0232	0 0350	0 0729	0 397**
X_4	0 0190	**0.3195**	0 0355	0 0365	-0 0296	0 381**
X_5	0 0300	0 0610	**0.1859**	0 0139	0 0160	0 307**
X_7	0 0375	0 0520	0 0115	**0.2243**	0 0055	0 331**
X_9	0 0829	-0 0044	0 0141	0 0058	**0.2115**	0 31**

Residual =0 5858

X_2 Educational status

X_4 Area under organic farming

X_5 Livestock possession

X_7 Market perception

X_9 Information seeking behaviour

Y Adoption of organic farming technologies

The results of path analysis as attributed in the table 22, indicates that out of nine variables educational status, area under organic farming, livestock possession, market perception and information seeking behaviour had positive

direct significance on the adoption of organic farming technologies by vegetable cultivators

Detailed perusal of the table shows that maximum direct effect was attributed by area under organic farming followed by educational status, market perception, information seeking behaviour, livestock possession in the decreasing order of significance

However the direct effect of independent variables indicates that the rate of scale was high for area under organic farming (0 3195) Whereas moderate for educational status (0 2405), market perception (0 2243) and information seeking behaviour (0 2115) and the direct effect of livestock possession (0 1859) was low

The residual effect of path analysis (0 585) was slightly more than half indicating that adoption of organic farming technologies by vegetable cultivators were partially explained by the selected variables But among selected characteristics educational status, area under organic farming and market perception are the fundamental variables exhibited by the path analysis

Half of the farmers who adopted organic vegetable production had less than twenty five cents of organic vegetable cultivating area Vegetable growers cultivating in small land area are more likely to adopt organic farming practices This may be the reason that area under organic farming shows high direct effect on the adoption of organic farming technologies

Educated farmers had opportunities to adopt organic farming technologies because higher level of formal schooling enhances the farmer's capacity to understand the complexities involved in the various organic farming technologies and apply them in the field situations which are perceived through trainings and exposure visits Educated farmers had greater interaction with the society and other innovative farmers assisted in the adoption of organic farming technologies This may be the reason that education had moderate direct effect on the adoption

of organic farming technologies This finding was in line with the findings of Jaganathan (2004)

Marketing is an important aspect in the adoption of organic farming technologies Opportunity to receive premium price and proper marketing channel for organic products has intensified producer's interest in the adoption of organic vegetable production This may be the reason that market perception had moderate direct effect on the adoption of organic farming technologies in vegetable cultivation

Farmers who had adopted and were considering adoption had actively sought information on organic farming from various sources Organic farming in Kasaragod was implemented as a government policy Due to the sudden switch over from conventional farming to organic, farmers depended up on various sources to create awareness and knowledge about different aspects of organic production system Cluster members, extension officers, trainings and exposure visits were the major sources Apart from this some farmers were using Facebook as an online information source This might be the reason that information seeking behavior had moderate direct effect on the adoption of organic farming technologies by the vegetable growers

4.7.6 Effects of selected characteristics on the dependent variables in organic banana cultivation

The variables which had shown significant correlation with dependent variables on organic banana farmers were subjected to path analysis and the respective path coefficients, direct and indirect effects were presented in Table 24

Table 24. Correlation matrix of profile characteristics on dependent variables on organic banana cultivation

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1								
X2	-	1							

	.409**								
X3	- 174	- 138	1						
X4	- 012	.273*	238	1					
X5	- 239	- 097	.282*	105	1				
X6	- 004	- 215	.287*	206	.566**	1			
X7	041	- 125	195	005	- 064	093	1		
X8	- 024	- 066	.345**	149	.536**	.541**	- 030	1	
X9	-.312*	.270*	.274*	111	214	087	- 104	095	1
Awareness	- 050	- 085	206	216	.521**	.581**	- 020	.377**	.365**
Knowledge	- 062	149	.312*	.255*	.394**	.500**	154	.446**	.354**
Attitude	- 001	- 130	239	- 077	.387**	.480**	187	.393**	163
Adoption	- 177	142	172	.374**	.466**	.379**	-.291*	.273*	166

4.7.4. Effects of selected characteristics on the awareness

Table 25. Direct and indirect effects of characteristics contributing to the awareness of organic banana growers.

	X_5	X_6	X_8	X_9	Y
X_5	**0.2149**	0 2457	0 0001	0 0601	0 521**
X_6	0 1214	**0.4349**	0 0001	0 0244	0 581**
X_8	0 1149	0 2353	**0.0002**	0 0264	0 377**
X_9	0 0459	0 0378	0 0061	**0.2811**	0 365**

Residual =0 5325

X_5 Livestock possession

X_6 Trainings attended

X_8 Environmental orientation

X_9 Information seeking behavior

Y Awareness of organic banana growers

The results of path analysis as attributed in the table 23, indicates that out of nine variables, livestock possession, trainings attended, environmental orientation and information seeking behaviour had positive direct significance on the awareness of organic banana growers

Detailed perusal of the table shows that maximum direct effect was attributed by trainings attended followed by information seeking behaviour, livestock possession and environmental orientation in the decreasing order of significance

However the direct effect of independent variables indicates that the rate of scale was high for trainings attended (0 4349) Whereas moderate for information seeking behaviour (0 2811) and livestock possession (0 2149) and negligible for environmental orientation (0 0002).

The residual effect of path analysis was 0 532 which indicates that the effect of selected characteristics on the awareness of organic banana growers was almost half and the variation in awareness is due to other unexploited factors

Cluster based awareness cum training programmes on organic farming in banana cultivation was organized by the Krishibhavan which is the nodal agency in the implementation of the organic farming programmes of the department of agriculture Majority of the cluster members used to attend different trainings on organic farming This might be the reason that trainings attended had high direct effect on the awareness of the organic banana growers regarding the organic farming programmes and technologies The indirect effect was mainly channeled through livestock possession

Information seeking behaviour is operationally defined in the study as the curiosity to know more about organic farming technology from different sources by the respondent Information seeking behaviour had moderate direct effect on awareness

According to the basic principles of organic agriculture, livestock are kept as a part of the farming system Farmers who possess livestock component along with their farms were well aware about the organic inputs such as cow dung, cow urine based formulations and its direct effect on soil properties and plant growth Livestock provides cheapest source of quality organic inputs Those farmers who had livestock component had more awareness and positive attitude towards organic farming The total indirect effect of livestock possession was more and mainly channeled through trainings attended and information seeking behaviour

The direct effect of environmental orientation (X_8) was negligibly small 0 0002 The total indirect effect was 0 376 which was similar to that of correlation coefficient (0 377) The indirect effects were routed mainly through trainings attended, livestock possession and information seeking behavior respectively

4.7.5. Effects of selected characteristics on the knowledge

Table 26. Direct (diagonals) and indirect (off diagonals) effects of characteristics contributing to the knowledge of organic banana growers.

	X_3	X_5	X_6	X_8	X_9	Y
X_3	**0.0599**	0 0204	0 0899	0 0653	0 0753	0 311**
X_5	0 0168	**0.0725**	0 1775	0 0669	0 0590	0 393**
X_6	0 0171	0 0409	**0.3143**	0 1025	0 0240	0 499**
X_8	0 0206	0 0388	0 1700	**0.1895**	0 0259	0 445**
X_9	0 0163	0 0155	0 0273	0 0178	**0.2759**	0 353**

Residual = 0 6142

X_3 Experience in organic farming

X_5 Livestock possession

X_6 Trainings attended

X_8Environmental orientation

X_9 Information seeking behavior

Y Knowledge of organic banana growers

The results of path analysis as attributed in the table 24, Indicates that out of nine variables experience in organic farming, livestock possession, trainings attended, environmental orientation and information seeking behaviour had positive direct significance on the knowledge of organic banana growers

Detailed perusal of the table shows that maximum direct effect was attributed by trainings attended followed by information seeking behaviour, environmental orientation, livestock possession and experience in organic farming in the decreasing order of significance

However the direct effect of independent variables indicates that the rate of scale was high for trainings attended (0 3143) Whereas moderate for information seeking behaviour (0 2759) Environmental orientation (0 1895) was low and experience in organic farming (0 0599) and livestock possession (0 0725) was negligible

The residual effect of path analysis was 0 614 indicating that knowledge of the organic banana growers were partially explained by the selected variables But among selected characteristics, trainings attended, information seeking behaviour and environmental orientation are the important variables shown by the path analysis

The trainings attended by the banana growers on organic farming had helped them in enhancing their knowledge regarding organic cultivation The result proves that trainings attended had a high direct effect on the knowledge level of organic banana growers The indirect effects were mainly channeled through environmental orientation and livestock possession

The interest and curiosity developed in the farmers regarding to organic cultivation has motivated them to gain new information on the topic and expand their level of knowledge They tend to collect more information from different sources like Krishibhavan, extension functionaries, peer group farmers, mass media, internet and social networking place a key role in this regards This explains the moderate direct effect of information seeking behaviour on knowledge of banana farmers

The direct effect of experience in organic farming was low and had more indirect effect on the knowledge of banana growers More experienced the farmer more will be the knowledge concerning organic cultivation The indirect effects were mainly routed through trainings attended, environmental orientation and information seeking behaviour

When diverse crop and livestock component are maintained in a farming unit the soil microorganisms will have plentiful supply of organic supplies This in turn increases soil fertility and plant health The direct effect of livestock possession was low and the indirect effect was mainly through trainings attended

The impact of chemical pesticides on human health and environment has driven the farmers towards organic cultivation The knowledge level of such farmers regarding organic cultivation will be high indicating that environmental orientation had low direct effect on knowledge of banana growers The indirect effect was channeled through trainings attended

4.7.6. Effects of selected characteristics on attitude

Table 27 Direct (diagonals)and indirect effects(off diagonals) of characteristics contributing on the attitude of organic banana growers

	X_5	X_6	X_8	Y
X_5	**0.1172**	0 1876	0 0810	0 386**
X_6	0 0666	**0.3304**	0 0819	0 479**

X_8	0 0627	0 1787	**0.1515**	0 393**

Residual = 0 7369

X_5 Livestock possession

X_6 Trainings attended

X_8 Environmental orientation

Y Attitude of organic banana growers

The results of path analysis as shown in the table 25, Indicates that out of nine variables livestock possession, trainings attended and environmental orientation had positive direct significance on the attitude of organic banana growers

Detailed perusal of the table shows that maximum direct effect was attributed by trainings attended followed by environmental orientation and livestock possession in the decreasing order of significance

However the direct effect of independent variables indicates that the rate of effect of trainings attended (0 3304) was high whereas livestock possession (0 1172) and environmental orientation (0 1515) was low

The residual effect of path analysis here is 0 736 which was slightly high indicating that the attitude of organic banana growers was not much explained by the selected characteristics But among the selected factors trainings attended and environmental orientation are the vital variables observed from the results of path analysis

Majority of the banana farmers are prompt and regular in attending trainings with regards to organic farming These trainings programmes thus helped in inculcating a favourable attitude towards organic farming among the banana

growers This justifies the high direct effect of trainings attended on the attitude of organic banana growers

Farmers having livestock components tend to develop a favourable attitude towards organic farming due to the easy and timely availability of on-farm inputs This substantiates the low direct effect livestock possession and the indirect effects were routed through trainings attended and environmental orientation

The people of Kasaragod district are well aware of the ill effect of indiscriminate use agrochemicals better than any others The apprehension regarding the safety of chemical pesticides has contributed to the low direct effect and the indirect effect of environmental orientation was through trainings attended and livestock possession

4.7.7. Effects of selected characteristics on the adoption

Table 28 Direct (diagonals) and indirect effects (off diagonals) of the independent variables contributing on the adoption of organic farming technologies by banana growers

	X_4	X_5	X_6	X_8	Y
X_4	**0.3150**	0 0407	0 0245	0 0073	0 373**
X_5	0 0327	**0.3920**	0 0675	-0 0264	0 466**
X_6	0 0645	0 2215	**0.1196**	-0 0267	0 379**
X_8	0 0469	0 2097	0 0647	**-0.0494**	0 272**

Residual = 0 667874

X_4 Area under organic farming

X_5 Livestock possession

X_6 Trainings attended

X_8 Environmental orientation

Y Adoption of organic farming technologies by banana growers

The results of path analysis as given in the table 26, indicates that out of nine variables area under organic farming, livestock possession, trainings attended had positive direct significance and environmental orientation had negative direct significance on the adoption of organic banana growers

Detailed perusal of the table shows that maximum direct effect was attributed by livestock possession followed by area under organic farming, trainings attended and environmental orientation in the decreasing order of significance

However the direct effect of independent variables indicates that the rate of scale was high for livestock possession (0 3920) and area under organic farming (0 3150) Whereas low for trainings attended (0 1196) and environmental orientation (-0 04943) was negligible

Here the residual effect of path analysis was 0 667, which was slightly high indicating that the adoption of organic farming technologies by banana growers was partially explained by the selected variables But among selected characteristics, area under organic farming and livestock possession are the vital variables evidenced by the path analysis

Banana is an annual herb which requires continuous supply of nutrients and water for obtaining a profitable yield When it comes to organic cultivation, this high nutrition requirement of banana could be satisfied only by the incorporation of large quantities of farm yard manure which is available in plenty in the farm having livestock as a component It is seen that organic farmers indulged in integrated farming system with livestock as a major component inclined more to adoption of organic farming This might be the reason that livestock possession had high direct effect on adoption of organic farming technologies by the banana growers

Majority of the banana growers had 25 cents to 1 acre of organic banana growing area Farmers cultivating in medium land area are more likely to adopt

organic farming practices in banana cultivation This may be the reason that Area under organic farming high direct effect on adoption of organic farming technologies in banana

Direct effect of trainings attended was low and the indirect effects was mainly channeled through livestock possession The direct effect of environmental orientation was negatively significant and the indirect of environmental orientation was mainly channeled through livestock possession and was moderate

4 8 ROLE OF KERALA AGRICULTURAL UNIVERSITY IN PROMOTING ORGANIC FARMING

The education, research and extension activity of Kerala Agricultural University for the promotion of organic farming in the state is inevitable The research works carried out by the different research stations of KAU have helped to develop and standardize different organic farming technologies The Adhoc package of practices recommendations for organic farming, of KAU aims to provide necessary guidelines to the practitioners and potential followers of organic farming

Giving a big fillip to the organic farming in the state university has signed a MoU with the Fertilizers and Chemicals Travancore Ltd (FACT) for the marketing of microbial inoculants and bio fertilizers Bio pesticides such as *Pseudomonas fluorescence* and *Trichoderma* and bio fertilizers including PGPR mix I and II and composting inoculants from KAU production centers will be marketed through FACT outlets as KAU FACT brand

Periodic bulletins from Pesticide Residue Research and Analytical Lab informing the residual level in vegetables acted as a catalyst in the boosting up of organic farming in the state

Kerala Agricultural University has two institutes at Kasaragod district viz, College of Agriculture, Padanakkad and Regional Agricultural Research Station, Peelicode

Though production and supply are not the mandate of the university, with the aim of promoting organic agriculture KAU is producing various organic / biological inputs such as different types of composts, vermicompost, vermiwash, worms for vermicomposting Bio control agents like Arbuscular Mycorrhizal Fungi, Trichoderma, Fluorescent pseudomonas, PGPR mix II Bio fertilizers like Rhizobium (Bradyrhizobium and Azorhizobium), Azotobacter, Azospirillum, Blue green algae (BGA), Azolla, Phosphate solubilising bacteria and fungi, Vesicular/Arbuscular Mycorrhiza (VAM/AMF), PGPR mix I

KAU is also providing technological assistance / consultancy for under taking organic farming through its various centers like ATIC, communication centers, various colleges, Krishi Vigyan Kendras and also the special programme called 'Santhwanam' Technical support is also provided online through its Centre for E Learning The Centre for E Learning of KAU is also under taking online course on organic agricultural management, specifically meant for empowering farming and the general public on principles and practices of organic farming The KAU is also demonstrating various organic practices and technologies to the farmers through its seven Krishi Vigyan Kendras and other centre's

The scientists of KAU are also under taking research projects on organic farming and its related areas to generate appropriate technologies, for the purpose the University has established separate project coordination under the Directorate of Research In addition a Lead centre for Organic Farming has also been established for the promotion of organic farming

4 9 CONSTRAINTS PERCEIVED BY THE FARMERS IN THE ADOPTION OF ORGANIC FARMING PRACTICES

The causes for non adoption is operationalized as the factors or bottlenecks, which impedes the farmers from adopting organic farming technologies The Constraints perceived by the farmers in the adoption of organic farming technologies were presented in the Table 29

Table 29. Constraints perceived by the farmers in the adoption of organic farming practices.

Sl. No.	Constraints perceived by the farmers	Banana growers		Vegetable growers	
		Score	Rank	Score	Rank
1	Lack of premium price for organic products	172	I	165	I
2	Difficulty in selling of the produce	170	II	163	II
3	High prevalence of pest and diseases	150	III	138	III
4	Non availability of quality planting materials	148	IV	80	VIII
5	Non availability of quality organic inputs	138	V	110	VI
6	High cost of organic inputs	136	VI	118	V
7	High labour charge	130	VII	63	XI
8	Natural calamities	126	VIII	70	X
9	Lack of crop insurance facilities	122	IX	60	XIII
10	Yield reduction in the initial years	120	X	72	IX
11	Low effectiveness of organic plant protection measures	116	XI	92	VII
12	Lack of knowledge and awareness about organic farming	108	XII	120	IV
13	Lack of extension activities	71	XIII	61	XII

Spearman's rank correlation was done to identify and test the strength of relationship between the constraints faced by vegetable and banana growers It was found significant at 1 per cent level

It was observed from the table 27, that lack of premium price for organic products ranked first in the constraints faced by the vegetable and banana growers As part of the schemes eco shops are to be established in each panchayath so as to facilitate marketing of the organic produce of the farmers

directly to the consumers It is also assumed that 10-15% increase in the price of these produce will be received as premium price Out of the four panchayath selected under the study only two of the panchayath could use this facility Accessibility to eco shops is a problem for majority of the farmers since there is lack of transportation facilities Only a marginal difference is seen among price of the produce of the farmers of clusters and that of the produce coming from outside the district

There is no mechanism to distinguish between organic and non organic products Hence it was noticed that the second important constraint faced by the vegetable and banana growers were difficulty in selling the produce Majority of the farmers sell their produce to nearby retail shops In the initial years, appearance and size of organic products will be less compared to non organic products which will act as a limiting factor for the less preference by retailers and consumers This problem can be solved to an extend by implementing a mechanism which proves the traceability of the produce, i e, provide a labeling system which helps in distinguishing the products of different farmers

With regard to vegetable cultivation half of the organic vegetable growers were cultivating in less than 25 cents of land Since the production under small area was low, retail shops might not procure and the farmers would have sold directly to consumers

High prevalence of pest and disease were ranked as the third important constraint faced by the vegetable and banana growers Biocontrol, botanicals and other physical and mechanical control measures are the major plant protection methods employed in organic cultivation The field efficacy of these plant protection chemicals are far less compared to the control using chemicals A large majority of the farmers are oblivious about the use and effectiveness of organic plant protection measures Despite Kasaragod was declared as the first organic district in Kerala, the government failed to suggest efficient alternatives concerning plant protection Cluster farmers were not homogenous and the area was not contiguous hence farmers using chemicals in their field was seen within the cluster area Farmer's complaint that the insect pests that are escaped from the

conventional farms migrate into these organic farms which are lying in close proximity causing reduction in the yield

Non availability of quality planting materials was ranked as the fourth most important constraint by banana growers whereas, vegetable growers ranked the same as eighth constraint Non availability of quality suckers from known source was one of the limiting factors in organic banana cultivation Farmers depend on other states for procuring suckers which acted as the source of inoculum of various pest and diseases Moreover these suckers were produced by conventional means without following the standards of organic cultivation Tissue culture plantlets supplied through the Krishibhavan as Nendran variety did not show the typical varietal characteristics which also resulted in heavy loss in income to the farmers This clearly indicates that farmers should be provided with quality planting materials from the known source

In the case of vegetable farmers, non availability of quality planting materials was a constraint This is because enough quantity of seed materials could not be directly supplied to these farmers' from the research institutes Hence farmers rely on the local/traditional varieties which give modcrate production with organic inputs in comparison with the new varieties from the research stations

Quality inputs are available from the research stations which are away from farmers farms The quality of the bio inputs from the private agencies was not strictly monitored by the government Hence farmers are reluctant to buy these products knowingly However if the products are supplied through the government agencies farmers don't have any options except to accept it A viable option to maintain quality inputs is either to have an input production center such as composting, vermicomposting etc at individual farmer level or at cluster level

Among other constraints, high cost of inputs was ranked sixth by banana growers and fifth by the vegetable growers Even though organic inputs are cheap on per kilo basis, their requirement in large quantities make them unprofitable to small scale farmers when compared to chemical inputs which is needed only in small quantities

Majority of banana farmers possess 26 cents to one acre of land which demands more number of human labour to fulfill the necessary cultural operations Due to the scarcity and high labour cost, the farmers had ranked it as seventh constraint in banana production While the vegetable growers had ranked it as the eleventh constraint since vegetable cultivation was taken up mostly using family labour in a small land holding

Crop loss due to natural calamities was ranked eighth in banana and tenth in vegetable cultivation The undulating topography and large stretches of hilly tracts make Kasaragod prone to heavy wind accompanied by rain Banana being a succulent herb tend to break easily due to the rainstorm causing sever crop loss

Cost of cultivation of crop such as banana is comparatively high Crop loss due to external factors and natural calamities put the farmers in a difficult position especially when it is not insured Hence lack of adequate crop insurance was ranked ninth by banana growers

The other constraints experienced by the banana growers were yield reduction in the initial years, lower effectiveness of organic plant protection measures, lack of knowledge and awareness about organic farming, lack of extension activities

In case of vegetables, yield reduction in initial years, natural calamities, high labour charge, lack of extension activities, lack of crop insurance facilities were the other constraints faced by the farmers

4 10 CONSTRAINTS PERCEIVED BY THE EXTENSION FUNCTIONARIES IN THE IMPLEMENTATION OF THE ORGANIC FARMING PROGRAMMES

The Constraints perceived by the extension functionaries in the implementation of the organic farming programmes were presented in the Table 30

Lack of premium price and marketing facilities was the prior constraint perceived by the extension functionaries The farmers does not receive desired price for their products and few number of marketing institutions are operating for

organic products in the district This might retards the adoption of organic farming technologies among farmers

Table 30. Constraints perceived by the extension functionaries

Sl. No.	Constraints	Constraints	Score
1	Lack of premium price and marketing facilities	28	I
2	Lack of sufficient funds	27	II
3	Inadequate and untimely supply of quality inputs	26	III
4	Yield reduction in the initial years	23	IV
5	High cost of inputs	23	V
6	Extensive prevalence of pest and diseases	23	VI
7	Additional duties	23	VII
8	Lack of proper organic certification agencies at government level	23	VIII
9	Lack of transportation facilities	20	IX
10	Lack of uniformity in the implementation of the schemes	21	X
11	Lack of quality control mechanism for Organic manures	21	XI
12	Lack of awareness and knowledge about organic farming	16	XII
13	Lack of communication support	14	XIII
14	Lack of technical support	12	XIV
15	Lack of labour	12	XV

In case of organic farming, the financial support provided is insufficient Even though Government had implemented many policies for the promotion of organic farming in Kasaragod district the insufficiency of fund slacken the growth of organic farming in the district High cost and bulkiness of the organic inputs, conducting extension activities such as trainings, exposure visits, and demonstration plots etc requires a strong financial back up This may be the reason that lack of sufficient funds was mentioned as the second important constraint by the extension officials

Krishibhavans take a lead role directly or indirectly in the supply of inputs for the farmers Inadequate and untimely supply of organic inputs to Krishibhavan is a major concern among the extension workers Unlike chemical inputs, quality standards of the organic inputs is uncertain This was ranked as the third important constraint by the extension officers

Yield reduction in the initial years is ranked as the fourth constraint Sudden transformation from conventional farming to organic farming results in drastic yield reduction in the initial tenure resulting in the low income from the farms No financial support was provided for the farmers who are likely to convert or in the conversion period Combination of yield reduction and less income from the farm delay the adoption

Often the extension workers in one Krishibhavan have to take charges of the other Krishibhavans due to the shortage of agricultural officers and other supporting staffs In addition to this, they are also a part of different committees which makes their work cumbersome

Organic certification is a tool for farmer as well as for consumers to distinguish the product from non-organic products Through the certification farmers can sell for premium price and consumers can access quality products Now we are following third party certification in which the cost of certification is very high and this certification is mainly done for export purpose Because of this reason small and marginal farmers were unable to do To solve this problem,

location specific organic certification agencies at government level is needed for making a frame work of standards of production

The consumers of the organic products are inhabitants of urban areas On the contradictory, organic production is mainly concentrated in rural areas Thus lack of proper transportation facilities for the conveyance of fresh organic products to urban areas hinders the marketing of the produce

Orgamc farming schemes are implemented mostly in a fragmented manner restricting the reach of the schemes among the beneficiaries So it is necessary to have integrated as well as need based approach for the robust growth of organic farming

Unlike chemical inputs most of the organic inputs does not possess quality standards and moreover, branded products are fewer This inadequacy in quality control mechanism for organic inputs contributes to the production of substandard products

For conversion of a conventional field to organic, first step is to replenish the fertility status of the soil Crop residue, animal dung, bone meal, slaughter house waste, blood meal and green manures are important organic sources As compared to chemical inputs organic inputs are required in bulk quantities making it costly

The other constraints reported by the extension functionaries were extensive prevalence of pest and diseases, lack of awareness and knowledge about organic farming, lack of communication and technical support as well as lack of labour

Summary

5. SUMMARY

Government declared Kasaragod as the first organic district With support from KAU the state department of agriculture drafted a road map for implementing organic farming in a phased manner It is a pilot project to be completed in 2016 and role model inventiveness for other districts to follow and make Kerala state completely organic in the near future It is against this backdrop that the present study has been taken up in Kasaragod district In this regard the study entitled **"Adoption of organic farming technologies in banana and vegetable crops in Kasaragod district"** was taken up with the major objectives as follows

1 To assess the level of adoption of organic farming technologies

2. To study the attitude of farmers towards organic farming programme

3 Examine the constraints in the adoption of organic farming technologies as perceived by the farmers

4. Examine the constraints perceived by the extension functionaries in the implementation of organic farming programmes

5 To analyse the sustainability of cluster based approach of organic farming

6. To analyse the role of KAU in promoting organic farming

Kasaragod district was purposefully selected for the study From this four panchayaths were identified having maximum area under organic vegetable and banana cultivation Out of that 30 farmers were selected from each panchayth 60 farmers selected for vegetable cultivation and 60 for banana cultivation Thus a total of 120 respondents were selected for the study This study was conducted and carried out with well structured pre-tested interview schedule and ex-post facto research design employed with appropriate statistical analysis

Salient findings of the study are presented below -

AWARENESS ABOUT SELECTED ORGANIC FARMING PRACTICES AND PROGRAMMES

1 Sixty seven per cent of the vegetable growers had medium level of awareness about organic farming technologies Almost an equal percent of farmers fell in the low (18%) and high (15%) category
2 Majority (75%) of the banana growers had medium level of awareness Exactly 17% had low awareness whereas only eight per cent had high level of awareness regarding organic farming

KNOWLEDGE OF VEGETABLE AND BANANA GROWERS ABOUT ORGANIC FARMING PRACTICES

3 Majority of the vegetable growers (70%) had medium and 17% of the growers had low level of knowledge about organic vegetable cultivation respectively
4 Majority (73 %) of the respondents had medium level of knowledge about organic banana cultivation About 17 % had high level of knowledge

ATTITUDE OF VEGETABLE AND BANANA GROWERS TOWARDS ORGANIC FARMING

5 Majority of the vegetable growers (72%) and banana growers (65 %) had favourable attitude towards organic farming practices

ADOPTION OF ORGANIC FARMING PRACTICES BY BANANA AND VEGETABLE GROWERS

6 Majority (80%) of the vegetable growers had medium level of adoption Whereas 12 % had high level of adoption and only 8% had low level of adoption of organic farming practices

7 Adoption of organic farming practices in banana cultivation 72 per cent of the respondents had medium level of adoption followed by high (15 %) level and low (13 %) level of adoption

SUSTAINABILITY OF CLUSTER BASED APPROACH IN PROMOTING ORGANIC FARMING

8 92 per cent of the vegetable growers suggested high sustainability of clusters Only 8 per cent of the respondents had suggested low level of sustainability of the organic vegetable clusters

9 In organic banana clusters, 60 per cent of the respondents suggest high level of sustainability of the cluster, while 40 per cent of the cluster members suggest low sustainability

PROFILE CHARACTERISTICS OF THE ORGANIC FARMERS

10 More than fifty per cent of the farmers belonged to middle aged category 37 and 30% belonged to old age category in vegetable and banana crops respectively

11 All farmers under this study were literate

12 It is seen that 48% of the vegetable farmers and 52% of the banana growers had high school level education and another 47% and 33% had primary school education respectively

13 Ninety five per cent of farmers had experience in organic farming 42 % of the vegetable growers and 47% of banana growers had less than 3 years of experience in organic farming However, 32 % in vegetable farmers and 40 % in banana farmers were having more than 5 years of experience in organic farming practices

14 More than half (52 %) of the respondents having less than 0 1 Ha of organic vegetable cultivating area and 43 per cent of the respondents were having area up to 0 1 to 0 4 Ha

15 Majority (67 %) of the banana farmers had 0 1 to 0 4 Ha area Further 18 per cent of the banana farmers had more than 0 4 Ha area under organic banana cultivation

16 Forty five per cent of the vegetable growers had high livestock components and 13 % of the respondents had low livestock component It is interesting to note that 42 per cent had no livestock component, at all

17 In banana cultivation, more than half (55 %) of the respondents were having high livestock component While 17 per cent of the farmers were found to have low livestock possession Here 28 per cent of the farmers did not possess livestock component

18 Three by fourth (76%) of the vegetable farmers had regularly attended trainings on organic vegetable production While, 7 per cent had attended the trainings occasionally Among the vegetable farmers 17 per cent had not attended any training on organic farming

19 With regard to banana cultivation, half of the respondents (50%) had regularly attended trainings, while 18 per cent of the farmers had attended trainings occasionally Here 32 per cent for the respondents never attended any training on organic farming

20 Majority (82%) of the organic vegetable growers had low market perception with respect to organic products While high market perception was observed in 18 % of the farmers

21 Among orgamc banana growers, 87 per cent belonged to low category, whereas 13 per cent belonged to high category with respect to market perception

22 Majority of the vegetable farmers (75%) had high environmental orientation, whereas one fourth (25%) of the farmers had low environmental orientation

23 Fifty five per cent of the farmers had high environmental orientation and 45 per cent had low environmental orientation with regard to organic banana cultivation

24 Majority (68%) of the organic vegetable farmers had medium level of information seeking behaviour in organic vegetable cultivation followed by low 19 per cent

25 In case of organic banana farmers 70 per cent belonged to the medium category, 17 per cent belonged to the low category with respect to information seeking behaviour

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Appendices

APPENDIX -I

KERALA AGRICULTURAL UNIVERSITY

College of Agriculture, Vellayani, Thiruvananthapuram 695 522

DEPARTMENT OF AGRICULTURAL EXTENSION

From,

Dr A K Sherief

Professor and Director

Center for E- learning

Sir / Madam

Sub MSc Research project – judges opinion requested – regarding

One of my MSc Students Mr AkshaySasidharan (2013-11-167) has taken up his research work entitled "Adoption of organic farming technologies in banana and vegetable crops in Kasaragode district" for his MSc (Ag) programme

The objective is to assess the extent of adoption and constraints in the adoption of organic farming technologies by banana and vegetable farmers The study is also aimed to analyse the sustainability of cluster based approach of organic farming, constraints perceived by the extension functionaries and the role of KAU in promoting of organic farming in Kasaragode

As you may be aware all may not be equal contributors of organic farming practices For this purpose the student has listed a number of organic farming practices in banana cultivation So the list of practices are to be rated in a three point continuum such as most important, important and least important

Considering your vast experience and professional expertise in banana cultivation I consider that you, Sir/ Madam will be most appropriate judge to give the opinion about organic farming practices I request you to kindly spare some of your valuable time for examining the questionnaire critically Kindly return the list duly filled at the earliest

Thanking you

Yours sincerely,

(A K Sherief)

Please put a tick mark in the appropriate column against each practice keeping in view the possible contribution of each practice towards organic farming practices in banana

Sl No	Organic farming practices	Most important	Important	Least Important
1	Summer ploughing			
2	*In situ* incorporation of crop residues			
3	Raising green manure and incorporation			
4	Season			
5	Selection of good quality suckers			
6	Hot water treatment of suckers			
7	Rhizome dip in cow dung slurry and ash and shade dry			
8	Use of tissue culture plants			
9	Resistant / tolerant variety			
10	Sucker treatment with bio fertilizers			
11	Correct depth of planting			
12	Application of PGPR mix			
13	Application of panchagavya			
14	*In situ* vermicomposting of banana leaves and bunch stalk			
15	Application of FYM			
16	Application of green leaf manure			
17	Application of vermicompost / compost			
18	Application of poultry manure			
19	Application of oil cakes			
20	Application of bio fertilizers in soil			
21	Application of bordeaux mixture			
22	Timely irrigation			
23	Irrigation at critical stages			
24	Desuckering			
25	Trap cropping			
26	Crop rotation			
27	Intercropping system			
28	Mulching			
29	Hand / mechanical weeding			
30	Monitoring of pest and diseases			
31	Collection and destruction of pests (egg, larvae, pupae) and disease affected plants			
32	Use of split pseudostem			
33	Swab mud slurry around the pseudostem			
34	Use of entomopathogenic nematode(EPN)			
35	Use of pheromone traps			
36	Introduction of bio control agents			

37	Use of botanical pesticides			
38	Ash / cow dung slurry spray			
39	Conservation of natural enemies			
40	Leaf axil filling of beauveria or neem cake			
41	Any other practices please specify			

Please put a tick mark in the appropriate column against each practice keeping in view the possible contribution of each practice towards organic farming practices in vegetable cultivation

Sl No	Organic farming practices	Most important	Important	Least Important
1	Summer ploughing			
2	*In situ* incorporation of crop residues			
3	Raising green manure and incorporation			
4	Season			
5	Selection of good seeds			
6	Resistant / tolerant variety			
7	Use of optimum seed rate			
8	Seed treatment with bio fertilizers			
9	Correct depth of sowing / planting			
10	Application of FYM			
11	Application of green leaf manure			
12	Application of vermicompost / compost			
13	Application of poultry manure			
14	Application of oil cakes			
15	Application of cow urine based formulations			
16	Application of bio fertilizers in soil			
17	Timely irrigation			
18	Irrigation at critical stages			
19	Trap cropping			
20	Crop rotation			
21	Intercropping system			
22	Mulching			
23	Hand / mechanical weeding			
24	Monitoring of pest and diseases			
25	Collection and destruction of pests (egg, larvae, pupae) and disease affected plants			
26	Use of light traps			
27	Yellow sticky trap			
28	Introduction of bio control agents			
29	Use of botanical pesticides			
30	Ash / cow dung slurry spray			
31	Conservation of natural enemies			
32	Any other practices please specify			

APPENDIX-II

KERALA AGRICULTURAL UNIVERSITY

College of Agriculture, Vellayam, Thiruvananthapuram 695 522

DEPARTMENT OF AGRICULTURAL EXTENSION

From,

Dr A K Sherief
Professor and Director
Center for E- learning

To,

The Director of Research
Kerala Agricultural University

Sir,

Sub MSc Research project – information on organic farming research studies– regarding

Mr AkshaySasidharan (2013-11-167) has taken up his research work entitled " Adoption of organic farming technologies in banana and vegetable crops in Kasaragode district " for his MSc (Ag) programme

The objective is to assess the extent of adoption and constraints in the adoption of orgamc farming technologies by banana and vegetable farmers The study is also aimed to document the result of research and extension studies undertake by KAU scientists in promoting of organic farming for the last five years in Kerala This is one of the first attempt to document the contributions of our scientists in promoting organic farming in the state

Hence I request you to kindly provide relevant data/reports related to this work for the above purpose

Thanking you

Yours sincerely,

Place Vellanikkara
Date 10/07/2015

(A K Sherief)

APPENDIX III

KERALA AGRICULTURAL UNIVERSITY

College of Agriculture, Vellayani, Thiruvananthapuram 695 522

DEPARTMENT OF AGRICULTURAL EXTENSION

From,

Prof (Dr) A K Sherief
Director,
Center for E- learning

To,

Sir / Madam

Sub MSc Research project – judges opinion requested – regarding

Mr AkshaySasidharan , currently pursuing his masters degree in Extension has taken up his research work entitled **"Adoption of organic farming technologies in banana and vegetable crops in Kasaragode district"** for under my guidance and supervision

The objective of this study is to study the extent of adoption of organic farming technologies by banana and vegetable farmers and the constraints faced by them The study is also aimed to examine the sustainability of cluster based approach of organic farming, constraints perceived by the extension functionaries and the role of KAU in promoting of organic farming in Kasaragode

As you may be all aware that, there are some constraints in implementing the technologies to promote organic farming in vegetable and banana cultivation in Kasaragod Considering your vast experience and professional expertise I consider that you will be most appropriate to point out these constraints

So , I request to kindly spare some of your valuable time for this Kindly return the form duly filled at the earliest

Thanking you

Yours sincerely,

(A K Sherief)

Constraints perceived by the Extension functionaries to promote organic farming in vegetable and banana cultivation in Kasaragod

(Please spare sometime to complete the following and express your response frankly The information thus collected will be used for the study purpose only)

Name
Designation
Email address
Mobile number
Name of panchayth
Block

A) About cluster groups

1 Total number of farmers/ farm families in the panchayath

2 Number of clusters formed under the KB

3 Average no of farmers in a cluster

4 How many clusters are functioning effectively

5 What type of support extended for implementing the scheme

a) Supply of inputs

b) Marketing of produce

c) Extension support- Training/demonstration

6 Does the clusters have formal meeting with officials of KB, if so how often and what time

B) What type of constraints you experience in implementing the programme in your area

Some of the constraints are given below which may be rated by putting a tick (√) However you are free to mention any other constraints which you consider important

Sl No	Constraints	Most important	Important	Least important
1	Lack of sufficient funds			
2	Lack of technical support			

3	Non availability of quality inputs			
4	Yield loss in the initial years			
5	Extensive prevalence of pest and diseases			
7	Lack of awareness and knowledge about organic farming practices			
8	High cost of inputs			
9	Lack of marketing facilities			
10	Additional duties			
11	Lack of transportation facilities			
12	Lack of communication support			
13	Any others, please specify			

C) Suggestions to overcome the constraints

1
2
3
4
5

APPENDIX -IV
INTERVIEW SCHEDULE FOR BANANA FARMERS
ADOPTION OF ORGANIC FARMING PRACTICES IN BANANA AND VEGETABLE CROPS IN KASARAGODE DISTRICT

Date
Block
Panchayath
Ward
Respondents No

1 Name and phone no
2 Address
3 Age in completed years
4 Educational status

Sl No	Category	Response
1	Illiterate	
2	Primary school	
3	High school	
4	Higher secondary school	
5	College education	

6 Experience in organic farming

Sl No	Experience	Score
1	< 1 year	
2	1-<3 years	
3	3-5 years	
4	Above 5 years	

7 Area under banana cultivation

Category	Banana	Area

Area owned		
Leased in		
Leased out		
Total		

8 Livestock possession

Category	**No:**	**Value (Rs)**
Buffalo		
Bullock		
Cow		
Calf		
Goat		
Poultry		
Others please specify		

9 Trainings attended

Sl No	Number of trainings	Duration of trainings
1		
2		
3		

10 Market perception

Statement	**Response**			
Do you think the farmer will be able to sell vegetables at higher price/demand if he adopts organic farming practices?	Yes		No	
Do you find it difficult to sell the produce in the local market?	Very difficult	Difficult	Easy	Very easy
How much price the organic produce will fetch compared to those produced under conventional methods?	Low	Same		High

11 Environmental orientation

Sl No	Statement	Agree	Disagree
1	Indiscriminate use of pesticides causes environmental hazards		
2	Man is exploiting the earth too much		
3	Man has to be greatly concerned about environmental issues like soil pollution, air pollution, water pollution etc		
4	There is truth in what environmental activist claim and we should lend our support to them		

5	The present trend is to reduce the use of chemical control measures Now do you agree that older method of farming were more safer than the present ones		
6	Agricultural produce obtained without use of chemicals are more tastier and healthier		
7	Agro chemicals can be used during emergency situations		
8	Recommended dose of agro chemicals in correct quantity shall be used		

12 Information seeking behavior

Sl. No.	Source	Frequently (3)	Occasionally (2)	Rarely (1)
1	Radio			
2	Television			
3	Newspaper			
4	Magazines			
5	Agrl Literatures			
6	KIOSKs			
7	Mobile Phone			
8	E - extension			
9	Krishibhavan			
10	Fellow growers			
11	Any other			

13 Attitude towards organic farming

Sl No	Statement	Agree	Undecided	Disagree
1	Organic farming sustains soil health over a period of time			
2	It is worthful to adopt organic farming			

	practices even by suffering the initial losses			
3	Following organic farming practice alone is not a feasible approach in the present age			
4	Traditional farming approach are more economic than the organic farming approach			
5	Adoption of organic farming practices is practically not feasible			
6	One need not bother about undesirable consequences when chemicals are used in banana cultivation			
7	It is possible to get good yield by adopting organic farming practices			
8	It is not profitable to adopt organic farming practices in banana cultivation			
9	Organic farming practice should be practiced by all farmers			
10	Cultivation of organic banana has brought a new light in the field of agriculture			
11	Adoption of organic farming practice is highly risky and hence it is not advisable to follow the same			
12	It is better to give more importance to other occupation than following organic farming practices			
13	Use of organic farming practices is essential for better quality of bananas			
14	It is not correct to support organic farming practices			
15	It is possible to solve our environmental problems through organic farming			
16	Organic farming practices have no advantages over conventional farming			

14 Sustainability of cluster based approach in promoting organic farming is based on

Sl No	Statement	Always	Sometimes	Never
1	Getting right information at right time			

2	Members are trust worthy			
3	Decisions are made after consulting the group members			
4	Cluster members sharing their knowledge			
5	Responsibilities are shared by the cluster members			
6	Problems related to farming can be solved with the help of clusters members			
7	Actively participating in training programmes			
8	Actively participate in exposure visits			
9	Cluster helps in market oriented production process			
10	Are the committee members(president, secretary) selected by the members			
11	Committee members are the leading farmers of the group			
12	Do they having good contact with the officials and farmers			
13	Do they exhibit bias or differences among the members			
14	Do the committee members functions for a fixed period			
15	Do the cluster members have the power to change the committee members			

i How long the cluster have been working
ii Functions of the cluster
iii Achievements of the cluster
iv Suggestions to improve the performance of the cluster

15 Knowledge about organic farming practices in banana cultivation

1 Hot water (50°C) treatment of rhizome for 20 mins is to prevent ---------- infestation in banana
2 Leaf axil filling with ---------is used to control pseudostem weevil in banana
3 In banana cultivation quantity of vermicompost required for basal application is ----- kg
4 ----------can be used as green manure crops in banana

5 In banana cultivation quantity of neem cake / ground cake required for basal application is ----- kg

6 Compost made from banana leaves and stalk are rich source of

i Nitrogen

ii Phosphorous

iii Potassium

7 Application of crushed neem seed / neem cake 1 kg in the pit at the time of planting helps to control ----------

8 Name some varieties suitable for intercropping in coconut gardens

9 Distance to keep between conventional farming and organic farm?

i 15 m

ii 20 m

iii 25 m

iv 30 m

10 How many years it will take to convert conventional farm to organic farm?

11 ----------can be applied for neutralizing the acidic soils in organic farming

12 *Trichoderma* can be enriched with ---------- and ----------

16 Adoption of organic farming practices in banana

Sl No	Banana practices	Adopt	Partially adopt	Non adopt
1	In situ incorporation of crop residues			
2	Application of green leaf manure			
3	Selection of good quality suckers			
4	Suckers dip in cow dung slurry and ash and shade dry			
5	Resistant / tolerant variety			
6	Sucker treatment with bio fertilizers			
7	Application of FYM			
8	Application of vermicompost / compost			
9	Timely irrigation			
10	Desuckering			
11	Raising green manure and incorporation			
12	Crop rotation			
13	Weeding			

14	Monitoring of pest and diseases			
15	Collection and destruction of pests (egg, larvae, pupae) and disease affected plants			
16	Introduction of bio control agents			
17	Use of botanical pesticides			
18	Leaf axil filling of *Beauveria* or neem cake for the control of pseudostem weevil			

17 Awareness about organic farming programs and practices

Sl No	Statement	Aware	Unaware
1	Kasaragode district is declared as the first organic district in Kerala		
2	Red and yellow labeled plant protection chemicals were banned		
3	Different schemes and subsides of the Department of Agriculture		
4	Bio control agents and its applications (*Pseudomonas Bevaria, Verticelliumetc)*		
5	Botanical pesticides (neem based products)		
6	Eco shops are functioning for the marketing of the produce		
7	Animal husbandry is an important component in organic farming		
8	Leaf axial filling with *Bevaria*or neem cake is an important management practice for the control of pseudostem weevil		
9	Nanma and Menma products which are extracted from the tapioca leaves for the control of pseudostem weevil		
10	Certification of organic products		
11	Mulching the basin with paddy straw improve the bunch yield		
12	Conservation of natural enemies is one of the important practice in organic farming		
13	Different types of composting methods		

14	PGPR mix I and II		
15	Compost can be made from banana leaves and stalks		

18 What are the motives behind your shifting towards or continuing organic farming?

a) Government policies
b) Interest in organic farming

19 Whether the farm is certified?

a) Yes b) no

20 Which certification?

21 To whom do you sell your organic goods?

a) Directly to local consumers
b) Through the clusters (govt aided/ not)
c) Local retailers
d) Eco-shops
e) Exporters

22 Constraints perceived by farmers

Sl No	Constraints	Ranking	Most important	Important	Least important
1	Lack of premium price for organic products				
2	Difficulty in selling of the produce				
3	High prevalence of pest and diseases				
4	Non availability of quality planting materials				
5	Non availability of quality organic inputs				
6	High cost of organic inputs				
7	High labour charge				
8	Natural calamities				

9	Lack of crop insurance facilities				
10	Yield reduction in the initial years				
11	Low effectiveness of organic plant protection measures				
12	Lack of knowledge and awareness about organic farming				
13	Lack of extension activities				

APPENDIX -V

INTERVIEW SCHEDULE FOR VEGETABLE GROWERS

ADOPTION OF ORGANIC FARMING PRACTICES IN BANANA AND VEGETABLE CROPS IN KASARAGODE DISTRICT

Date
Block
Panchayath
Ward
Respondents No

5 Name and phone no

6 Address

7 Age in completed years

8 Educational status

Sl No	Category	Response
23	Illiterate	
24	Primary school	
25	High school	
26	Higher secondary school	
5	College education	

27 Experience in organic farming

Sl No	Experience	Score
1	< 1 year	
2	1 <3 years	
3	3-5 years	

4	Above 5 years	

28 Area under vegetable cultivation

Category	vegetable	Area
Area owned		
Leased in		
Leased out		
Total		

29 Livestock possession

Category	**No:**	**Value (Rs)**
Buffalo		
Bullock		
Cow		
Calf		
Goat		
Poultry		
Others please specify		

30 Trainings attended

Sl No	Number of trainings	Duration of trainings
1		

2		
3		
4		

31 Market perception

Statement	**Response**			
Do you think the farmer will be able to sell vegetables at higher price/demand if he adopts organic farming practices?	Yes		No	
Do you find it difficult to sell the produce in the local market?	Very difficult	Difficult	Easy	Very easy
How much price the organic produce will fetch compared to those produced under conventional methods?	Low	Same		High

32 Environmental orientation

Sl No	Statement	Agree	Disagree
1	Indiscriminate use of pesticides causes environmental hazards		
2	Man is exploiting the earth too much		
3	Man has to be greatly concerned about environmental issues like soil pollution, air pollution water pollution etc		

4	There is truth in what environmental activist claim and we should lend our support to them		
5	The present trend is to reduce the use of chemical control measures Now do you agree that older method of farming were more safer than the present ones		
6	Agricultural produce obtained without use of chemicals are more tastier and healthier		
7	Agro chemicals can be used during emergency situations		
8	Recommended dose of agro chemicals in correct quantity shall be used		

33 Information seeking behavior

Sl No	Sources	Frequently	Occasionally	Rarely
1	Radio			
2	Television			
3	Newspaper			
4	Magazines			
5	Agrl Literatures			
6	KIOSKs			
7	Mobile Phone			
8	E - extension			
9	KrishiBhavan			
10	Fellow growers			

11	Any other			

34 Attitude towards organic farming

Sl No	Statement	Agree	Undecided	Disagree
1	Organic farming sustains soil health over a period of time			
2	It is worthful to adopt organic farming practices even by suffering the initial losses			
3	Following organic farming practice alone is not a feasible approach in the present age			
4	Traditional farming approach are more economic than the organic farming approach			
5	Adoption of organic farming practices is practically not feasible			
6	One need not bother about undesirable consequences when chemicals are used in vegetable cultivation			
7	It is possible to get good yield by adopting organic farming practices			
8	It is not profitable to adopt organic farming practices in vegetable cultivation			
9	Organic farming practice should be practiced by all farmers			
10	Cultivation of organic vegetables has brought a new light in the field of agriculture			
11	Adoption of organic farming practice is highly risky and hence it is not advisable to follow the same			
12	It is better to give more importance to other occupation than following organic farming practices			

13	Use of organic farming practices is essential for better quality of vegetables			
14	It is not correct to support organic farming practices			
15	It is possible to solve our environmental problems through organic farming			
16	Organic farming practices have no advantages over conventional farming			

35 Sustainability of cluster based approach in promoting organic farming is based on

Sl No	Statement	Always	Sometimes	Never
1	Getting right information at right time			
2	Members are trust worthy			
3	Decisions are made after consulting the group members			
4	Cluster memberssharing their knowledge			
5	Responsibilities are shared by the cluster members			
6	Problems related to farming can be solved with the help of clusters members			
7	Actively participating in training programmes			
8	Actively participate in exposure visits			
9	Cluster helps in market oriented production process			
10	Are the committee members(president secretary) selected by the members			
11	Committee members are the leading farmers of the group			
12	Do they having good contact with the officials and farmers			
13	Do they exhibit bias or differences among the members			
14	Do the committee members functions for a fixed period			

15	Do the cluster members have the power to change the committee members			

36 Knowledge about organic farming in vegetable cultivation

1 Which contains highest amount of nitrogen?

i Farmyard manure

ii Poultry manure

iii Groundnut cake

2 Name one trap to control fruit fly?

3 How many years it will take to convert conventional farm to organic farm?

4 Distance to keep between conventional farming and organic farm?

v 15 m

vi 20 m

vii 25 m

viii 30 m

5 ----------can be applied for neutralizing the acidic soils in organic farming

6 Yellow sticky trap is used to control?

7 *Trichoderma* can be enriched with ---------- and ----------

8 ---------- can be used as a trap crop in okra plants to control root knot nematode

9 Dipel / Halt can be used to control ---------- in amaranth

10 Cows urine should be diluted to --------- times before apply in vegetables

11 Bhindi leaf roller can be controlled by the application of ---------- bio control agent

12 Vegetable seeds are treated with --------- bio control agents before planting

37 Adoption of organic farming practices in vegetables

Sl No	Vegetable practices	Adopt	Partially adopt	Non adopt
1	Summer ploughing			
2	In situ incorporation of crop residues			
3	Raising green manure and incorporation			
4	Resistant / tolerant variety			
5	Seed treatment/ seedling dip with bio control agents			
6	Application of FYM			
7	Application of panchagavya			
8	Application of green leaf manure			
9	Application of vermicompost / compost			
10	Application of poultry manure			
11	Application of cow urine based formulations			
12	Application of bio fertilizers in soil			
13	Irrigation at critical stages			
14	Crop rotation			
15	Mulching			

16	Weeding			
17	Monitoring of pest and diseases			
18	Collection and destruction of pests (egg larvae pupae) and disease affected plants			
19	Use of light traps			
20	Use of fruitfly trap			
21	Use of pheromone traps			
22	Use of botanical pesticides			
23	Conservation of natural enemies			

38 Awareness about different organic farming practices and schemes

Sl No	Statement	Aware	Unaware
1	Kasaragode district is declared as the first organic district in Kerala		
2	Red and yellow labeled plant protection chemicals were banned		
3	Different schemes and subsides of the Department of Agriculture		
4	Bio control agents and its applications (*Pseudomonas Bevaria Verticellumetc)*		
5	Botanical pesticides (neem based products)		
6	Eco shops are functioning for the marketing of the produce		
7	Animal husbandry is an important component in organic farming		
8	Fruit flies can be effectively control using pheromone trap		
9	Soil solarisation is an effective method for preventing soil borne pests and diseases		
10	Certification of organic products		

11	PGPR mix I and II		
12	Preparation of panchagavya		
13	Preparation of fish amino acid		
14	Conservation of natural enemies is one of the important practice in organic farming		
15	Different types of composting methods		

39 What are the motives behind your shifting towards or continuing organic farming?

c) Government policies

d) Interest in organic farming

40 Whether the farm is certified?

b) Yes b) no

41 Which certification?

42 To whom do you sell your organic goods?

f) Directly to local consumers

g) Through the clusters (govt aided/ not)

h) Local retailers

i) Eco-shops

j) Exporters

43 Constraints perceived by farmers

Sl No	Constraints	Ranking	Most important	Important	Least important
1	Lack of premium price for organic products				
2	Difficulty in selling of the produce				

3	High prevalence of pest and diseases				
4	Non availability of quality planting materials				
5	Non availability of quality organic inputs				
6	High cost of organic inputs				
7	High labour charge				
8	Natural calamities				
9	Lack of crop insurance facilities				
10	Yield reduction in the initial years				
11	Low effectiveness of organic plant protection measures				
12	Lack of knowledge and awareness about organic farming				
13	Lack of extension activities				

Abstract

ADOPTION OF ORGANIC FARMING TECHNOLOGIES IN BANANA AND VEGETABLE CROPS IN KASARAGOD DISTRICT

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Abstract of the thesis

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ABSTRACT

The study entitled 'Adoption of organic farming technologies in banana and vegetable crops in Kasaragod district' conducted in Kasaragod district covered 120 respondents with 30 from each Panchayath having maximum area under banana and vegetable crops under organic farming Objective is to assess the extent of adoption and constraints in the adoption of organic farming technologies by banana and vegetable farmers, analyse the sustainability of cluster based approach of organic farming, constraints perceived by the extension functionaries and the role of KAU in promoting of organic farming in Kasaragod

Nine independent variables viz , age, education, experience in organic farming, area under organic farming, livestock possession, trainings attended, market perception, environmental orientation and information seeking behaviour were selected through judges rating Dependent variables were awareness, knowledge, attitude and adoption

The result of study revealed that majority of the respondents had medium level of awareness (67%) and (75%), knowledge (70%) and (73%), attitude (72%) and (65%), and adoption (80%) and (72%) in vegetable and banana crops respectively

Results of path analysis of organic vegetable cultivation revealed that educational status, livestock possession, trainings attended, information seeking behaviour had direct effect on awareness

Knowledge of organic vegetable farmers were directly influenced by educational status, trainings attended, market perception and environmental orientation

Educational status, area under organic farming, livestock possession, market perception, and information seeking behaviour had direct effect on the adoption of organic farming technologies by vegetable growers

Livestock possession, trainings attended and environmental orientation had direct effect on all the dependent variables of organic banana cultivation In addition to that information seeking behaviour had direct effect on awareness

Experience in organic farming and information seeking behaviour had direct effect on the knowledge Area under organic farming had direct effect on adoption

Major constraints perceived by the extension functionaries were lack of marketing facilities, lack of sufficient funds, non availability of quality inputs, high cost of inputs, yield loss in the initial years,

Organic farming programme is implemented through a system of the farmer cluster formed under each Krishi bhavan of the panchayat The programme is well received and the result indicated that 92 % of the vegetable growers and 60 % of the banana growers had responded high sustainability of this system

Major constraints perceived by the farmers were lack of premium price for organic products, difficulty in selling the produce, high prevalence of pest and diseases, non-availability of quality planting materials, non availability of organic inputs, high labour charge, and high cost of organic inputs

Kerala Agricultural University plays a vital role in the promotion of organic farming in the state, like publishing an adhoc POP for organic farming, tied-up with FACT for marketing of microbial inoculant and bio fertilizers, production and supply of organic inputs, on-learning programme for organic farming and initiating research and extension works on organic farming Periodic bulletins from Pesticide Residue Research and Analytical Lab informing the residual level in vegetables acted as a catalyst in the boosting up of organic farming in the state