

**MULTIDIMENSIONAL ANALYSIS OF FARMERS OF
INTEGRATED FARMING SYSTEMS IN KUTTANAD**

by

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(2015-11-064)

THESIS

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2017

DECLARATION

I, hereby declare that this thesis entitled “**MULTIDIMENSIONAL ANALYSIS OF FARMERS OF INTEGRATED FARMING SYSTEMS IN KUTTANAD**” 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 “**MULTIDIMENSIONAL ANALYSIS OF FARMERS OF INTEGRATED FARMING SYSTEMS IN KUTTANAD**” is a record of research work done independently by Ms. Mamatha G Nair under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associate ship to her.

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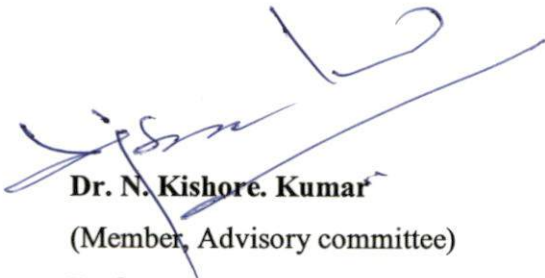
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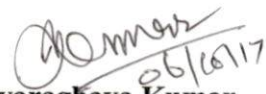
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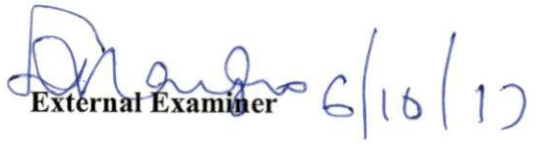
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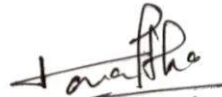
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CONTENTS

Sl. No.	CHAPTER	Page No.
1	INTRODUCTION	
2	REVIEW OF LITERATURE	
3	METHODOLOGY	
4	RESULTS & DISCUSSION	
6	SUMMARY	
7	REFERENCES	
	ABSTRACT	
	APPENDICES	

LIST OF APPENDICES

Sl no.	Appendix	Page No.
1.	Interview schedule for the study	

LIST OF ABBREVIATIONS

CARDI	Caribbean Agricultural and Research and Development Institute
CSRC	Cropping System Research Centre
FAO	Food and Agriculture Organization
GOI	Government of India
IFS	Integrated Farming Systems
IIFSR	Indian Institute of Farming System Research
NREGA	National Rural Employment Guarantee Act

LIST OF TABLES

Table No.	Title of the table	Page No.
1(a)	Distribution of farmers based on their perception regarding the feasibility of IFS.	
1 (b)	Comparison of perception regarding feasibility of IFS of marginal and small farmers	
2 (a)	Distribution of farmers based on their perception regarding the utility of IFS	
2 (b)	Comparison of perception regarding utility of IFS of marginal and small farmers.	
3	Distribution of farmers according to their age	
4	Distribution of farmers according to their educational status	
5	Distribution of farmers based on their family size	
6 (a)	Distribution of marginal farmers according to their economic motivation	
6 (b)	Distribution of small farmers according to their economic motivation	
6 (c)	Comparison of economic motivation of small and marginal farmers	
7 (a)	Distribution of respondents according to their level of aspiration	
7 (b)	Comparison of level of aspiration of small and marginal farmers.	
8	Distribution of farmers according to their self confidence	
9 (a)	Distribution of marginal farmers according to their input availability	

LIST OF TABLE CONTINUES.....

Table No.	Title of Tables	Page No.
9 (b)	Distribution of small farmers according to their input availability	
10	Distribution of farmers based on their experience in integrated farming	
11(a)	Major products produced from the farming systems of Kuttanad	
11 (b)	Distribution of farmers according to their product diversification	
11(c)	Comparison of product diversification of small and marginal farmers	
12	Distribution of farmers with respect to their resource recycling practice.	
13	Distribution of the farmers based on their entrepreneurial behaviour	
14(a)	Distribution of marginal farmers based on their orientation towards competition	
14(b)	Distribution of small farmers based on their orientation towards competition	
14(c)	Comparison of competition orientation of small and marginal farmers	
15(a)	Distribution of marginal farmers based on their risk taking ability	
15 (b)	Distribution of small farmers based on their risk taking ability	
16 (a)	Distribution of marginal farmers according to their achievement motivation	
16 (b)	Distribution of small farmers according to their achievement motivation	
16 (c)	Comparison of achievement motivation of small and marginal farmers	
17(a)	Distribution of marginal farmers according to their mass media contact	
17 (b)	Distribution of small farmers according to their mass media contact	
18 (a)	Correlation between perception regarding the feasibility of IFS of the farmers to the independent variables.	

LIST OF TABLE CONTINUES....

Table No.	Title of Tables	Page No.
18 (b)	Correlation between perception regarding the utility of IFS of the farmers to the independent variables.	
19 (a)	Involvement of family members of marginal farmers in the harvesting of crops	
19(b)	Involvement of family members of small farmers in the harvesting of crops.	
20(a)	Involvement of family members of marginal farmers in the marketing of produce	
20 (b)	Involvement of family members of small farmers in the marketing of produce.	
21 (a)	Involvement of family members of marginal farmers in the purchase of animals	
21 (b)	Involvement of family members of small farmers in the purchase of animals	
22 (a)	Involvement of family members of marginal farmers in care and management of animals	
22 (b)	Involvement of family members of small farmers in care and management of animals	
23 (a)	Employment pattern in rice fields of Kuttanad	
23 (b)	Seasonal details of rice cultivation from different panchayats of Kuttanad.	
23 (c)	Employment availability of other components included in rice based farming systems	
24(a)	Employment pattern of coconut plantations of the three panchayats	
24 (b)	Employment availability of other components included in coconut based farming systems	
25 (a)	Employment pattern of banana cultivations of Kuttanad	

LIST OF TABLES CONTINUES....

Table No.	Title of tables	Page No.
25 (b)	Seasonal details of banana cultivation in Kuttanad	
25(c)	Employment availability of other components included in banana based farming systems	
26 (a)	Employment pattern of vegetable cultivations of Kuttanad	
26 (b)	Seasonal details of vegetable cultivation of different panchayats of Kuttanad.	
26(c)	Employment availability of other components included in vegetable based farming systems	
27	Distribution of farmers according to their subsidiary occupation.	
28	Distribution of marginal farmers who practice subsidiary occupation based on different occupation practiced.	
29	Distribution of different farming systems in the selected panchayats	
30	Details of integrated farming system components inventorised from Kuttanad	
31	Details of important farming systems of Kuttanad	
32	Distribution of animal components among farmers	
33	Constraints perceived by the farmers of IFS Kuttanad	

LIST OF FIGURES

Figure No.	Title	Page No.
1	Percentage distribution of farmers based on their perception regarding the feasibility of IFS	
2	Percentage distribution of farmers based on their perception regarding the utility of IFS	
3	Percentage distribution of the respondents based on their age	
4	Percentage distribution of respondents based on their economic motivation.	
5	Percentage distribution of farmers based on their level of aspiration	
6	Percentage distribution of respondents based on their self confidence	
7	Percentage distribution of respondents based on their input availability	
8	Experience of the farmers	
9	Percentage distribution of farmers based on their entrepreneurial behaviour of farmers.	
10	Percentage distribution of farmers based on their risk taking ability.	
11	Percentage distribution of farmers based on their mass media contact.	
12	Distribution of marginal farmers with and without subsidiary occupation	
13	Distribution of marginal farmers based on their subsidiary occupations	
14	Major farming systems of Kuttanad	
15	Distribution of different farming systems in the three selected panchayats	
16	Distribution of animal components among farmers	

LIST OF PLATES

Plate no.	Title	Page No.
1	Demonstration unit on IFS of Kuttanad at KVK Kottayam	
2	Fish cultivation practiced in Kuttanad	
3	Demonstration of the integration of duckery and fisheries along with biogas components.	
4	Rice based farming system of Kuttanad	
5	Banana based farming system of Kuttanad	
6	Coconut based farming system of Kuttanad	

LIST OF APPENDICES

Sl no.	Appendix	Page No.
1.	Interview schedule for the study	

Introduction

1. INTRODUCTION

Agriculture is demographically the broadest economic sector that plays a significant role in the overall socio-economic fabric of India. However the unchecked population growth, industrialization and fragmentation of farm holdings are forcing the country's agriculture to experience new opportunities and challenges. Intensive agriculture coupled with non judicious use of farm inputs like chemical fertilizers and pesticides have developed stress on natural resources along with physical and chemical degradation of the agricultural land in several parts of the country, leading to poor yield in terms of quality and quantity of the produce. So in order to be competitive we have to achieve improvement in productivity, input use efficiency, reduction in cost of production and creation of gainful employment for rural mass along with the tackling of soil and other input related problems.

According to the recent studies, India and China holds 70 per cent of the world's small farms (IIFSR, 2015). China and India accounts for about 286 million of small farms out of the 404 million small farms in the world and of which India accounts for 92 million farms. Nearly 70 per cent of these farms in India are marginal farms with operational holding size less than 1 ha.

The average land holding size of Kerala is about 0.13 ha (Census 2011). The state is having a rapid urbanization rate. According to the 2011 census 47.7 per cent, which is nearly 50 per cent of the population in Kerala are urban residents which was 25.9 per cent a decade ago. In order to provide quality life in terms of food and fabrics to relatively richer population in urban areas, nutritionally rich and safe food should be available in the domestic markets.

An integrated farming system with available resources accessible to farmers ensures high standard of food production with minimum environmental impact even in highly vulnerable climate. It has revolutionized conventional farming of livestock, aquaculture, poultry, horticulture, agro- industry and allied sector. IFS is a reliable way of obtaining high productivity with substantial nutrient economy in combination with maximum compatibility and replenishment of organic matter by way of effective recycling of organic residues/wastes etc. obtained through the integration of various land-based enterprises.

Kuttanad is the deltaic formation of four river systems namely, Pamba, Meenachil, Manimala, and Achankovil. The region is 1-2.5m below MSL and it is situated in three districts of Kerala namely Kottayam, Alapuzha and Pathanamthitta (Chattopadhyay and Sidharthan, 1985). The Kuttanad region extends to an area of 5600 ha. Kuttanad is one among the two major rice production centres in Kerala the other being Palakkad. Hence rice based farming system is the major farming systems that is found in the Kuttanad region. However in some localities of the Kuttanad area we can also find oilseed based cropping system, tuber crop based cropping system, livestock based cropping system etc.

As mentioned above, rice is the major crop of Kuttanad. Earlier rice was cultivated in the fields of Kuttanad region as a sole crop. But the returns from this crop was comparatively less and also the rice fields of Kuttanad remained under utilized, and were kept fallow for more than 6 months which caused major infestation of weeds that in turn resulted in high land preparation costs to the farmers. As per the studies carried out by Padmakumar (1993) the average returns from a Kuttanad rice field was less than Rs 25000/ acre.

The recent researches have included the integration of many other components into the Kuttanad fields. These are coconut palms, banana, yams and some vegetables along the bund with fish, duck and buffaloes in the field, thus giving rise to the new Kumarakom model. According to Sasidharan and Mathew (2014) one acre paddy field can hold 20000 fish fingerlings, 300 broiler ducks, 1-2 buffaloes, 20 coconut palms on bunds, 40 banana plants, 20-40 yams or cassava and single line fodder of 80m length.

The integration of these components however provided complementary effects of field on land preparation, weeding, manuring and plant protection. According to the result of studies conducted by Sasidharan (2012) the integration of these components decreased the cost of production of rice by 17.6 percent along with a 50 percent increase in the yield. He also reported that the multi level integration increased the returns to 3-4 times. Apart from the economic benefits integration also has ecological benefits like, reduction in the use of agricultural chemicals, improvement in soil conditions, recycling of agricultural wastes and perceptible improvement in soil biological characters. The

cost of production of rice per quintal in Kuttanad was reduced through IFS with fish accompanied to mono cropping of rice by 34 per cent (Shanat, 2001).

1.1 NEED FOR THE STUDY:

In the present scenario where scientist were struggling to meet the food needs of growing population both qualitatively and quantitatively, a scientific and systemic study is a need to understand the perception of the small and marginal farmers about the feasibility and utility of integrated farming systems as this farming system approach is a self sufficient system to meet the demand of the growing population. The location specific study on the farmer's perception regarding IFS along with the listing of allied enterprises and their major problems helps to draw effective suggestions to modify the existing major farming systems.

1.2 SCOPE OF THE STUDY:

The study was a humble effort to understand the farmer's perception regarding the feasibility and utility of IFS along with the identification of different farming systems and its components. Major constrains faced by the farmers were also identified through the study. Hence it can serve as a short inventory of the major farming systems in Kuttanad which can further help the development planners and policy makers to carry out effective interventions.

Objectives

Study the perception of farmers about the feasibility, utility and constraints of integrated farming systems in Kuttanad. Seasonal employment pattern, employment profile and involvement of family members were also assessed and components of integrated farming systems were inventorised.

1.3 LIMITATIONS OF THE STUDY

The study is having limitations of the factors like time and money as it is carried out as a part of the requirement for the PG.Programme. The study was conducted only in three panchayats which can narrow down the scope of generalisation of results for the entire Kuttanad region. Every effort was taken to conduct the study in a systematic manner however it can have effects of individual biases and prejudices.

1.4 PRESENTATION OF THE STUDY

Detailed report of the study is presented in five chapters. Chapter one is the introduction that deals with the need scope and limitations of the study. Chapter two, review of literature covers the published literature related to the present study. The third chapter deals with the methodology through which the study is carried out. The fourth chapter deals with the result and its discussions in detail and the fifth and last chapter is the summary of the study with suggestions for future research. The references, appendices and abstract of the thesis are provided at the end.

Review of Literature

2. REVIEW OF LITERATURE

Review of literature is the scholarly articles which provide knowledge about the known facts and ideas about the area of the study. The collected review about the study is presented below in the following titles.

2.1 Integrated farming systems

2.2 Perception regarding the feasibility and utility of integrated farming systems

2.2.1 Perception of the respondents

2.2.2 Feasibility of Integrated farming systems.

2.2.3 Utility of Integrated farming systems.

2.3. Seasonal employment pattern and employment profile

2.4. Involvement of the family members

2.5. Components of Integrated farming systems.

2.6. Profile

2.7 Constraints perceived by the respondents.

2.1 Integrated farming systems.

According to Okigbo (1995) integrated farming system is a mixed farming system that includes at least two different but interdependent components of a crop and livestock enterprises.

Jayanthi *et.al*, (2000) reported integrated farming system as a mixed animal crop system where agricultural wastes are used to raise animal components at the same time animal wastes are used as fuel and fertilizer to cultivate crops.

According to FAO (2001) integrated farming system is a system where plant and animal component interact to create a synergy with the recycling and maximum use of available resources.

Agbonlabor *et.al*,(2003) defined Integrated farming as a method of mixed farming where the combination of crop and livestock are utilized in supplementary or complementary manner.

Jayanthi (2006) identified IFS as a component of farming system research which modifies existing farming techniques for maximization of production and optimal use of resources.

According to Tipraqsa (2006) degree of integration of resources available in a farming system marks the basic difference between integrated farming and commercial farming.

Integrated farming system is an integrated group of components and practices that farmers perform in their fields in a sustainable basis under their resources to improve the productivity and net farm income, Singh and Ratan (2009).

Panke *et.al*, (2010) reported that the integration of different components in the farming system should be made in such a manner that the output of one of the enterprise should be input to other enterprises.

Bahire *et al.* (2010) defined IFS as a practice of raising different yet dependent enterprises that are supplementary and complementary to each other.

2.2 Perception of the farmers regarding the feasibility and utility of Integrated farming systems.

2.2.1 Perception of the respondents.

Young (1957) reported that perception is an activity which depends on past experience where people sense, interpret and appreciate objects both physically and socially.

Bonner (1966) reported that orderly arrangement of physical objectives and events which is also modified by memory, imagination, needs, opinion and expectation of others forms the basis of perception.

Jaiswal and Roy (1968) stated that the adoptions of certain agricultural methods by the farmers are mainly influenced by the perception of the six characteristics like profitability, cost, physical compatibility, communicability and complexity.

Rajan (1979) reported that the important role in attitude formation, perception and their effect on the adoption of new technology is played by social structure and farm family.

Brady (1981), in a study on developing and transferring technology to small scale farmers sited the significant influence of social benefits on perception.

Harwood (1981) reported the significance of low requirements on perception in a study on agronomic and economic consideration of technology acceptance for small scale farming.

Latha (1990) found out that the correlation between perception and educational status is highly positive and significant.

Babu (1995) reported medium level perception among majority (72.22%) of the homestead farmers about the appropriateness of farming systems.

2.2.2. Feasibility of integrated farming systems.

The word feasible according to Advanced Learner's Dictionary (1988) means

- (a) capable of being done.
- (b) that can be done.

Rangaswamy *et al.*, (1996) reported that rice- fish- poultry- mushroom integration over a period of five years increases the net income from the farm along with the available employment days when compared to the conventional rice cultivation.

Singh *et al.*, (1997) reported that integrated farming is more profitable than arable farming alone in various size of land holdings.

Radhamani *et al.*, (2003) reported that the integrated farming positively influence the economic viability of a farm.

Behra *et al.*, (2004) reported that considering the wide shrinkage of land holdings, the integration of land based enterprises with respect to the bio physical and socio economic environment of the farmer will be more profitable.

Sasidharan *et al.*, (2012) stated that the economic returns from a rice field that is following integrated farming in Pokkali region can be improved through temporal integration of prawns rather than spatial integration.

Sasidharan and Mathew (2014) reported that a minimum of 5000 fishes, 750 broiler ducks and 3-5 buffaloes can be accommodated in one hectare of paddy folder in Kuttanad.

2.2.3. Utility of integrated farming systems.

According to Light foot (1990), reported that efficiently managed integrated farming systems have many benefits derived from synergism among enterprises, diversity in produce and environmental soundness.

Itna *et al.*,(1999) reported that the appropriate integration of two or more enterprises like crop, dairy, apiculture, piggery, poultry, pisciculture etc based on the resource availability in the farm will help in sustainable production hence satisfying the farmers necessities.

Geetha *et al.*,(2003) reported that increase in income generation, employment days dietary nutrition and awareness of new technologies was due the scientific interventions made in homesteads.

According to Tiprasqa *et al.*, (2007) integrated farming systems have many advantages that includes increased productivity, capital savings, family labour employment and income generation.

2.3. Seasonal employment pattern and employment profile

According to Fisher *et al.* (1997) nonfarm employment is important to marginal, small and landless farmers as they are not able to derive sufficient income from agriculture. He also states the importance of subsidiary occupation among the above mentioned category at the time of agricultural distress.

Coppard (2001) stated the importance of nonfarm employment among both marginal and small farmers in order to eradicate rural poverty.

Barrette (2001) reported seasonality in employment opportunities as one of the major cause for income diversification in rural agricultural sectors.

Bhaskar *et al.* (2007) found out that the major income of farm households are contributed by Kharif season crops while Rabi crops has only a small contribution. He even identified that the marginal farmers of Chhattisgarh only cultivated paddy crop with an increasing trend in farm size during Rabi season.

2.4. Involvement of family members.

According to Jayanthi *et al.* (2003) integrated farming system improves the involvement of family labour throughout the year along with the provision of a supplementary income to the farmers.

Pandey (2003) reported on an average the presence of 1.81 male and 1.57 female members of rural farm households as active labour force.

Toulmin and Gayye (2003) reported family labour as an important resource of family farms.

According to Poulton (2010) family labour which is a critical resource of family farms offers a competitive advantage.

Ye and Wu (2008) reported the increasing involvement of women, children and elderly people in farming as a result of severe labour migration.

Jacob et al. (2014) while studying the role of women in decision making in integrated farming systems noticed that the female members of the farm family were actively involved in decisions regarding sowing of crops, purchase and sale of farm animals and purchase and sale of milch animals.

2.5. Components of Integrated farming system.

Chawla *et al.*, (2004) identified bovines, cattle or buffaloes along with desi fowls as the components in the family backyard of small and marginal farmers. He also identified the rearing of ducks in coastal and backwater areas and reported sheep as a rare component in mixed farming.

Thamizoli *et al.*, (2006) found that risk from disasters like drought and flood can be managed with the introduction of tree crops and enterprises like dairy, goat rearing, apiculture etc.

Mohanti *et al.*, (2010) reported that the integrated farming systems in Gajpati district of Orissa consists of field crops like rice, groundnut, maize, pigeon, pea and ragi along with horticultural crops (Yam, banana, tapioca and vegetables), vermin composting unit and poultry (Vanaraj breed).

Thripathi and Rathi (2011) identified crop, dairy, goatry, vegetables and other horticultural crops as the important components of integrated farming system models of Uttarkhand.

Manivannan (2011) identified dairy and goatry as the major animal components of integrated farming systems in Erode districts of Tamil Nadu.

According to vision 2020 (2011), integrated farming system is a diversified or coordinated system for the production of fish. Fish is the main component here, in order to reduce the application of synthetic fertilizers, maximize the utilisation of land and water through recycling of wastes and also to maintain a balanced ecosystem.

Vision 2030(2011) reported the integration of agro forestry, pisciculture and animal husbandry along with mono cropping to enhance farm income and livelihood security of farmers with proper resource utilization.

2.6. Profile

2.6.1. Age

Prasad (2002) found out majority (60.71%) of the paddy farmers to be in the middle age group followed by young age (35.71%) and old age (3.58%).

According to Thomas (2002) majority of the Kuttanadan rice farmers are of middle aged (56.4%) followed by old aged (26%) and then young aged.

Prakash et al, (2003) reported the majority (53%) of the paddy growers to be in the middle age group followed by young age (23%) and old age (19.20%).

Rajanna (2003) identified majority of the dairy farmers (43%) to be below 25 years, followed by farmers between age group 26-40 years (33.40%) and above 41 years (23.30%).

Obaiah (2004) reported that more than half of the rice growers (52.14%) were middle aged followed by young age (26.43%) and old aged (21.43%).

Kumaran (2008) found out majority of the farmers in Palakkad district (59%) in the old age category followed by middle age (38%) and young age (3%).

Nirmala (2012) reported that, out of the SRI paddy cultivators whom she surveyed majority belonged to middle aged group (57.5%) followed by young age (32.5%) and old age (10%) group.

Dewi (2012) reported that an ICM-FFS farmer is with an average age of 46 years while a non ICM-FFS farmer is with an average age of 43 years.

2.6.2. Educational status.

Prasad (2002) categorized 45.12 percent of rice farmers under primary level followed by middle school (18.07%), high school (13.50%), illiterate (12.50%), and college level education (10.71%).

Thomas (2002) reported 96.43% of literacy rate among farmers of Ramankari village of Kuttanad Taluk in Kerala.

Reddy (2003) identified majority of the paddy cultivators (51.33%) to have medium level education followed by low (30.00%) and high level education (18.67%).

According to Nattarajan (2004) 34.44 per cent of rice cultivators are having middle school education followed by high school education (29.89%), higher secondary (18.89%), and primary school level (16.67%). Only a minority of 1.11 per cent were found to be illiterate.

Nataraju (2012) identified majority of the dairy farmer women (35%) to have high school education followed by middle school education (30%), college and above education (14.47%) illiterate (6.67%) and primary school education (5%) respectively.

2.6.3. Family size.

Mansingh (1980) identified nuclear family system having maximum of five members predominant among two by third of the rural women agricultural labourers.

Sagar (1989) reported positively significant relation between family size and adoption of improve agricultural practices.

Reddy (1991) reported that family size non significantly correlated to the adoption of improved agricultural practices.

Shailaja et al, (1997) reported the majority of respondents(63.78%) to have nuclear family and the remaining to have joint family.

Alauiddin et al. (1998) reported the presence of small families having up to five members among majority (78%) of the respondents.

Nath (2002) reported the total number of family members to be four to five for majority (76%) of the respondents.

Nataraju (2012) reported that majority of the dairy farmer women(51.67%) are having medium family size followed by small (33.33%) and big families(15%) .

2.6.4. Economic motivation

Sivapasad (1997) identified economic motivation as an important factor that motivates farmers to adopt improved agricultural practices to ensure sustainable returns from farms.

Israel (2003) observed majority of the farmers were having high level economic motivation (40.42%) followed by medium (31.25%) and low level (28.33%) economic motivation respectively.

Kumar (2004) observed medium economic motivation among majority (62%) of the respondents followed by low (23.33%) and high (14.67%) economic motivation.

Natarajan (2004) found out that majority of the rice farmers (42.22%) were having medium level economic motivation followed by high (31.11%) and low (26.64%) economic motivation respectively.

Aghazia (2008) reported that majority of the onion farmers (49.63%) were having high economic orientation followed by low (32.50%) and medium (15.83%) economic motivation respectively among the remaining respondents.

Kumar (2013) reported high level of economic motivation among majority of the respondents (45%) followed by medium (37.5%) and low (17.5%) level of economic motivation.

2.6.5. Level of aspiration

Muthayya (1971) identified one's personal and socio-economic attributes as the factors that contributed to one's level of aspiration which in turn improved the adoption of a new idea.

Sushama (1979) observed a positively significant relationship between level of aspiration of tribes and knowledge about modern living practices.

Neelaveni et al. (2002) reported medium level of aspiration among 75 per cent of respondents.

Anitha (2004) reported high level of aspiration among 30.80 per cent of respondents while 33.4 per cent and 35.8 per cent of the respondents were having medium and low level of aspiration respectively.

Krishnamurthy (2006) reported significant relationship between the knowledge level and level of aspiration of the respondents.

2.6.6. Self confidence

According to Prasad (1983) self confidence of both small and large farmers in Kerala, Tamil Nadu and Karnataka were associated with achievement motivation.

Sharma (1988) reported significant association of entrepreneurial self confidence with his development and performance.

Muthayya and Loganathan (1990) identified self confidence along with locus of control and self actualisation were the characters that were high among entrepreneurs.

Singh (1992) observed high level of self confidence among most of the entrepreneurs.

Jayalekshmi (1996) identified self confidence as an important factor that contribute to the entrepreneurial behaviour of untrained rural women.

According to Lalitha (1999) three categories of rural women had medium level of self confidence.

Neelima and Swaroop (2000) identified self confidence as an important aspect of entrepreneurial behaviour.

2.6.7. Input availability

Veerendranath (2000) categorized 56.67 per cent of respondents under low input availability and 43.33 per cent of them under high input availability.

Vasanth (2002) reported that majority (49.95%) of the cotton farmers were having medium level input availability followed by low (34.28%) and high (16.67%) level input availability.

According to Narayanaswamy (2005) dairy manure is the main source of organic manure among majority (89%) of the farmers followed by sericulture waste (74%), sheep goat waste (41%) and poultry wastes (40%).

Parvender et al. (2006) reported that 94.11 per cent of the farmers are using decomposed cattle dung and waste material as a source of organic manure whereas 2.94 per cent of the farmers use either poultry waste or crop residues.

Gangadhar (2009) reported high level (46.66%) agricultural input acquisition among majority of the farmers followed by medium (39.16%) and low (14.16%) acquisition pattern.

Nirmala (2012) identified that 40.83% of the rice cultivators were having medium level input availability while the remaining respondents had low (25%), high (18.03%), very low (11.67%) and very high input availability (4.17%) respectively.

2.6.8. Farming experience

Reddy (2003) identified 71 per cent of paddy growers with medium level farming experience followed by high (19%) and low (9.4%) level respectively.

Ahire and Thorat (2007) reported more than ten years of experience for majority (40%) of the paddy farmers followed by 5 to 10 years (34.17%) and less than 5 years of experience (25.83%) among farmers respectively.

Kiran and Shenoy observed medium level experience among majority (61%) of the SRI paddy farmers followed by low farming experience (39%). High farming experience was not observed by them in the case of SRI paddy farmers.

Thiyagu (2011) reported medium level farming experience among 46.70 per cent of SRI paddy farmers followed by 30.80 per cent and 22.50 per cent of farmers with low and high level of farming experience respectively.

Nirmala (2012) identified 52.50% of SRI paddy farmers with medium experience followed by farmers with low (30%) and high (17.50%) farming experience respectively.

2.6.9. Product diversification

Roy (1991) reported that the multipurpose trees and shrubs in homesteads food, fuel, wood, timber, foliage, manure and fertilizer.

Johnson (1995) reported that other than agronomic and economic benefits the diversification of farms are also having social benefits.

According to CARDI (2010) product diversification is a major advantage of Integrated farming systems.

2.6.10. Resource recycling

FAO (1997) defined waste as a misplaced resource in IFS which later has a potential to become a valuable resource.

According to FAO (1999) integration of crop and livestock results in the effective recycling of nutrients in the farm as manure itself has the potential to act as an effective fertilizer with 8 kg of nitrogen, 4 kg of phosphorus and 16 kg of potassium to the tonne.

Fakoya (2002) reported the feeding of livestock on crop residues and other products that would otherwise be a problem to waste disposal as one of the key advantage of crop- livestock integration.

Gill et al. (2010) suggested integrated farming system as an effective method to obtain high productivity with maximum compatibility and organic matter replenishment through effective recycling of organic wastes and residues obtained from various land based enterprises.

2.6.11. Entrepreneurial behaviour

According to Nandapurkar (1982) entrepreneurial behaviour is combination of various components like farm decision making, innovativeness, risk taking ability, achievement motivation, information seeking, knowledge of farming, assistance of management services, co- ordination of farm activities, cosmopolitaness and leadership ability.

Narayanaswamy (1996) described entrepreneurial behaviour as doing already done things in new way rather than doing new things.

Patil et al. (1999) reported medium level entrepreneurial behaviour among majority of the respondents (63%) which was followed by high (21%) and low (16%) level entrepreneurial behaviour respectively.

Rao and De (2003) reported that 60 per cent of the respondents are having medium level entrepreneurial behaviour which is followed by low (23%) and high (16%) respectively.

Anitha (2004) identified medium level entrepreneurial behaviour among majority (47.50%) of the farm women which was followed by high (28.30%) and low (24.20%) level of entrepreneurial behaviour.

Patel et al. (2003) reported a significantly positive relationship between entrepreneurial behaviour and extension participation.

Sowmya (2009) reported a non significant relationship between entrepreneurial behaviour and cosmopolitaness.

2.6.12. Orientation towards competition

Rao and Mehta (1978) identified competition and collaboration as prime factors that influence entrepreneurship.

Naik et al. (1990) identified the significant association of competition orientation and entrepreneurial behaviour.

Singh (1992) reported medium level competition spirit among majority of the respondents.

According to Jayalekshmi (1996) competitive orientation contributed around 12 to 15 per cent of entrepreneurial behaviour of trained rural women and this was one of the important factors that are responsible for improving their economic performance.

Kalio and Kola (1999) identified profitable production along with continuous follow ups and constant development of skills as the important factors that help the farmers to gain competitive advantage.

2.6.13. Risk taking ability

Jaleel (1992) reported a positively significant relationship between risk orientation and extent of adoption.

According to Vijayakumar (2001) his study identified 38 per cent of farmers with low risk taking ability followed by 35 per cent and 26.66 per cent of the farmers with medium and high risk taking ability respectively.

Subramanyam (2002) reported that majority of the trained farmers (75%) had medium risk preference followed by high (13.34%) and low (11.66%) levels of risk preference.

According to Bhagyalaxmi et al. (2003) 75.56 per cent had medium risk orientation followed by low (15.56%) and high (13.33%) risk orientation categories.

Suresh (2004) reported that 24.58 per cent of the respondents selected from Chittoor district of Andrapradesh were having medium level of risk taking ability while

13.36 per cent and 62.06 per cent of them were having low and high risk taking ability respectively.

Preethi (2011) reported medium risk taking ability among majority (62.92%) of the respondents.

2.6.14. Achievement motivation

Naik (1988) reported that the extend of adoption of selected recommended practices in paddy is having significant association with achievement motivation.

Narayana Swamy (1988) operationalised achievement motivation as the tendency to do things with best efforts within a time limit without the expectation of results.

— .Gowda (1989) reported a positive association between achievement motivation and perception of respondents.

According to Thimmaraju (1989) achievement motivation scores were higher for big farmers when compared to small farmers.

Bonny (1991) identified achievement motivation as a significant factor contributing to the extent of adoption of commercial vegetable cultivation.

Sajeev (2003) reported 30 per cent of the respondents who were students were having high achievement motivation while 38.00 per cent and 32 per cent were having medium and low achievement motivation respectively.

Jadhav and Aski (2014) reported a significantly positive relationship between achievement motivation of trained farmers with their knowledge.

2.6.15. Mass media contact

Thomas (2000) reported a positively significant relation between mass media exposure and knowledge.

Gattu (2001) reported medium mass media contact among majority (66.67%) of respondents followed by low (18.33%) and high (15%) mass media contact.

Neelaveni et al. (2002) identified 54.34 per cent of respondents in medium category and 32.50 per cent and 14.16 per cent respondents respectively in low and high category of mass media contact.

Suresh (2004) reported moderate level mass media contact among 64.17 per cent of respondents followed by low (21.25%) and high (14.58%) level.

Ahire and Shenoy (2005) identified newspapers, TV and farm magazines as the important mass media sources among the mango growers of Andrapradesh.

According to Sengupta (2008) lack of mass media exposure is the cause of misinformation about crop prospects among majority of the farmers.

Savitha (2009) found out a highly significant and positive relation between mass media participation and entrepreneurial behaviour of the respondents.

Kumar (2013) reported majority of the respondents (50%) under medium level mass media contact followed by high (28.33%) and low level (21.67%).

2.7. Constraints of Integrated farming systems.

Banerjee *et al.*,(1990) identified the lack of capital as a major problem in integrated farming systems.

According to Ngmabeki *et al.*,(1992) the lack of labour at needy times along with timely availability of animal feeds were the major constraints of integrated farming systems.

Michael (1995) identified lack of water, seeds, planting material and time were the major constraints faced by the farmers.

According to Thomas (2002), labour shortage, high cultivation and lack of proper extension and research systems are some of the constraints faced by the farmers of Kuttanad.

Balachand (2009) reported the human interventions in Kuttanad have disrupted the natural system in the field resulting in salinity and acidity of the fields.

Tipraqsa et al., (2007) reported the high initial investment as the major constrain in adopting integrated farming systems.

Kadam *et al.*,(2010) observed high cost and unavailability of inputs like concentrate feeds and green fodder along with lack of market facilities as the major constraints of integrated farming system.

Jacob et al. (2014) identified the absence of reliable market as the main constraint faced by both the small and marginal farmers of integrated farming systems in southern Kerala.

Materials and Methods

3. MATERIALS AND METHODS

This chapter is a precise description of the methodology that is used for the study and also about the tools that are employed in data collection and data analysis. This chapter includes the research design of the investigation, sampling procedures, variables and their empirical measurements, methods used for data collection and statistical procedures used for the analysis of the data under the following heads:

3.1 Location of the study

3.2. Selection of respondents

3.3. Research Design

3.4 Operationalization and measurement of dependent variables.

3.5 Involvement of family members in IFS

3.6 Seasonal employment pattern and employment profile of the farmers

3.7 Inventorisation of different types of IFS and their components

3.8 Selection, operationalization and measurement of profile characteristics of IFS farmers.

3.9 Constrains perceived by the farmers

3.10 Techniques of Data Collection

3.11 Statistical tools used for the study

3.1 Location of the study.

The study was conducted in the Kuttanad region which is constituted by the three districts of Kerala namely Kottayam, Alapuzha and Pathanamthitta. One panchayat each was selected from these three districts for the purpose of the study.

Out of the 73 panchayats of Alapuzha district Nedumudi panchayat was purposively selected considering the ample amount of Integrated Farming Systems in this panchayat. Similar pattern was used in the selection of Kumarakom panchayat and Niranam panchayat from the districts of Kottayam and Pathanamthitta respectively.

3.2. Selection of respondents

Twenty marginal IFS farmers and 20 small IFS farmers were selected from one of the selected panchayat. Therefore 40 IFS farmers were selected from a panchayat. Similar selection procedure was carried out in the other selected panchayats also. So the total number of respondents selected for the study was 120 IFS farmers which included 60 marginal and 60 small IFS farmers.

3.3. Research Design

As the variables that are chosen for the study are already occurred, an Ex-post-facto research design is adopted for the study. According to Kerlinger (1964) ex-post-facto research is a systematic enquiry in which the scientists do not have control of influencing the variables because their manifestations have already occurred.

3.4 Operationalization and measurement of Dependent Variables

The study was carried out with the help of two independent variables. The first being the perception of the farmers regarding the feasibility of IFS and the second being the perception of the farmers regarding the utility of IFS.

3.4.1. Perception of farmers regarding the feasibility of Integrated Farming Systems.

Farmer's perception regarding the feasibility of integrated farming system was selected as one of the dependent variable of the study. So accordingly the variable is

operationalized as the awareness of the farmers about the practicability in carrying out Integrated farming system practices.

The measurement of this variable was carried out with the help of selected statements from the scale developed by Argade (2015) in order to measure the perception of IFS farmers.

The modified scale had a total of 10 statements of which 3 being negative and the remaining being positive. The responses of the farmers were rated using a three point continuum namely agree, neutral and disagree with score 3, 2 and 1 respectively. However the scores were reversed for negative statements. Hence the scoring range here varied between 10 and 30.

3.4.2. Perception of the farmers regarding the utility of integrated farming system.

Farmer's perception regarding the utility of integrated farming system was the second dependent variable with the help of which the study was carried out. This particular variable for the purpose of the study was operationalized as the farmers awareness about the benefits of IFS.

This variable was also measured with the help of selected statements from the scale developed by Argade (2015). The total number of statements selected was ten in number out of which three were negative statements.

Farmer's responses were rated with the help of a three point continuum namely agree, neutral and disagree with respective scores of 3, 2 and 1. The scoring pattern was however reversed for negative statements. Here also the scoring range was between 10 and 30.

3.5 Involvement of family members in IFS

Involvement of family members is an important aspect of integrated farming as this type of farming is mainly intended to provide year round employment to the farmer and his family with an improvement in their income. This can be operationalized as the activities of the farm that is performed by any of the family member of the farmer other than himself. This was measured by listing various activities of the farm with respect to

its performance and the regularity with which they are performing these activities. The regularity was measured with caption as always, sometimes and never. Further measurement was carried out with the help of frequency and percentage analysis.

3.6 Seasonal employment pattern and Employment profile of the farmers.

In this study the seasonal employment pattern is defined as the season wise activities carried out in the major cropping systems of Kuttanad. This was carried out by identifying and recording the activities of the farmer's for the main crop of different farming system and also recording the season wise cropping practice and employment from other allied enterprises. Labour days per acre of major crops were calculated according to the activities listed by the farmers.

Employment profile of the farmers was also assessed by identifying their main and subsidiary occupations along with other selected profile characteristics.

3.7 Inventorisation of the components of IFS.

The components of IFS include both the crop and animal enterprises that constitute an integrated farming system. The Inventorisation of these components were carried out by listing the number of enterprises practiced by the farmers.

3.8 Selection, operationalization and measurement of profile characteristics of IFS farmers.

3.8.1 Age

This was operationally defined as the number of years completed by the respondents at the time of enquiry. The measuring of this variable was carried out with the help of 2011 Census. The results were expressed in frequency and percentage. The categorization carried out is depicted below.

Age category	Years
Young	< 35
Middle aged	35-55
Aged	> 55

3.8.2. Educational status

Educational status is operationally defined highest academic qualification possessed by the individual by formal and informal education. This was measured using the scale developed by Trivedi (1963). The results were expressed in terms of frequency and percentage.

Sl. No.	Category	Score
1	Illiterate	1
2.	Can read and write	2
3.	Primary school	3
4.	Middle school	4
5.	High school	5
6.	College	6
7.	Professional degree	7

3.8.3 Family size

This variable is operationally defined as the number of members that constitute the farmer's family at the time of interview. The measurement of this variable was carried out by counting the number of members. The results were expressed in terms of frequency and percentage.

Sl no	Family size	Score
1.	<3	1
2	3-6	2
3	>6	3

3.8.4. Economic Motivation

This variable refers to the extent to which respondent is oriented towards profit maximization and relative value he/she places on monetary gain.

The variable was measured using the scale developed by Supe (1969) modified by Fayas (2003). This contains six statements of which all the statements are positive. A five point continuum strongly agree, agree, neutral, disagree and strongly disagree was used to note the responses of the farmers with scores 5,4,3,2 and 1. The total score was obtained through the summing up the scores of these responses. The scoring range here was from 6 to 30.

3.8.5. Level of Aspiration

The variable refers to the overall life goals in his reality world that the farmer is striving for. This was measured using the scale developed by Saradamony (1983).

The scale contains five statements with two point continuum that is true or false with scores 2 and 1 respectively. The scoring range for level of aspiration was 5 to 10.

3.8.6 Input Availability

This variable is operationally defined as the availability of various items other than credit that are used for the practicing of integrated farming. This was measured by the schedule developed by Shamna (2014) with slight modification.

The schedule used for this purpose is having 9 statements with a three point continuum that is readily available, not readily available and difficult to get with scores 3, 2 and 1 respectively. So the range of scores was from 9 to 27.

3.8.7. Product Diversification

This refers to the number of processed and unprocessed products that are produced by the farmer. A teacher made test was used to measure this variable.

According to this the products that are produced by farmer's are listed and score 1 is given for two products, 2 for three products , 3 for four products and 4 for five products and 5 for more than five products.

3.8.8. Resource recycling

The variable is defined as the reuse of various available resources in the farmer's field. A teacher made test was followed for the measuring of this variable.

According to the procedure followed in this test a score of 2 is given if the farmer is practicing recycling and 1 is given if it is not so.

3.8.9. Orientation towards Competition

This refers to the degree to which a farmer is oriented to place himself in a competitive situation with respect to other farmers to show his excellence in integrated farming. This is measured using the scale developed by Singh (1981).

The scale has five statement out of which three are positive and two are negative. The scale is four point continuum that is strongly agree, agree, disagree and strongly disagree with scores 4, 3, 2 and 1 respectively for positive statements. However the scores will be reversed for negative statements. Here the scoring range was from 5 to 20.

3.8.10. Entrepreneurial Behaviour

This variable is defined as the ability of the respondent to exploit the opportunities and initiate an enterprise of his/her own for income generation. The measurement was carried out using the scale developed by Varma (1996).

Accordingly the scale has six statements with five point continuum that is strongly agree, agree, neutral, disagree and strongly disagree with scores 5,4,3,2 and 1. The range for calculation was from 6 to 30.

3.8.11. Achievement motivation

This refers to the striving of farmers to do good work and attain a sense of accomplishment. This was measured using the scale developed by Singh (1970).

This has seven statements with a five point continuum that is strongly agree, agree, neutral, disagree and strongly disagree with scores 5,4,3,2 and 1 respectively.

3.8.12. Self confidence

This refers to the feeling of an individual's ability, about initiative and zeal to achieve his goal or aim. Measured using the scale developed Basavana (1971) modified by Prasad (1983).

This scale has five statements with five point continuum that is strongly agree, agree, neutral, disagree and strongly disagree with scores 5,4,3,2 and 1 respectively. The scoring range for self confidence was from 5 to 25.

3.8.13 Farming Experience

This refers to the total number of years the respondent has been engaged in integrated farming. The procedure developed by Sreedaya (2000) was used to quantify this variable. The table depicting the scoring pattern is thus given below.

Sl no.	Experience	Score
1.	Up to 5 years	1
2.	6 to 10 years	2
3.	11 to 25 years	3
4.	Above 25 years	4

3.8.14 Risk taking ability

It is defined as the degree to which farmers are oriented towards risk and uncertainty and have courage to face the problems in adopting integrated farming practices. This was measured using the scale developed by Supe (1969). The scale has six statements with five point continuum that is strongly agree, agree, neutral, disagree and strongly disagree with scores 5,4,3,2,and 1 respectively. The scoring is reversed for negative statements. The scores obtained ranged from 6 to 30.

3.8.15 Mass media contact

This refers to the extent to which farmers are exposed to various mass medias such radio, television and newspapers. The method adopted by Jayalekshmi (1996) was followed to quantify this variable.

Accordingly there are eight statements with a three point continuum that is yes-always, yes-sometimes and no with scores 3, 2 and 1 respectively. The scoring range was from 8 to 24.

3.9 Constraints perceived by the farmers

For the purpose of the study constraints are operationalized as the major problems or difficulties faced by the farmers while practicing integrated farming system. With the help of review of literature and expert discussions, major constrains of integrated farming system farmers were identified and mediated to the farmers through interview schedule.

A total of nine constraints were identified and farmers were asked to rank them in such a way that the constraint with high numerical rank is with more relevance. The ranks given by both marginal and small farmers were added up separately. The constraint with highest score was identified as the most important one.

3.10 Techniques of Data Collection

Data collection was carried out with the help of pre tested interview schedules which were prepared with respect to the objectives of the study. The schedule which was prepared in English was later translated into Malayalam before administrating it to the respondents.

3.11 Statistical tools for the study.

The statistical tools used to carry out the study are as follows:

1. Categorisation

Quartile deviation was calculated for the two selected dependent variables and eight out of the fifteen selected independent variables. According to this the respondents were categorised into low, medium and high and their frequency and percentage were calculated.

2. Frequency and percentage analysis

The remaining independent variables were analysed using frequency and percentage analysis.

3. Single factor ANOVA

Single factor analysis of variance was used to compare various profile characteristics of small and marginal farmers.

4. Simple Correlation Analysis

This analysis was carried out to establish the relationship between the selected independent and dependent variables. The significance of their relation was also checked at 5 per cent and 1 per cent.

5. Spearman's rank order correlation

This measurement was used to check the agreement of both the marginal and small farmers about the constraints perceived by them.

Results & Discussion

4. RESULTS AND DISCUSSION

This chapter contains all the findings of the study along with its discussions. The results are presented as the following subheadings.

4.1 Perception of the farmer's regarding the feasibility of integrated farming systems.

4.2 Perception of the farmers regarding the utility of integrated farming systems.

4.3 Profile characteristics of farmer's of integrated farming systems.

4.4. Correlation of the profile characteristics of the farmers to the perception regarding feasibility and utility.

4.5 Involvement of family members.

4.6 Seasonal employment pattern and employment profile of the family members.

4.7 Inventorisation of different types of existing integrated farming systems and their components

4.8 Constraints perceived by the farmers of integrated farming systems.

4.1 PERCEPTION OF FARMER'S REGARDING FEASIBILITY OF INTEGRATED FARMING SYSTEMS

4.1.1 Perception of small and marginal farmers regarding feasibility of integrated farming systems.

The perception of both marginal and small farmers regarding the feasibility of integrated farming system was analysed and the results are presented in table 1(a).

Table 1 a: Distribution of farmers based on their perception regarding the feasibility of IFS.

Sl no.	Category	Marginal farmers(N=60)		Small farmers (N=60)	
		No.	Percentage	No.	Percentage
1.	Low (<Q ₁)	10	16.67	7	11.67
2.	Medium (Q ₁ -Q ₃)	27	45	32	53.33
3.	High (>Q ₃)	23	38.33	21	35

Q₁ =17 Q₂ =20

From the above table it can be understood that 45 per cent of marginal farmers were having medium level perception while the remaining of them were having high (38.33%) and low level (16.67%) of perception respectively. Similarly in the case of small farmers more than half of them (53.33%) were having medium level perception while the remaining 11.67 per cent and 35 per cent were having low and high level of perception respectively.

Hence it can be inferred that majority of the integrated farming system farmers were having medium level perception irrespective of being marginal or small. The findings from the study are in line with the perception study carried out by Babu (1995) in homesteads.

4.1.2 Comparison of the perception of marginal and small farmers regarding the feasibility of integrated farming systems.

The comparison of the perception regarding the feasibility of integrated farming systems was carried out using single factor ANOVA technique and its result is presented in table 1(b).

Table 1 b: Comparison of perception regarding feasibility of IFS of marginal and small farmers

Source of variation	SS	df	MS	F	P-value	F critical
Between groups	1.633	1	1.633	0.310	0.578	3.921
Within groups	621.533	118	5.267			
Total		119				

From the table it can be deduced that the calculated F value is less than the F critical value. Hence there was no significant difference between the perception regarding feasibility of integrated farming systems of both small and marginal farmers.

PERCEPTION OF FARMER'S REGARDING THE UTILITY OF INTEGRATED FARMING SYSTEMS.

4.2.1 Perception of marginal and small farmers regarding the utility of integrated farming system.

The perception of marginal and small farmers regarding the utility of integrated farming systems are quantified separately and the results are presented in table 2 (a).

Fig 1: Percentage distribution of farmers based on their perception regarding the feasibility of IFS

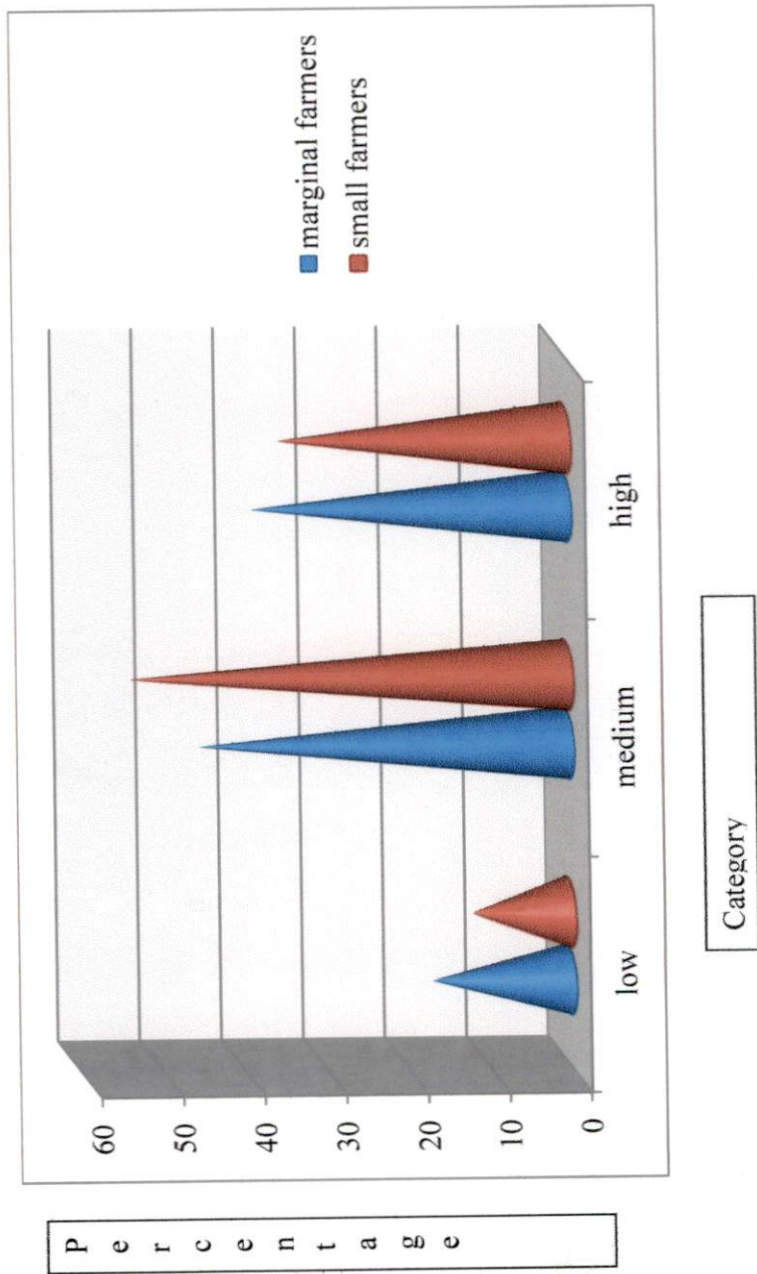


Table 2 a: Distribution of farmers based on their perception regarding the utility of IFS

Sl no.	Category	Marginal farmers(N=60)		Small farmers (N=60)	
		No.	Percentage	NO.	Percentage
1.	Low (<Q ₁)	10	16.67	7	11.67
2.	Medium (Q ₁ -Q ₃)	40	66.67	42	70
3.	High (>Q ₃)	10	16.67	11	18.33

Q₁ = 22 Q₃ = 25

The table shows that majority of both small and marginal farmers were having medium level perception regarding the utility of integrated farming systems. In the case of marginal farmers 66.67 per cent were having medium level perception while the remaining respondents show an equal distribution of 16.67 per cent in both low and high level. Majority of the small farmers (70%) were also having medium level perception. However unlike the marginal farmers 18.33 per cent of the small farmers were having high perception and 11.67 per cent were having low perception.

Hence it is inferred that majority of the integrated farming system farmers were having medium level perception irrespective of being marginal or small. The findings are in line with the perception study carried out by Babu (1995) in homesteads.

4.2.1 Comparison of perception of both marginal and small farmers regarding the utility of integrated farming systems.

Comparison carried out with single factor ANOVA technique is represented in table 2 (b).

Table 2 b: Comparison of perception regarding utility of IFS of marginal and small farmers.

Source of variation	SS	df	MS	F	P-value	F critical
Between groups	0.3	1	0.3	0.058	0.809	3.921
Within groups	605.566	118	5.131			
Total	605.866	119				

Here since the calculated F value is less than the F critical value, there was no significant difference between the perception of marginal and small farmer's regarding the utility of integrated farming systems.

4.3 PROFILE CHARACTERISTICS OF THE FARMERS.

This section contains the distribution of farmers based on various profile characteristics like age, educational status, family size, economic motivation, level of aspiration, self-confidence, input availability, farming experience, product diversification, resource recycling, entrepreneurial behaviour, orientation towards competition, risk taking ability, achievement motivation and mass media contact.

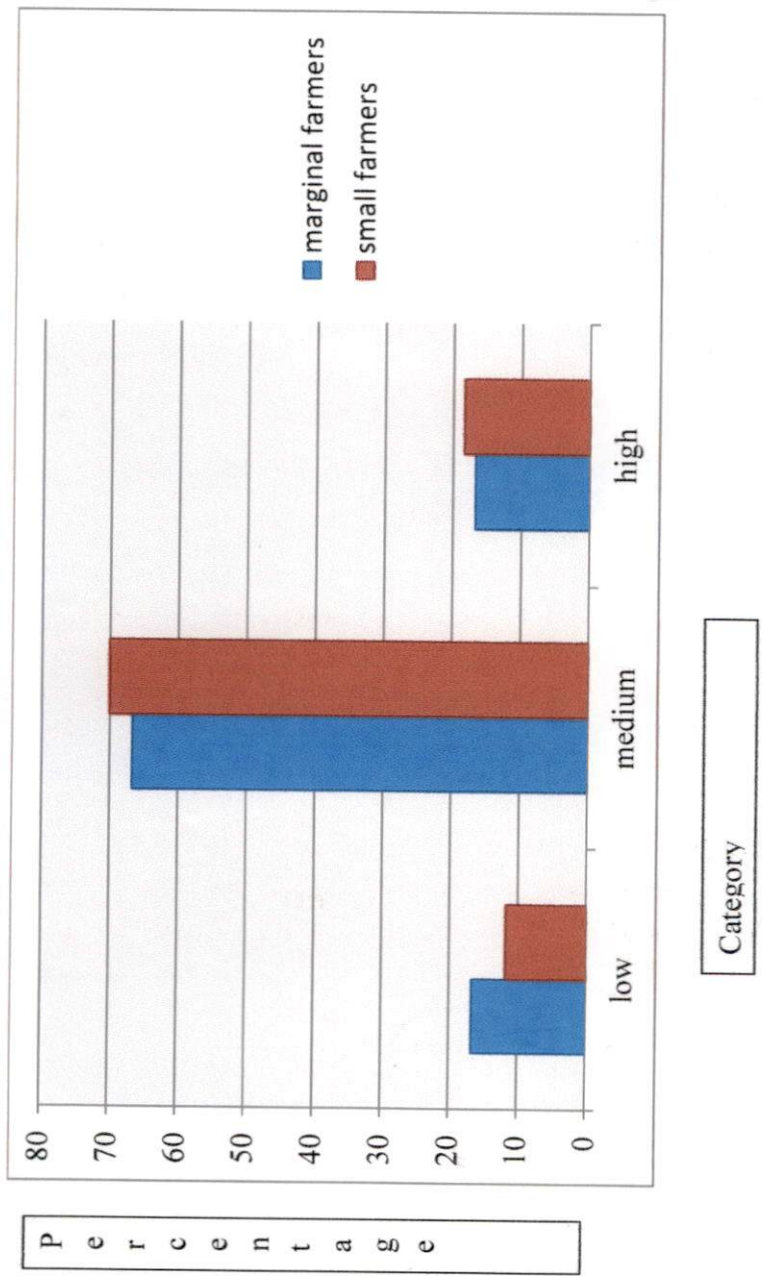
4.3.1 Age

The farmers were classified according to the 2011 census into three category that is young age, middle age and old age. The result of this is represented in table 3.

Table 3: Distribution of farmers according to their age

Category	Age in years	Marginal farmers (N=60)		Small farmers (N=60)	
		No.	Percentage	No.	Percentage
Young age	< 35	0	0	0	0
Middle age	35 -55	24	40	27	45

Fig 2: Percentage distribution of farmers based on their perception regarding the utility of IFS



Old age	>55	36	60	33	55
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From the table, it is clear that majority of marginal (60%) and small (55%) farmers were belonging to the old age category. However 40 per cent of marginal and 45 per cent of small farmers were coming under the middle age category. An important fact of interest identified from this table is that none among both the small and marginal farmers were in the young age category.

The results were in line with the findings of Kumaran (2008) where majority of the farmers are in old age category. These findings help us to understand the declining interest of younger generation in agriculture and allied activities.

4.3.2 Educational status

Educational status of both marginal and small farmers was represented in table 4.

Table 4: Distribution of farmers according to their educational status

Sl no.	Category	Marginal farmers (N=60)		Small farmers (N=60)	
		No.	Percentage	NO	Percentage
1.	Illiterate	0	0	0	0
2.	Can read and write	3	5	4	6.67
3.	Primary school	14	23.33	11	18.33
4.	Middle school	18	30	14	23.33
5.	High school	16	26.67	22	36.67
6.	College	9	16	8	13.33
7.	Professional college	0	0	0	0

Fig.3: Percentage distribution of the respondents based on their age

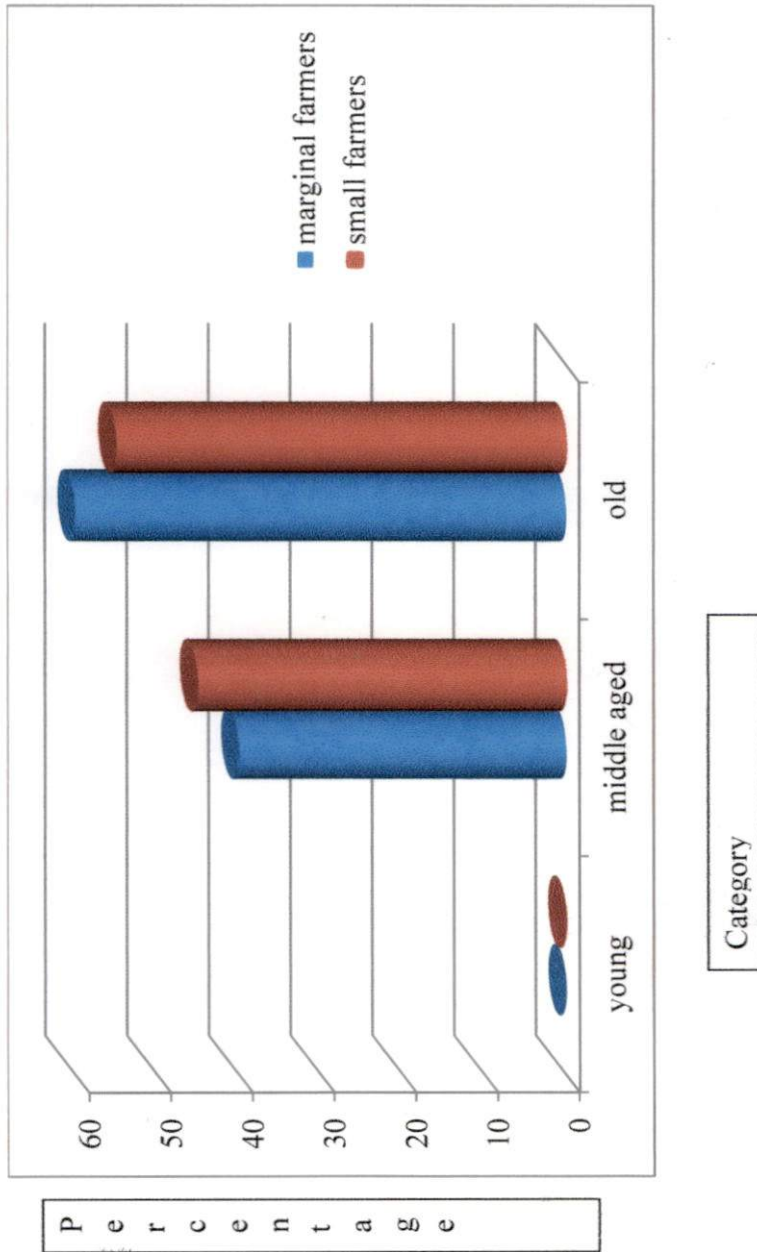


Table 4 which depicted the educational status it could be understood that majority of the marginal farmers (30%) were having middle school education which was followed by high school (26.67%), primary school (23.33%) and college education. Neither of the marginal farmers were having professional college education nor they were illiterate. However there was a 5 per cent population who were not having any formal education but still they were able to read and write.

In the case of small farmers majority (36.67%) of them were having high school education followed by middle school (23.33%), primary school (18.33%) and college (13.33%) education. However 6.67 per cent of small farmers were only able to read and write while none of them were illiterates or professional degree holders.

None among both small and marginal farmers were illiterate is a clear reflection to the high literacy of Kerala which is nearly 94 per cent according to the 2011 Census report.

4.3.3 Family size

Family size or the total number of family members of the farmer is depicted in table 5.

Table 5: Distribution of farmers based on their family size

Sl no.	Family members	Marginal farmers (N=60)		Small farmers(N=60)	
		No.	Percentage	No.	Percentage
1.	Less than 3	20	33.33	13	21.67
2.	3 to 6	33	55	40	66.67
3.	Greater than 6	7	11.67	7	11.67

Based on the above table majority of both marginal (55%) and small farmers (66.67%) were having a family size of 3-6. The total number of family members of these farmers were in between 3-6 and in the case of remaining respondents 33.33 per cent of marginal farmers were having family size less than three while only 21.67 per

cent small farmers were under this category. However 11.67 per cent of both marginal and small farmers were having a family size greater than 6.

The result obtained here is a projecting example of the decreasing tendency of joint families in the state. Majority of the farmers irrespective of being marginal or small are having a family size of three to six. The findings are in line with that of Nath (2002).

4.3.4 Economic Motivation

4.3.4.1 Economic motivation of marginal farmers and small farmers.

The economic motivation of marginal farmers and small farmers is represented in table 6(a) and 6(b) respectively.

The economic motivation of marginal farmers are represented in the following table.

Table 6 a: Distribution of marginal farmers according to their economic motivation

Sl no.	Category (N=60)	No.	Percentages
1.	Low (<Q ₁)	12	20
2.	Medium (Q ₁ -Q ₃)	38	63.33
3.	High (>Q ₃)	10	16.67

Q₁= 21 , Q₃= 25

From the above table it can be concluded that majority of the marginal farmers (63.33%) were having medium level economic motivation followed by low (20%) and high (16.67%) level of economic motivation respectively.

The economic motivation of small farmers is represented in table 6 (b).

Table 6 b: Distribution of small farmers according to their economic motivation

Sl no.	Category (N=60)	No.	Percentage
1.	Low (<Q ₁)	15	25
2.	Medium (Q ₁ -Q ₃)	38	63.33
3.	High (>Q ₃)	7	11.67

Q₁ = 21.75, Q₃ = 25

The table concludes that majority of the small farmers (63.33%) had medium level economic motivation followed by low (25%) and high (11.67%) level of economic motivation respectively.

So from both the tables 6(a) and 6(b) we can together conclude that majority of the IFS farmers were having medium level economic motivation. The findings are in accordance with that of Kumar (2004).

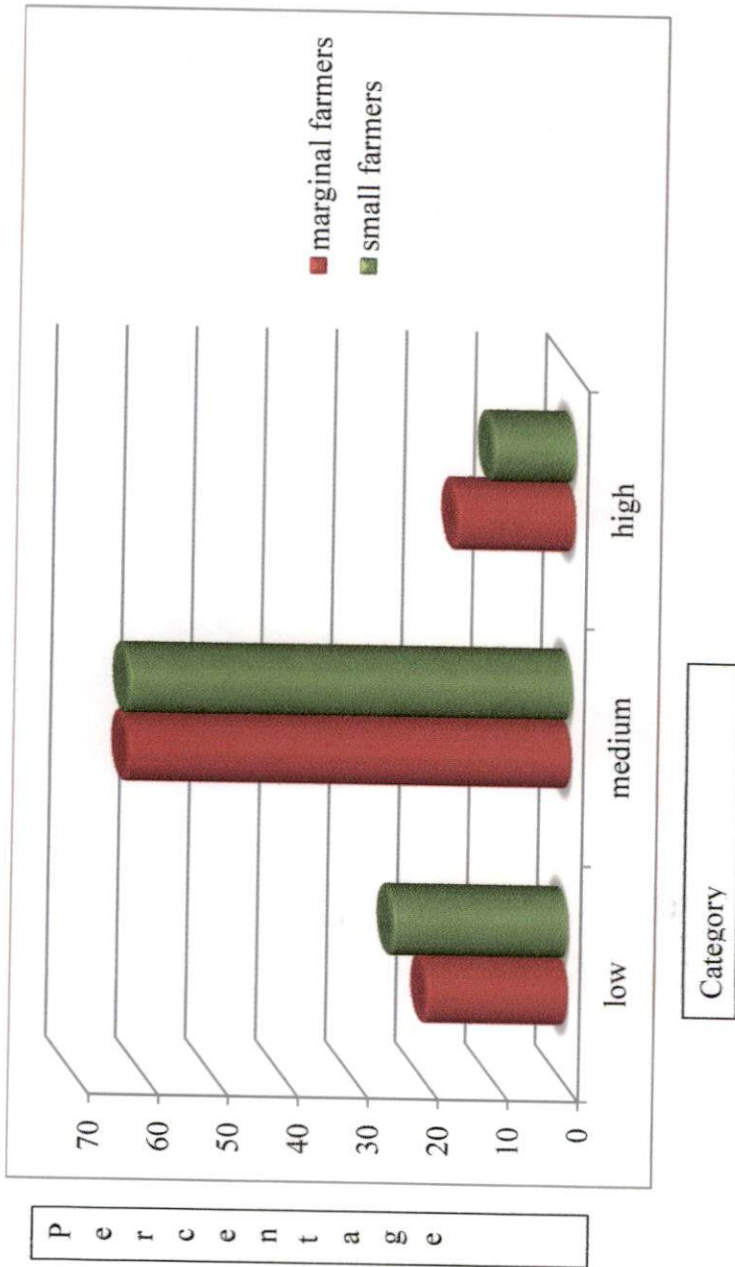
4.3.4.3 Comparison of economic motivation of marginal and small farmers.

The economic motivation of marginal and small farmers were compared using single factor ANOVA technique and the results are presented in table 6(c).

Table 6 c: Comparison of economic motivation of small and marginal farmers

Source of variation	SS	df	MS	F	P- value	F critical
Between groups	26.133	1	26.133	5.239	0.0238	3.921
Within groups	588.533	118	4.987			
Total	614.666	119				

Fig 4: Percentage distribution of respondents based on their economic motivation.



From the table it is clear that the calculated F value is greater than the F critical value. Hence it can be concluded that there was significant difference between the economic motivation of marginal and small farmers

From viewing the total sum of the scores of both marginal and small farmers we can observe that the sum of scores obtained by small farmers (Sum=1388) were more than that of marginal farmers (Sum=1332). So the differences in land holdings which were more for small farmers may be the reason for the observed significant difference.

4.3.5 Level of aspiration

4.3.5.1 Level of aspiration of marginal and small farmers.

The results concerning to the level of aspiration of marginal farmers are presented in table 7 (a).

Table 7a: Distribution of respondents according to their level of aspiration

Sl no.	Category	Marginal farmers (N=60)		Small farmers (N=60)	
		No.	Percentage	No.	Percentage
1.	Low (<Q ₁)	8	13.33	3	5
2.	Medium (Q ₁ -Q ₃)	50	83.33	47	78.33
3.	High (>Q ₃)	2	3.33	10	16.67

Q₁= 6 , Q₃=7

From this table it is clear that majority of marginal farmers (83.33%) were having medium level of aspiration which were followed by low (13.33 %) and high (3.33%) level of aspiration respectively. In the case of small farmers 78.33 per cent of them were observed to have medium level of aspiration. However this was followed by high (16.67%) and low (5%) level of aspiration respectively.

Majority of the farmers were having medium level of aspiration. The findings obtained are in accordance with the findings of Neelaveni et al. (2002).

4.3.5.2 Comparison of level of aspiration of marginal and small farmers.

Table 7 (b) represents the comparison of marginal and small farmers based on their level of aspiration.

Table 7 b: Comparison of level of aspiration of small and marginal farmers.

Source of variation	SS	df	MS	F	P- value	F critical
Between groups	3.008	1	3.008	4.897	0.0289	3.921
Within groups	72.583	118	0.615			
Total	75.591	119				

From the table it can be understood that the calculated F value was greater than the critical F value. Hence there was significant difference between the level of aspiration of marginal and small farmers.

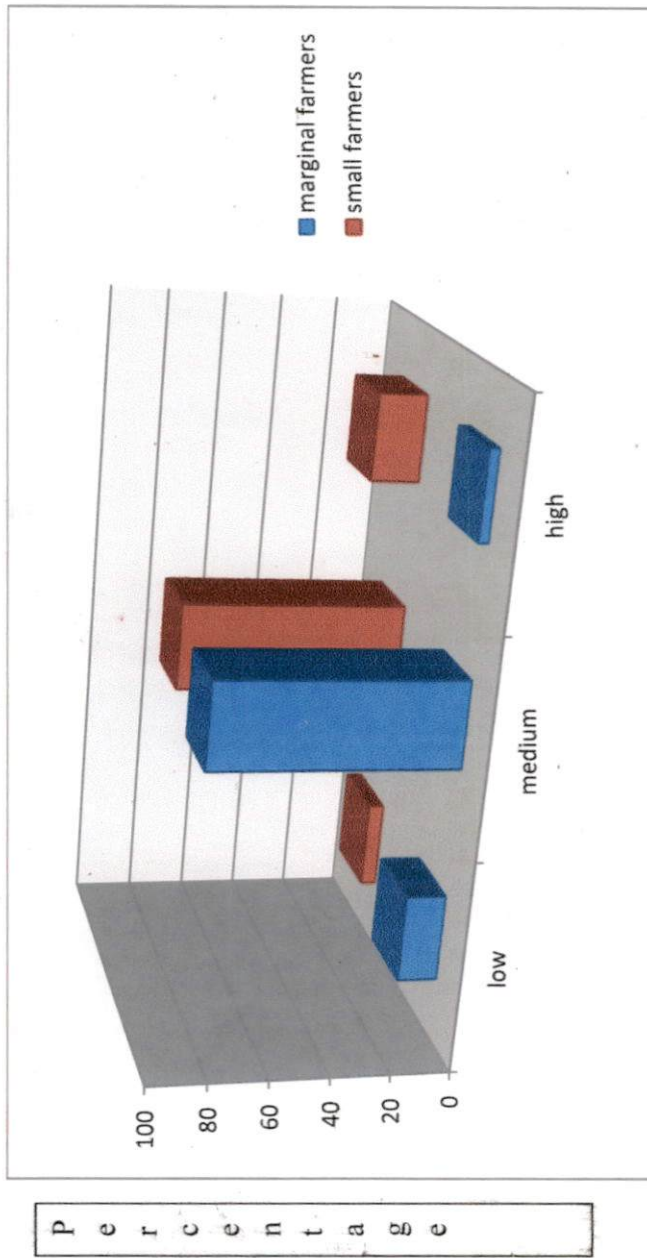
Total sum of scores obtained by small farmers (Sum= 396) was higher than marginal farmers (Sum= 377) which indicate more of level of aspiration among them. So the significant difference in level of aspiration among marginal and small farmers can be explained with their difference in land holdings and the significant difference shown by them in economic motivation.

4.3.6 Self confidence

4.4.1 Self-confidence of marginal and small farmers

The self-confidence of marginal and small farmers were separately analysed and the results are presented in table 8.

Fig 5: Percentage distribution of farmers based on their level of aspiration.



Category

Table 8: Distribution of farmers according to their self confidence

Sl no.	Category	Marginal farmers (N=60)		Small farmers (N=60)	
		No.	Percentage	No.	Percentage
1.	Low (<Q ₁)	7	11.67	10	16.67
2.	Medium (Q ₁ -Q ₃)	44	73.33	42	70
3.	High (>Q ₃)	9	15	8	13.33

Q₁= 16 , Q₃= 18

From the above table it can be concluded that 73.33 per cent of the marginal farmers were having medium level self-confidence, while 15 per cent and 11.67 per cent of them were having high and low level of self-confidence respectively.

Similarly in the case of small farmers majority of them (70%) were having medium level of self-confidence while 16.67 per cent and 13.33 per cent of them were having low and high level of self-confidence respectively.

Hence it is inferred that majority of the respondents were having medium level self-confidence irrespective of them being small or marginal farmers. The findings are in line with that of Lalitha (1999).

4.3.7 Input availability

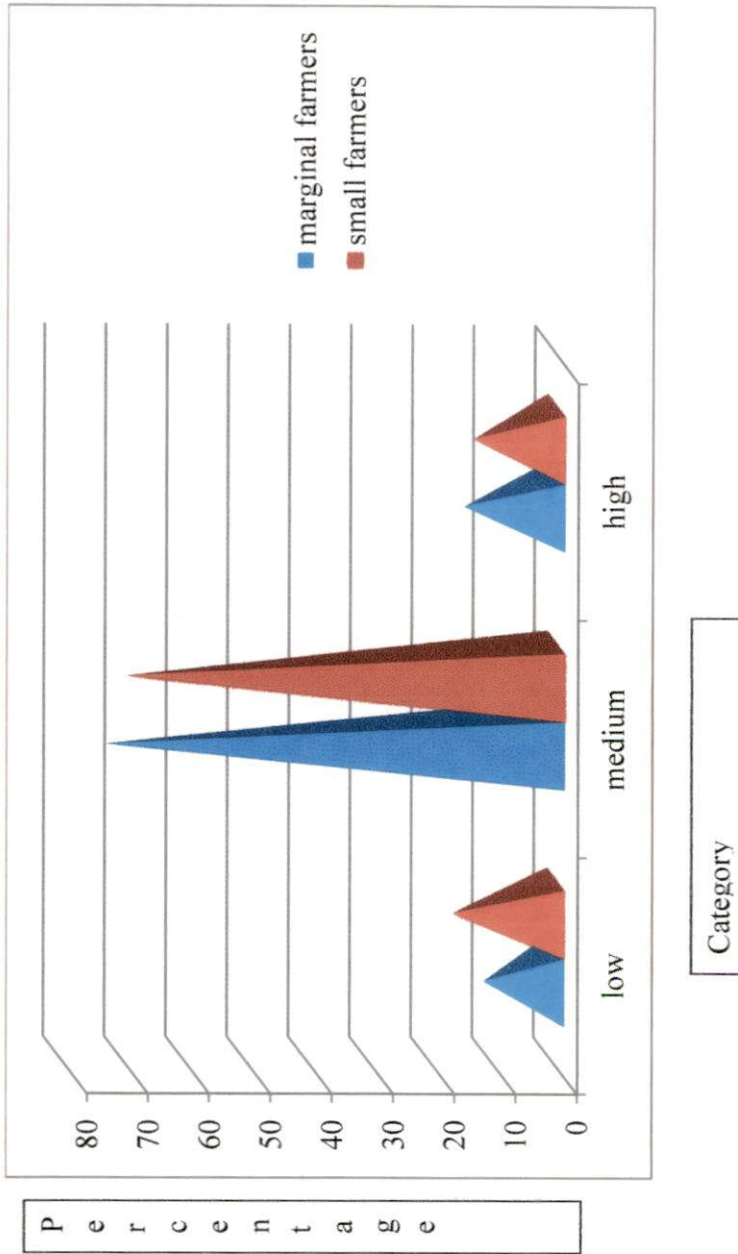
4.3.7.1 Input availability of marginal and small farmers

The input availability of marginal and small farmers are represented in table 9 (a) and 9 (b) respectively.

Table 9 a: Distribution of marginal farmers according to their input availability

Sl no.	Category (N=60)	No.	Percentage
1.	Low (<Q ₁)	7	11.67
2	Medium (Q ₁ -Q ₃)	41	68.33

Fig 6: Percentage distribution of respondents based on their self confidence.



3.	High ($>Q_3$)	12	20
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$Q_1=21, Q_3=22$

From the table it can be concluded that majority of the marginal farmers (68.33%) were having medium input availability while the remaining 20 per cent and 11.67 per cent were having high and low level of input availability respectively.

The input availability of small farmers are represented in table 9 (b)

Table 9 (b). Distribution of small farmers according to their input availability

Sl no.	Category (N=60)	No.	Percentage
1.	Low ($<Q_1$)	5	8.33
2	Medium (Q_1-Q_3)	47	78.33
3.	High ($>Q_3$)	8	13.33

$Q_1=21, Q_2=23$

From the table 9 (b) 78.33 per cent of the small farmers were having medium input availability followed by high (13.33%) and low (8.33%) input availability respectively.

Majority of the farmers selected whether marginal or small were having medium level input availability. The findings were in accordance with that of Vasantha (2002) and Nirmala (2012).

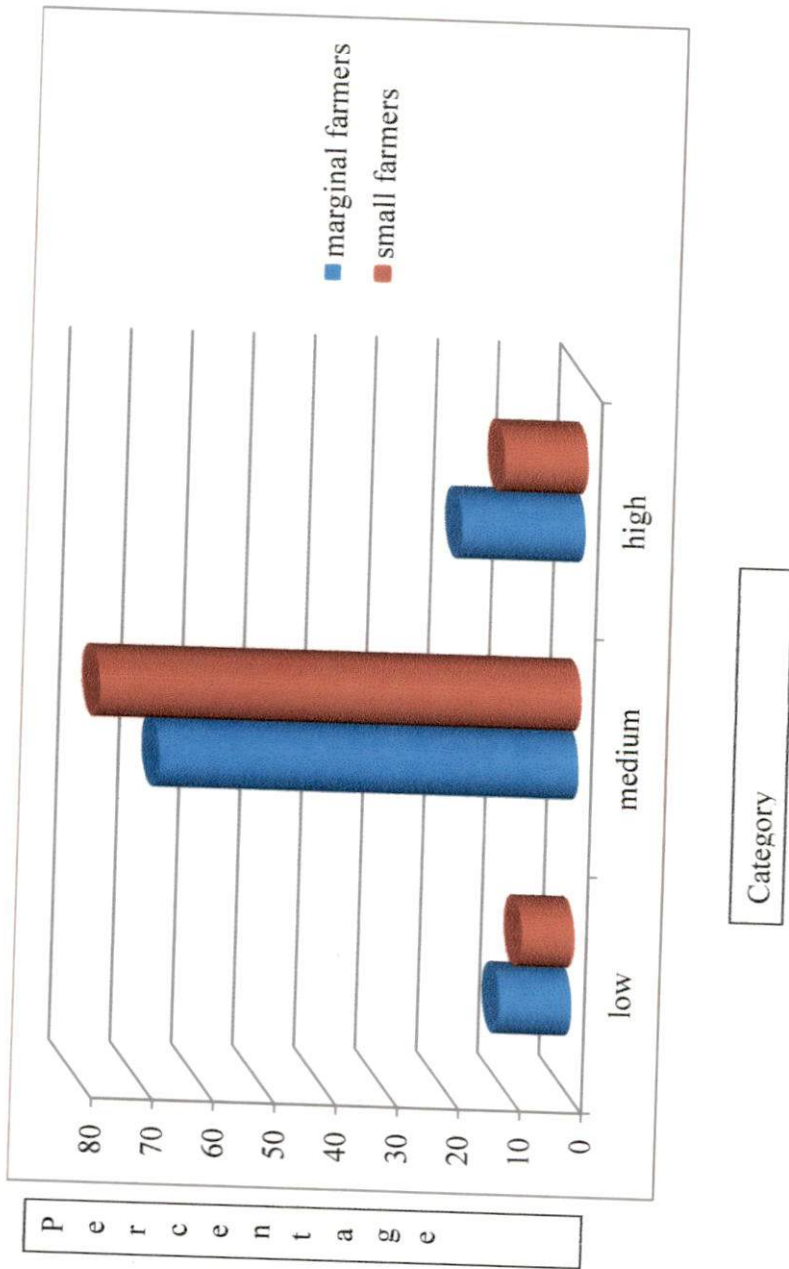
4.3.8 Farming experience

The distribution of farmers based on their experience in integrated farming is represented in table 10.

Table 10: Distribution of farmers based on their experience in integrated farming

Sl no.	Experience in years	Marginal farmers (N=60)		Small farmers (N=60)	
		No.	Percentage	No.	Percentage
1.	Up to 5 years	8	13.33	4	6.67

Fig 7: Percentage distribution of respondents based on their input availability



2.	6 to 10 years	24	40	20	33.33
3.	11 to 25 years	21	35	25	41.67
4.	Above 25 years	7	11.67	11	18.33

From the table it is understood that 40 per cent of the marginal farmers were having an experience between 6 to 10 years in integrated farming. This was followed 11 to 25 years of experience (35%), experience up to 5 years (13.33%) and above 25 years of experience (11.67%) respectively.

Similarly in the case of small farmers majority (41.67%) of them were having experience between 11 to 25 years which was followed by 6 to 10 years of experience (33.33%), above 25 years of experience and experience up to 5 years (6.67%) respectively.

Less experienced farmers (up to 5 years) were very less in the case of both marginal and small farmers. This indicate the need for constant practice and experience to carry out integration of various enterprise with the needful understanding of the most viable and feasible enterprises along with agriculture.

4.3.9 Product diversification

Product diversification of integrated farming system farmers were carried out by identifying and quantifying various processed and unprocessed products produced by the farmers with the help of their plant and animal components.

4.3.9.1 Products produced from the Kuttanadan farms.

The major products that were produced by the IFS farmers of Kuttanad irrespective of being small and marginal are represented in table 11 (a).



Fig 8: Experience of the farmers

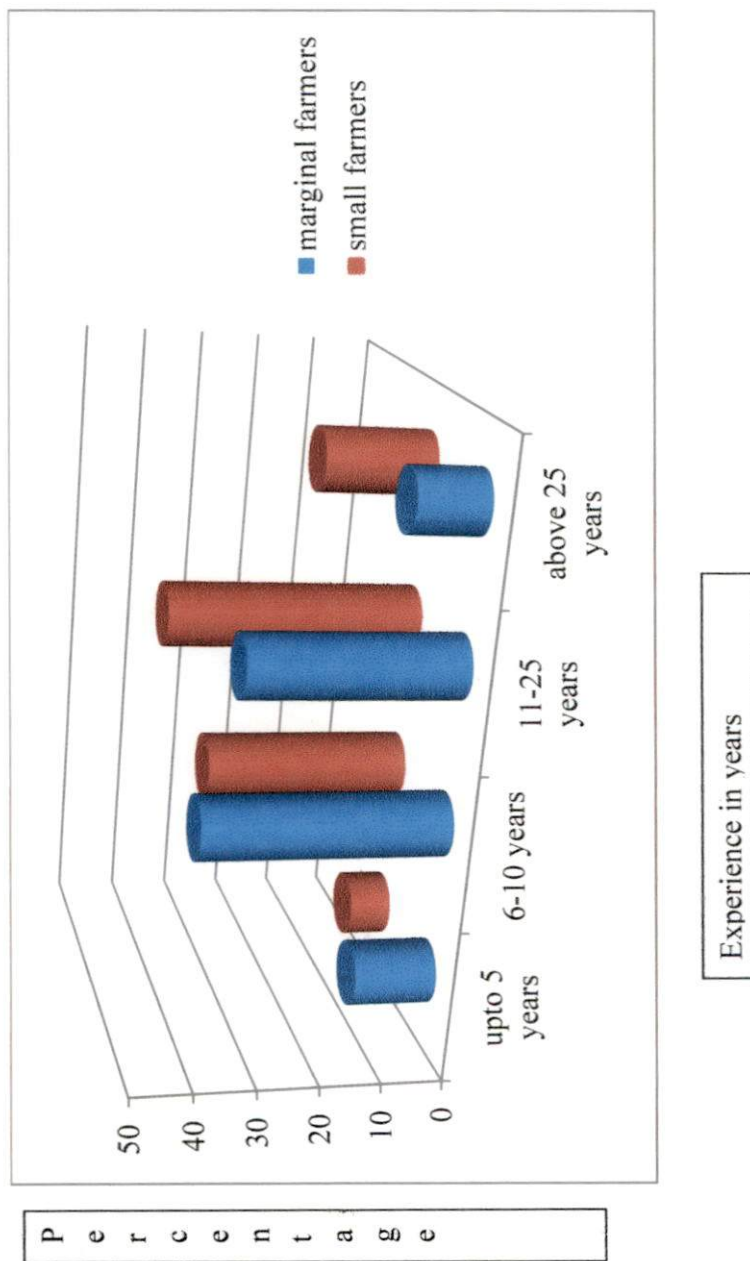


Table 11 a: Major products produced from the farming systems of Kuttanad

Sl no.	Crop based	Animal based
1.	Rice	Fish
2.	Coconut	Egg
3.	Oil	Meat
4.	Toddy	Milk
5.	Vegetables(cucurbits, cowpea, amaranthus)	Curd
6.	Banana	Butter
7.	Pepper	
8.	Tubers (Elephant foot yam, colocasia, tapioca)	

The major crop based products that were produced by farmers of Kuttanad are rice, coconut, banana, vegetables like cowpea, amaranthus and cucurbits, pepper and tubers like tapioca, elephant foot yam and colocasia. Products like oil and toddy are also obtained from the coconut gardens of Kuttanad. Milk, egg, butter, curd, fish and meat were the animal products that were identified from the farming systems of Kuttanad.

4.3.9.2 Product diversification of marginal and small farmers

Table 11 (b) represents the product diversification of marginal and small farmers.

Table11 b: Distribution of farmers according to their product diversification

Sl no.	No. of products produced	Marginal farmers (N=60)		Small farmers(N=60)	
		No.	Percentage	No.	Percentage
1	Two products	10	16.67	1	1.67
2	Three products	25	41.67	21	35
3	Four products	21	35	20	33.33
4	Five products	3	5	14	23.33
5	More than five products	1	1.67	4	6.67

From the above table it was observed that majority of the marginal farmers (41.7%) were producing a total of three product from their farms which was followed by the production of four products (35%). 16.67 per cent of the marginal farmers were producing only two products while 5 per cent and 1.67 per cent of them were producing five products and more than five products respectively.

In the case of small farmers majority of them (35%) were producing a total of three products which is closely followed by the farmers who were producing four products (33.33%). Among the remaining small farmers 23.33 per cent were producing five products while 6.67 per cent and 1.67 per cent were producing more than five products and two products respectively.

Majority of the farmers were producing a total of three products. However the production of more than five products was more in the case of small farmers than marginal farmers. This can be related to their land holding. That is, since the land holdings of small farmers were more than that of marginal farmers the chance of incorporating additional enterprises is high in the case of small farmers.

4.3.9.2 Comparison of product diversification of marginal and small farmers

Single factor ANOVA technique was used to compare the product diversification of marginal and small farmers. The result is represented in table 11 (c).

Table 11 c: Comparison of product diversification of small and marginal farmers

Source of Variation	SS	df	MS	F	P- value	F critical
Between groups	12.675	1	12.675	14.909	0.00018	3.921
Within groups	100.316	118	0.850			
Total	112.991	119				

Here the calculated F value was greater than the critical F value, hence we can conclude that there was significant difference in the product diversification of marginal and small farmers.

Total score of product diversification was more for small farmers (Sum= 196) than marginal farmers (Sum=177). So as discussed earlier the more availability of land among the small farmers were giving them a chance to include more enterprises which in turn creates a significant difference in their product diversification.

4.3.10. Resource recycling

Table 12 represents the resource recycling of both marginal and small farmers.

Table 12: Distribution of farmers with respect to their resource recycling practice.

Sl no.	Category	Marginal farmers (N=60)		Small farmers (N=60)	
		No.	Percentage	No.	Percentage
1.	Resource recycling practiced	42	70	47	78.33

2.	Resource recycling not practiced	18	30	13	21.67
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The above table depicts that 70 per cent and 78.33 per cent of marginal and small farmers respectively were practicing resource recycling while 30 per cent and 21.67 per cent of marginal and small farmers respectively were not practicing resource recycling.

Resource recycling being an unavoidable part of integrated farming was practiced by majority of the farmers surveyed. However a small portion of both the marginal and small farmers were not practicing recycling of resources. They were farmers who were depending on enterprises like backyard poultry and duckery other than agriculture.

4.3.11 Entrepreneurial behaviour

Entrepreneurial behaviour of the farmers were analysed and the results are presented in table 13.

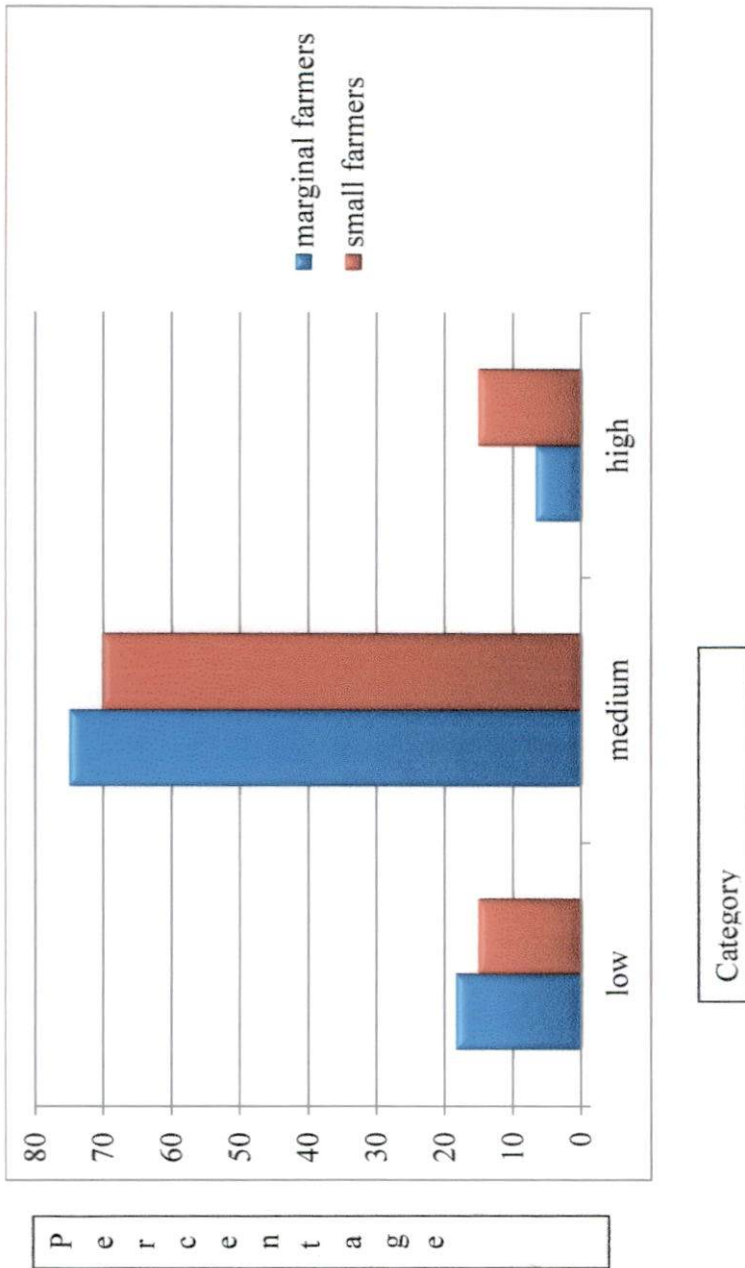
Table 13: Distribution of the farmers based on their entrepreneurial behaviour

Sl no.	Category	Marginal farmers (N=60)		Small farmers(N=60)	
		No.	Percentage	No.	Percentage
1.	Low (<Q ₁)	11	18.33	9	15
2.	Medium (Q ₁ -Q ₃)	45	75	42	70
3.	High (>Q ₃)	9	6.67	9	15

Q₁= 9, Q₃= 10

From the table it is clear that majority of the farmers were having medium level entrepreneurial behaviour. That is in the case of marginal farmers 75 per cent were having medium level entrepreneurial behaviour followed by low (18.33%) and high (6.67%) respectively. Similarly in the case of small farmers 70 per cent were having

Fig 9: Percentage distribution of farmers based on their entrepreneurial behaviour of farmers.



medium level entrepreneurial behaviour equally followed by low (15%) and high (15%) respectively.

The farmers surveyed were having medium level entrepreneurial behaviour. The results obtained are in accordance with the findings of Anitha (2004).

4.3.12 Orientation towards competition

4.3.12.1 Orientation towards competition of marginal and small farmers

The analysed result of competition orientation of marginal and small farmers is represented in table 14 (a) and 14 (b) respectively.

The competition orientation of marginal farmers are represented in table 14 (a).

Table 14 a: Distribution of marginal farmers based on their orientation towards competition

Sl no.	Category (N=60)	NO.	Percentage
1.	Low (<Q ₁)	11	18.33
2.	Medium (Q ₁ -Q ₃)	44	73.33
3.	High (>Q ₃)	5	8.33

Q₁= 12 , Q₂= 15

From table 14 (a) it can be understood that majority of the marginal farmers (73.33%) were having medium orientation towards competition followed by low (18.33%) and medium (8.33%) orientation towards competition.

Table 14 (b) represents the orientation towards competition of small farmers.

Table 14 b: Distribution of small farmers based on their orientation towards competition

Sl no.	Category (N=60)	No.	Percentage
1	Low (<Q ₁)	8	13.33

2.	Medium (Q ₁ -Q ₃)	47	78.33
3.	High (>Q ₃)	5	8.33

Q₁= 14 , Q₃= 16

The above table depicts that 78.33 per cent of small farmers were having medium level orientation towards competition while the remaining 13.33 per cent and 8.33 per cent had low and high level of orientation towards competition respectively.

Majority of the farmers were having medium level of competition orientation irrespective of them being marginal and small.

4.3.12.2 Comparison of orientation towards competition of marginal and small farmers

The comparison was carried out using single factor ANOVA technique and the result is presented in table 14 (c).

Table 14 c: Comparison of competition orientation of small and marginal farmers

Source of variation	SS	df	MS	F	P- value	F critical
Between groups	75.208	1	75.208	30.214	2.27	3.921
Within groups	293.716	118	2.489			
Total	368.925	119				

Here the calculated F value was greater than the critical F value hence there was significant difference between the competition orientation of small and marginal farmers.

The total sum obtained for small farmers (Sum=886) were more than that of the marginal farmers (Sum=791) which in a sense indicate the more degree of competition orientation among small farmers than that of the marginal farmers. The traits of small farmers like land holdings and also the significant differences in economic motivation

and level of aspiration can be the reason for the significant difference shown between marginal and small farmers in competition orientation.

4.3.13 Risk taking ability

4.3.13.1 Risk taking ability of marginal and small farmers.

The risk taking ability of marginal and small farmers is analysed and the result is presented in table 15 (a) and 15 (b) respectively.

The risk taking ability of marginal farmers is depicted in table 15 (a).

Table 15 a: Distribution of marginal farmers based on their risk taking ability

Sl no.	Category (N=60)	No.	Percentage
1.	Low ($\leq Q_1$)	12	20
2.	Medium (Q_1-Q_3)	38	63.33
3.	High ($> Q_3$)	10	16.67

$Q_1 = 21$, $Q_3 = 24$

From table 15 (a) it can be concluded that 63.33 per cent of marginal farmers were having medium risk taking ability followed by low (20%) and high (16.67%) respectively.

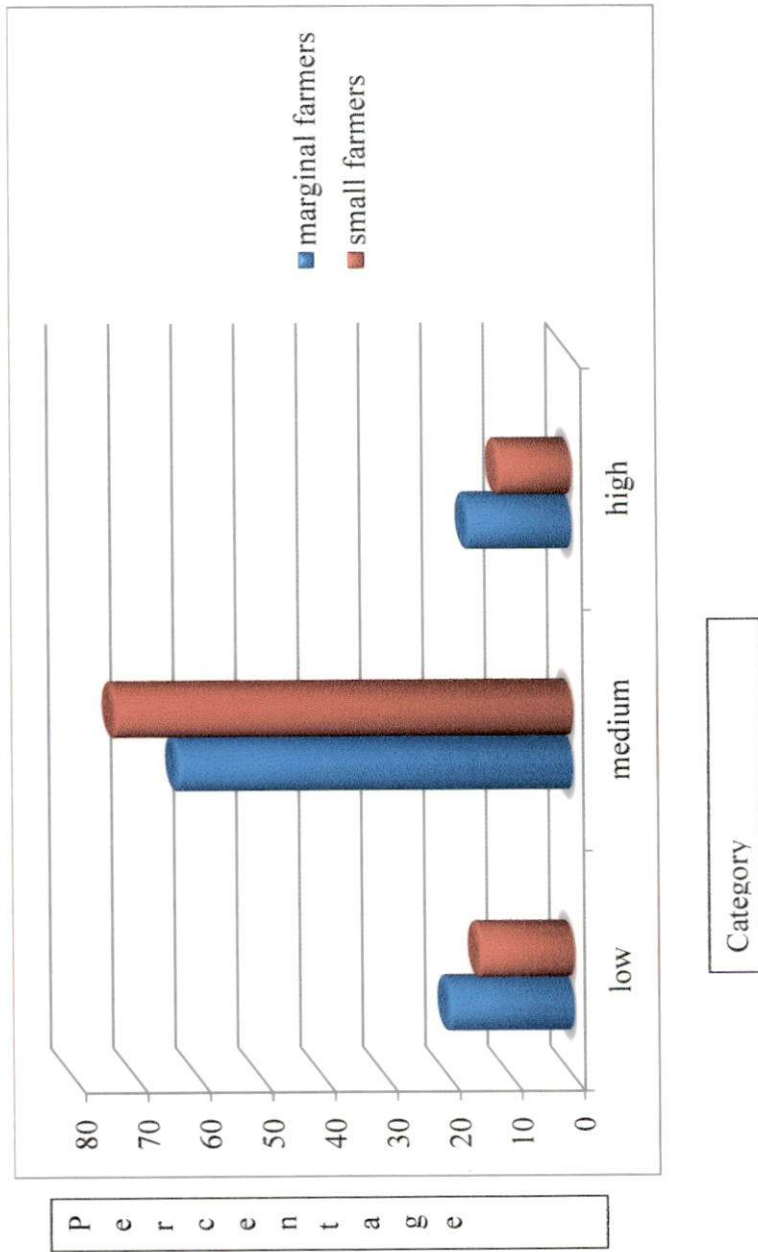
Analysed result of risk taking ability of small farmers is represented in table 15(b).

Table 15 b: Distribution of small farmers based on their risk taking ability

Sl no.	Category	No.	Percentage
1.	Low ($< Q_1$)	9	15
2.	Medium (Q_1-Q_3)	44	73.33
3.	High ($> Q_3$)	7	11.67

$Q_1 = 21$, $Q_3 = 25$

Fig 10: Percentage distribution of farmers based on their risk taking ability.



From the above table it was observed that 73.33 per cent of the small farmers are having medium risk taking ability followed by low (15%) and high (11.67%).

Majority of the total surveyed respondents were having medium risk taking ability. These findings are in accordance with the findings of Subramanyam (2002), Bhagyalaxmi et al. (2003).

4.3.14 Achievement motivation

4.3.14.1 Achievement motivation of marginal and small farmers

The achievement motivation of marginal and small farmers was analysed and the result is presented in table 16 (a) and 16 (b) respectively.

The achievement motivation of marginal farmers is depicted in table 16 (a).

Table16 a: Distribution of marginal farmers according to their achievement motivation

Sl no.	Category (N=60)	No.	Percentage
1.	Low (<Q ₁)	9	15
2.	Medium (Q ₁ -Q ₃)	39	65
3.	High (>Q ₃)	12	20

Q₁= 22 , Q₃= 25

The above table depicts that 65 per cent of the marginal farmers were having medium level achievement motivation followed by high (20%) and low (15%) level achievement motivation respectively.

The achievement motivation of small farmers was analysed and the result is presented in table 16 (b).

Table16 b: Distribution of small farmers according to their achievement motivation

Sl no.	Category (N=60)	No.	Percentage
1.	Low (<Q ₁)	14	23.33
2.	Medium (Q ₁ -Q ₃)	34	56.67
3.	High (>Q ₃)	12	20

Q₁= 24 , Q₃= 27

From the table it is clear that majority of the small farmers (56.67%) were having medium level achievement motivation followed by low (23.33) and high (20%) respectively.

So from both the table 16 (a) and 16 (b) it can be concluded that majority of the surveyed farmers were having medium level achievement motivation.

4.3.14.3 Comparison of achievement motivation of marginal and small farmers

The comparison was carried out using single factor ANOVA technique and the result is presented in table 16 (c).

Table 16 c: Comparison of achievement motivation of small and marginal farmers

Source of variation	SS	df	MS	F	P- value	F critical
Between groups	88.408	1	88.408	16.111	0.00010	3.921
Within groups	647.516	118	5.487			
Total	735.925	119				

Here the calculated F value was greater than the critical F value hence there was significant difference between the achievement motivation of small and marginal farmers.

The sum obtained for small farmers (Sum=1523) was greater than that of marginal farmers (Sum=1420). So the degree of achievement motivation was more for

small farmers compared to marginal farmers. This can be linked with their more interest in product diversification along with the significant difference they were showing in the case of level of aspiration, economic motivation and competition orientation when compared to marginal farmers.

4.3.15 Mass media contact

4.3.15.1 Mass media contact of marginal and small farmers

The mass media contact of marginal and small farmers is analysed and the result is presented in table 17 (a) and 17 (b) respectively.

Table 17 (a) depicts the mass media contact of marginal farmers.

Table 17 a: Distribution of marginal farmers according to their mass media contact

Sl no.	Category (N=60)	No.	Percentage
1.	Low (<Q ₁)	15	25
2.	Medium (Q ₁ -Q ₃)	40	66.67
3.	High (>Q ₃)	5	8.33

Q₁= 13.75 , Q₃= 16

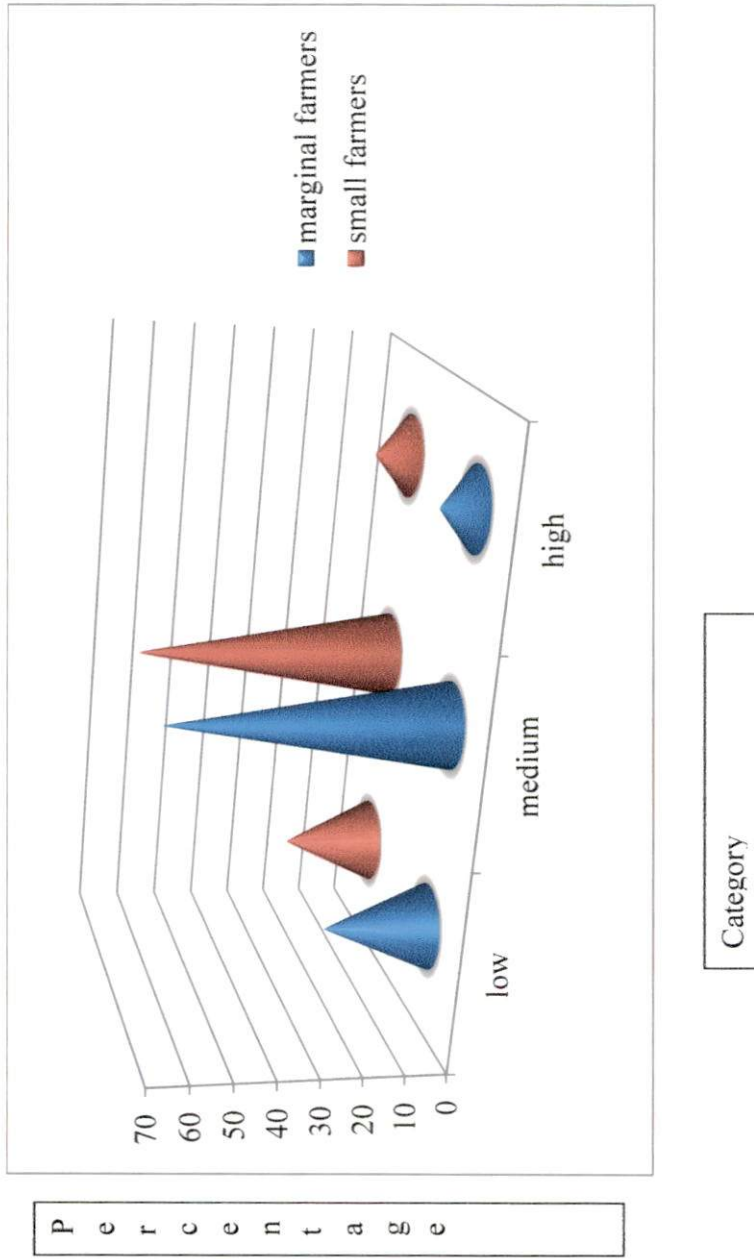
From table 17 (a) it can be concluded that 66.67 per cent of marginal farmers were having medium level mass media contact followed by low (25%) and high (8.33%) respectively.

Analysed result of mass media contact of small farmers is represented in table 17(b)

Table 17 b: Distribution of small farmers according to their mass media contact

Sl no.	Category (N=60)	No.	Percentage
1.	Low (<Q ₁)	13	21.67

Fig 11: Percentage distribution of farmers based on their mass media contact.



2.	Medium (Q ₁ -Q ₃)	38	63.33
3.	High (>Q ₃)	9	15

Q₁= 14 , Q₃= 16

From the above table it is observed that 63.33 per cent of the small farmers were having medium mass media contact followed by low (21.67%) and high (15%).

From table 17 (a) and 17 (b) it can be conclude that majority of the farmers were having medium level mass media contact irrespective of them being marginal or small. The result obtained is in accordance with the findings of Suresh (2004) and Kumar (2013).

4.4. CORRELATION OF THE PROFILE CHARECTERISTICS OF THE FARMERS TO THEIR PERCEPTION REGARDING FEASIBILITY AND UTILITY.

4.4.1 Correlation between perception regarding the feasibility of IFS of the farmers to the independent variables.

The calculated correlation between the perception of the farmers regarding feasibility of IFS and their profile characters are depicted in table 18 (a).

Table 18 a: Correlation between perception regarding the feasibility of IFS of the farmers to the independent variables.

Sl no.	Independent variables	r values	
		Marginal farmers	Small farmers
1.	Age	0.22	-0.188
2.	Education	-0.015	0.062
3.	Family size	0.251*	0.159

4.	Economic motivation	0.328**	0.294*
5.	Level of aspiration	0.199	0.370**
6.	Self confidence	0.322**	-0.029
7.	Input availability	0.039	-0.015
8.	Experience in farming	0.056	0.15
9.	Product diversification	-0.083	-0.043
10.	Resource recycling	0.306*	0.297*
11.	Entrepreneurial behaviour	0.142	0.351**
12.	Orientation towards competition	0.132	-0.030
13.	Risk taking ability	-0.013	-0.24
14.	Achievement motivation	0.075	0.122
15.	Mass media contact	-0.176	0.067

Significant positive correlation was observed between the profile characteristics of marginal farmers such as family size, economic motivation, self-confidence and resource recycling to the perception of the farmers regarding feasibility of integrated farming system.

Similarly significant positive correlation was observed between economic motivation, level of aspiration, resource recycling and entrepreneurial behaviour of small farmers to their perception regarding feasibility of the integrated farming systems.

Hence it can be understood that economic motivation and resource recycling are the common characters of both small and marginal farmers that were showing positively significant relationship with their perception regarding the feasibility of integrated farming systems, that is when the farmer's awareness regarding practicability in carrying out integrated farming increases the economic motivation and tendency of resource recycling also increases.

4.4.2 Correlation between perception regarding the utility of IFS of the farmers to the independent variables.

The calculated correlation between the perception of the farmers regarding feasibility of IFS and their profile characters are depicted in table 18 (b)

Table 18 b: Correlation between perception regarding the utility of IFS of the farmers to the independent variables.

Sl no.	Independent variables	r values	
		Marginal farmers	Small farmers
1.	Age	0.1229	-0.099
2.	Education	-0.066	-0.137
3.	Family size	0.262**	0.205
4.	Economic motivation	0.234	0.297*
5.	Level of aspiration	0.53**	0.282*
6.	Self confidence	0.315*	0.251*
7.	Input availability	-0.078	-0.05
8.	Experience in farming	0.264*	0.144

9.	Product diversification	0.035	0.05
10.	Resource recycling	0.096	0.196
11.	Entrepreneurial behaviour	0.307*	0.18
12.	Orientation towards competition	-0.177	0.267*
13.	Risk taking ability	0.096	-0.1004
14.	Achievement motivation	0.335**	0.37**
15.	Mass media contact	-0.043	-0.19

Profile characters of marginal farmers such as family size, level of aspiration, self-confidence, experience in farming, entrepreneurial behaviour and achievement motivation showed a significant positive correlation to their perception regarding utility of integrated farming system.

Likewise a significant positive correlation was observed between economic motivation, level of aspiration, self-confidence, orientation towards competition and achievement motivation of small farmers and their perception regarding utility of integrated farming system.

Economic motivation, self-confidence, level of aspiration and achievement motivation are the common characters that are showing significantly positive relation with the perception of farmers regarding the utility of integrated farming system that is when the awareness of farmers regarding the use and benefits of integrated farming system improves it shows a similar effect in their self-confidence, level of aspiration, achievement and economic motivation.

4.5 INVOLVEMENT OF FAMILY MEMBERS

Involvement of family members was mainly found in four different activities among the listed nine activities. These activities were harvesting of crops, marketing of produce, purchase of animals and care and management of animals.

4.5.1 Involvement of family members in harvesting of crops

The involvement of family members of marginal and small farmer is depicted in table 19(a) and 19 (b).

Family member involvement of marginal farmers in harvesting of crops is depicted in table 19 (a).

Table 19 a: Involvement of family members of marginal farmers in the harvesting of crops

Sl no.	Family member	Family member involvement of marginal farmers (N=60)					
		Most often (no)	Percentage	Sometimes (no)	Percentage	Never (no)	Percentage
1.	Wife	13	21.67	9	15	38	63.33
2.	Daughter	0	0	7	11.67	53	88.33
3.	Son	0	0	11	18.33	49	81.67

From the above table it is clear that 21.67 per cent of the farmers were most often helped by their wives while 15 per cent were sometimes helped by their wives. But majority of the marginal farmers that is 63.33 per cent were never helped by their spouses for harvesting activities. Often contribution of sons and daughters were absent in the performance of this activity but 11.67 per cent and 18.33 per cent of daughter's contribution and son's contribution respectively was utilised by the farmers for the

harvesting of crops. Similarly 88.3 per cent and 81.67 per cent of farmers were never getting help from their daughters and sons in performing harvesting activity.

The involvement of family members of small farmers is depicted in table 19(b)

Table 19 b: Involvement of family members of small farmers in the harvesting of crops

Sl no.	Family member	Family member involvement of small farmers (N=60)					
		Most often (no)	Percentage	Sometimes (no)	Percentage	Never (no)	Percentage
1.	Wife	16	26.67	11	18.33	33	55
2.	Son	5	8.33	4	6.67	51	85
3.	Daughter	0	0	6	10	54	90

The above table depicts that 26.67 per cent of the farmers were most often helped by their wives while 18.33 per cent were sometimes helped by their wives. But majority of the small farmers that is 55 per cent were never helped by their spouses for harvesting activities. Often contribution of daughters were absent in the performance of this activity but 8.33 per cent of farmers were often helped by their sons in harvesting. 10 per cent and 6.67 per cent of daughter's contribution and son's contribution respectively was utilised by the farmers for the harvesting of crops. Similarly 90 per cent and 85 per cent of farmers were never getting help from their daughters and sons in performing harvesting activity.

As we have already discussed majority of the marginal and farmers were having family size of 3-6. Hence the identified contributors from the family are sons, wives and daughters. From the above table we can see that wives were the major contributors in the case of harvesting of produce. While the contribution of sons and daughters were limited to sometimes or even never. This can be related with the earlier discussed

aspects like the lack of interest of younger generation in agriculture. Also most of the children of the farmers were coming under student or working category limiting their contribution in farming. The mechanisations of fields were also a reason for slight involvement of family members in harvesting activities. The obtained result is having similarities with the findings of Jacob et al. (2014).

4.5.2 Involvement of family members in marketing of produce.

The involvement of family members of marginal and small farmers is depicted in table 20(a) and 20 (b) respectively.

The family member involvement of marginal farmers in the marketing of produce is represented in table 20(a).

Table 20 a: Involvement of family members of marginal farmers in the marketing of produce

Sl no.	Family member	Family member involvement of marginal farmers (N=60)					
		Most often (no)	Percentage	Sometimes (no.)	Percentage	Never (no.)	Percentage
1.	Wife	6	10	21	35	33	55
2.	Son	16	26.67	2	3.33	42	70

The table depicts that wives and sons were the family members involving in marketing of the produce. While considering the contribution of sons 26.67 per cent of the farmers were most often helped by their sons in marketing of produce. Similarly 3.33 per cent and 70 per cent of the farmers were sometimes and never helped by their sons respectively in marketing their produce. Only 10 per cent of the farmers were most often helped by their wives in marketing. 35 per cent and 55 per cent of the farmers were sometimes and never helped by their wives respectively in carrying out this activity.

The involvement of family members of small farmers in marketing of produce are depicted in table 20(b)

Table 20 b: Involvement of family members of small farmers in the marketing of produce

Sl no.	Family member	Family member involvement of small farmers (N=60)					
		Most often (no)	Percentage	Sometimes (no.)	Percentage	Never (no.)	Percentage
1.	Wife	7	11.67	15	25	38	63.33
2.	Son	14	23.33	3	5	43	71.67

Table shows that 23.33 per cent of the farmers were most often helped by their sons in carrying out marketing while 5 per cent and 71.67 per cent were sometimes and never helped by their sons respectively in carrying out marketing. Similarly 11.67 per cent of farmers were helped by their wives in carrying out marketing while 25 per cent and 63.33 per cent of the farmers were sometimes and never helped by their wives respectively in carrying out market.

The result shows the most often involvement of sons to be larger than wives. However wives can be identified as the major contributors considering their overall involvement. The result has similarities with the findings of Jacob et al. (2014).

4.5.3 Involvement of family members in purchase of animals

The involvement of family members of marginal farmers is depicted in table 21(a) and 21 (b) respectively.

The involvement of the family members of marginal farmers regarding purchase and sale of farm animals is represented in table 21(a).

Table 21a: Involvement of family members of marginal farmers in the purchase of animals

Sl no.	Family members	Family member involvement of marginal farmers (N=60)					
		Most often (no.)	Percentage	Sometimes (no.)	Percentage	Never (no)	Percentage
1.	Wife	1	1.67	4	6.67	55	91.67
2.	Son	8	13.33	11	18.33	41	68.33

From the table it is understood that 91.67 per cent of the farmers were never helped by their wives in purchasing of animals while 6.67 per cent and 1.67 per cent were sometimes and most often helping them respectively in carrying out this activity. Similarly 68.33 per cent of the marginal farmers were never helped by their sons in purchase of animals while 18.33 per cent and 13.33 per cent of the farmers respectively were sometimes and most often helped by their sons.

The involvement of family members of small farmers in purchase and sale of animals is depicted in table 21(b)

Table 21 b: Involvement of family members of small farmers in the purchase of animals

Sl no.	Family members	Family member involvement of small farmers (N=60)					
		Most often (no.)	Percentage	Sometimes (no.)	Percentage	Never (no)	Percentage
1.	Wife	3	5	8	13.33	49	81.67
2.	Son	5	8.33	4	6.67	51	82.33

From the table it is understood that 81.67 per cent of the farmers were never helped by their wives in purchasing of animals while 13.33 per cent and 5 per cent were sometimes and most often helping them respectively in carrying out this activity. Similarly 82.33.33 per cent of the marginal farmers were never helped by their sons in purchase of animals while 6.67 per cent and 8.33 per cent of the farmers respectively were sometimes and most often helped by their sons.

The result shows the most often involvement of sons to be larger than wives. However wives can identified as a major contributors considering their overall involvement. The result is having similarities with the findings of Jacob et al. (2014).

4.5.4 Involvement of family members in care and management of animals.

The involvement of family members of marginal and small farmers is depicted in table 22(a) and 22 (b) respectively.

The involvement of family members of marginal farmers in care and management of animals are depicted in table 22 (a).

Table 22 a: Involvement of family members of marginal farmers in care and management of animals

Sl no.	Family members	Family member involvement of marginal farmers (N=60)					
		Most often (no.)	Percentage	Sometimes (no.)	Percentage	Never (no.)	Percentage
1.	Wife	38	63.33	18	30	4	6.7
2.	Daughter	13	21.66	5	8.33	42	70
3.	Son	4	6.66	11	18.33	45	75

Majority of the marginal farmers (63.33%) were most often helped by their wives in care and management of animals while the most of involvement of daughters

and sons were 21.66 per cent and 6.66 per cent respectively. Similarly 18 per cent of the farmers had a sometimes involvement of their wives in this activity which is 5 per cent and 11 per cent respectively in the case of daughters and sons. Seventy per cent of the farmers were never getting any involvement from their daughters and seventy five per cent of the farmers were never getting any help from their sons. Only 6.7 per cent farmers reported a never involvement from their wives regarding care and management of animals.

The involvement of family members of small farmers in care and management of animals is depicted in table 22(b)

Table 22 b: Involvement of family members of small farmers in care and management of animals

Sl no.	Family members	Family member involvement of small farmers (N=60)					
		Most often (no.)	Percentage	Sometimes (no.)	Percentage	Never (no.)	Percentage
1.	Wife	31	51.66	19	31.67	10	16.67
2.	Daughter	8	13.33	14	23.33	38	63.33
3.	Son	7	11.66	8	13.33	45	75

Majority of the small farmers (51.66%) were most often helped by their wives in care and management of animals while the most of involvement of daughters and sons were 13.33 per cent and 11.66 per cent respectively. Similarly 31.67 per cent of the farmers had a sometimes involvement of their wives in this activity which is 23.33 per cent and 13.33 per cent respectively in the case of daughters and sons. However 63.33 per cent of the farmers were never getting any involvement from their daughters and 75 per cent of the farmers were never getting any help from their sons. Only 16.67 per cent farmers reported a never involvement from their wives regarding care and management of animals.

Under care and management of animals the activities like feeding of animals, cleaning, milking even activities like collection of eggs were counted. And among both marginal and small farmers wives were the major contributors. This was because most of them were house wives and were very much interested in the management of farm animals. However the contribution of sons and daughters were less considering their working and studying nature. The result obtained is having similarities with the findings of Jacob et al. (2014).

4.6 SEASONAL EMPLOYMENT PATTERN AND EMPLOYMENT PROFILE

Seasonal employment pattern was analysed by identifying the employment pattern of major crops and also the employment availability from their allied enterprises by calculating the labour days. Seasonal details of the major crops along with the major activities performed were also identified. The result of this is presented below according to the major crops. Employment profile of the marginal and small farmers was separately identified.

4.6.1 Seasonal Employment pattern

4.6.1.1 Seasonal employment pattern of rice based farming system.

The seasonal employment pattern of rice based farming systems were studied under the subdivisions employment pattern of rice fields, seasonal details and employment availability from allied enterprises.

4.6.1.1.1 Employment pattern of rice fields

The employment pattern of rice fields of Kuttanad was calculated for a season and the result is presented in table 23 (a)

Table 23 a: Employment pattern in rice fields of Kuttanad

Sl no.	Activities performed	No. of labours/ acre	No. of days/acre	Total no. of labour days/ acre
1.	Land preparation	2	2	4

2.	Sowing (Broadcasting)	1	1	1
3.	De watering	1	1	1
4.	Plastering of bunds	2	1	2
5	Fertilizer application (3 splits)	2	3 (1 day for one split application)	6
6.	Pesticide application	2	2	4
7.	Harvesting	2	1	2
			Total	20

From the above table it is clear that the rice fields of Kuttanad provide a total of 20 labour days per acre.

The total no. of labour days obtained from the rice fields of Kuttanad was less compared to other rice cultivating areas. This is because of the absence of operations like transplanting and weeding due to the submerged condition of Kuttanadan field along with the mechanisation practiced by the farmers. Most of the activities in the fields were carried out with the help of male labours considering difficulty in the availability of female labours. This is because most of the female labours were now engaged under NREGRA.

4.6.1.1.2 Seasonal details of rice cultivation in Kuttanad

A panchayat wise seasonal details of rice cultivation in Kuttanad is presented in table 23 (b).

Table 23 b: Seasonal details of rice cultivation from different panchayats of Kuttanad.

Sl no.	Panchayats	Variety cultivated	No. of cropping seasons cultivation practiced	Cropping seasons
1.	Kumarakom	Uma	One	1.Virippu
2.	Nedumudi	Uma	Two	1.Puncha 2.Extended puncha
3.	Niranam	Uma	Two	1.Puncha 2.Extended puncha

Here we can see that the farmers of Kumarakom panchayat were only cultivating rice in one season that is Virippu. While in the case of Nedumudi and Niranam panchayats, rice was cultivated for two crop seasons namely Puncha and Extended puncha.

Considering the inundation of salt water in the rice field due to the opening of Thaneermukkam bund, the farmers of Kuttanad are restricted to cultivate rice to one or two seasons. This was the reason, why they are depending on other allied enterprises which offer them year round employment and increased income.

4.6.1.3 Employment availability of allied enterprises in rice based farming systems.

The employment availability of allied enterprises is represented in table 23 (c).

Table 23 c: Employment availability of other components included in rice based farming systems

Sl no.	Name of the component	Employment availability
1.	Fish	9 months
2.	Dairy	Round the year
3.	Poultry	Round the year
4.	Duckery	Round the year
5.	Goatry	Round the year
6.	Piggery	Round the year

From this table it can be understood that all the animal components other than fisheries included in rice based farming systems were offering year round employment and income to the farmers. While fisheries offer 9 to 10 months of employment.

4.6.1.2 Seasonal Employment pattern of coconut based farming system.

The seasonal employment pattern of coconut based farming systems was studied and the result is presented under the subdivisions employment pattern of coconut plantations and employment availability from allied enterprises.

4.6.1.2.1 Employment pattern of coconut plantations in Kuttanad

The employment pattern of coconut was not seasonal considering its perennial nature. But the timeliness of the performance of various activities related to the crop is represented in table 24 (a) based on the respective panchayats.

Table 24 a: Employment pattern of coconut plantations of the three panchayats

Sl no	Panchayat	Activities performed	Time gap within which activities are performed					
			45 days (no)	Percentage	45-60 days (no.)	Percentage	60 days (no.)	Percentage
1.	Kumarakom (N=9)	1.Harvest 2.Plant protection	0	0	2	22.22	7	77.77
2.	Nedumudi (N=7)	1.Harvest 2.Plant protection	4	57.14	1	14.28	2	28.57
3.	Niranam (N=8)	1.Harvest 2.Plant protection	6	75	2	25	0	0

From the above table it is clear that harvest and plant protection were the two major activities performed in coconut gardens. Both of these activities were simultaneously performed by the farmers. In the case of Kumarakom panchayat 77.7 per cent of the farmers were performing these activities within a gap of 60 days while a small portion (22.22%) was performing these activities between 45 to 60 days. Similarly in Nedumudi and Niranam panchayats 57.14 per cent and 75 per cent farmers respectively were carrying out these activities within 45 days. However 14.28 per cent and 25 per cent of farmers of Nedumudi and Niranam were performing these activities between 45 to 60 days. None from Niranam carry out this activity by 60 days while 28.7 per cent coconut farmers of Nedumudi fall under this category.

This difference in the gap for performing these activities was due to the unavailability skilled of labour to carry out activities like harvesting. The labour availability was found to be difficult in Kumarakom compared to the other two panchayats. This gap in performance of activities makes the coconut gardens suitable to include other crops and enterprises to ensure increased income and year round employment.

4.6.1.2.2 Employment availability of allied enterprises of coconut based farming system

The employment availability of allied enterprises is represented in table 24 (b).

Table 24 b: Employment availability of other components included in coconut based farming systems

Sl no.	Name of the component	Employment availability
1.	Pepper	10 labour days/ acre
2.	Tuber	6 labour days / acre
3.	Dairy	Round the year
4.	Poultry	Round the year
5.	Goatry	Round the year
6.	Rabbit	Round the year

Pepper and tubers like colocasia and elephant foot yam were the main intercrops identified in coconut based farming system. Pepper provided a total of 10 labour days at the same time tubers were providing a total of 6 labour days per acre. The animal components other than fisheries included in coconut based farming systems were offering year round employment and income to the farmers. While fisheries offer 9 to 10 months of employment.

4.6.1.3 Seasonal Employment pattern of banana based farming system.

The seasonal employment pattern of banana based farming systems was studied and the result is presented under the subdivisions employment pattern of banana cultivations, seasonal details and employment availability from allied enterprises.

4.6.1.3.1 Employment pattern of banana cultivations.

The employment pattern of banana cultivations are represented in table 25 (a).

Table 25 a: Employment pattern of banana cultivations of Kuttanad

Sl no.	Activities performed	No. of labours / acre	No. of days / required / acre	Total no. of labour days
1.	Land preparation	2	3	6
2.	Planting	2	2	4
3.	Inter cultural operation	2	2	4
4.	Fertilizer application (5 splits)	2	5	10
5.	Pesticide application	2	1	2
6.	Harvesting	2	1	2
			Total	28

Most of the banana cultivations in Kuttanad were non irrigated types so the process of irrigation was absent here. From the above table it was understood that a total of six activities were performed by banana farmers and for this they require a total of 28 labour days.

The banana cultivation in Kuttanad provides only 28 labour days per acre because of the absence of operations like irrigation etc. the farmers were practicing non

irrigated types of cultivation because of raised water table and unavailability of good quality irrigation water.

4.6.1.3.2 Seasonal details of banana cultivations.

The seasonal details of banana cultivations of different panchayats in Kuttanad are presented in table 25 (b).

Table 25 b: Seasonal details of banana cultivation in Kuttanad

Sl no.	Panchayat	Variety	Cropping season
1.	Kumarakom	Nendran	Dec/Jan- Aug/Sep (Harvest in Chingam)
2.	Nedumudi	Nendran	
3.	Niranam	Nendran Swarnamukhi	

From the above table it can be understood that in three of the selected panchayats the cultivation was taking place by Dec/Jan to Aug/Sep. The farmers were mainly cultivating varieties like Nendran and Swarnamukhi aiming the Onam market.

4.6.1.3.3 Employment availability of allied enterprises of banana based farming system

The employment availability of allied enterprises is represented in table 25 (c).

Table 25 c: Employment availability of other components included in banana based farming systems

Sl no.	Name of the component	Employment availability
1.	Amaranthus	2 labour days/ acre

2.	Tubers	7 labour days/acre
3.	Dairy	Round the year
4.	Poultry	Round the year
5.	Goatry	Round the year

Amaranthus and tubers like tapioca and colocasia were the major inter crops in banana gardens. The available labour days from amaranthus are 2 while that from tubers were 7 per acre. The animal components included were offering year round employment to the farmers.

4.6.1.4 Seasonal employment pattern of vegetable based farming systems.

The seasonal employment pattern of banana based farming systems was studied and the result is presented under the subdivisions employment pattern of banana cultivations, seasonal details and employment availability from allied enterprises.

4.6.1.4.1 Employment pattern from vegetables.

Employment pattern from vegetable cultivations are represented in table 26 (a).

Table 26 a: Employment pattern of vegetable cultivations of Kuttanad

Sl no.	Activities performed	No. of labours / acre	No. of days required / acre	Total no. of labour days
1.	Land preparation	2	2	4
2.	Pandal erection	2	1	2
3.	Planting	2	1	2
4.	Fertilizer application (2splits)	1	2	2

5.	Pesticide application	1	1	1
6.	Harvesting	2	1	2
			Total	13

The major cultivated vegetables in Kuttanad fields were cucurbits like snake guard, coccinia and cowpea. All these crops were cultivated with the help of supporting structures that were commonly called as Pandals. The total number of labour days available for these vegetable crops per acre is nearly 13. The farmers here prefer Pandal crops due to its huge market demand and reasonable returns.

4.6.1.4.2 Seasonal details of vegetable cultivations.

The seasonal details of vegetable cultivations of different panchayats in Kuttanad are presented in table 26 (b).

Table 26 b: Seasonal details of vegetable cultivation of different panchayats of Kuttanad.

Sl no.	Panchayat	Main vegetables cultivated	Cropping season
1.	Kumarakom	Snake guard, coccinia , cowpea	1. March – May 2. July- September
2.	Nedumudi	Snake guard, cowpea	1. March – May 2. July- September
3.	Niranam	Snake guard, cowpea, coccinia	1. March – May 2. July- September

From the above table it is understood that vegetable cultivation was practiced for 2 seasons in each of the three panchayats. The ecological conditions of Kuttanad like salinity and acidity forbids the farmers from carrying out year round production of vegetables. Hence the farmers depend on allied enterprises for year round employment.

4.6.3.3 Employment availability of allied enterprises of vegetable based farming system

The employment availability of allied enterprises is represented in table 26 (c).

Table 26 c: Employment availability of other components included in vegetable based farming systems

Sl no.	Name of the component	Employment availability
1.	Dairy	Round the year
2.	Poultry	Round the year
3.	Goatry	Round the year

From the above table it is understood that the main animal components that were included in vegetable based farming systems were able to provide year round employment to the farmers.

4.6.2 Involvement of other state laborers

While studying the employment pattern in Kuttanadan farming systems the involvement other state laborers were identified in Kumarakom panchayat. Out of the 40 IFS farmers surveyed in Kumarakom panchayat 6 were depending on other state laborers for agriculture and allied activities. That is a 15 per cent contribution of other state laborers was observed in Kumarakom panchayat. These laborers were mainly from the states of Tamil nadu, Assam, Bihar and West Bengal.

Other than Kumarakom panchayat neither the farmers of Niranam panchayat nor the farmers of Nedumudi panchayats are not depending on other state laborers for agricultural purposes. Hence the contribution of these laborers in agriculture and allied activities was observed to be nil in these panchayats.

The dependency of farmers of Kumarakom panchayat on other state laborers was mainly due to the lack of laborers available in this panchayat compared to the other to selected panchayats

4.6.3 Employment profile of the IFS farmers.

4.6.3.1 Occupational details of IFS farmers.

Occupational details of the surveyed IFS farmers are presented in table 27.

Table 27: Distribution of farmers according to their subsidiary occupation.

Sl no.	Types of farmers	With subsidiary occupation		Without subsidiary occupation	
		No.	Percentage	No.	Percentage
1.	Marginal farmers(N=60)	17	28.33	43	71.67
2.	Small farmers (N=60)	0	0	60	100

From the table it is understood that 28.33 per cent of the marginal farmers were depending on subsidiary occupation while none among the small farmers were having any subsidiary occupation.

The practice of subsidiary occupation among marginal farmers was due to their easiness in marketing produce and decreased income compared to small farmers. The results obtained here have similarities to the findings of Coppard (2001).

4.6.3.2 Subsidiary occupation of marginal farmers

The details of different subsidiary occupation practiced by the farmers are represented in table 28.

Fig 12: Distribution of marginal farmers with and without subsidiary occupation.

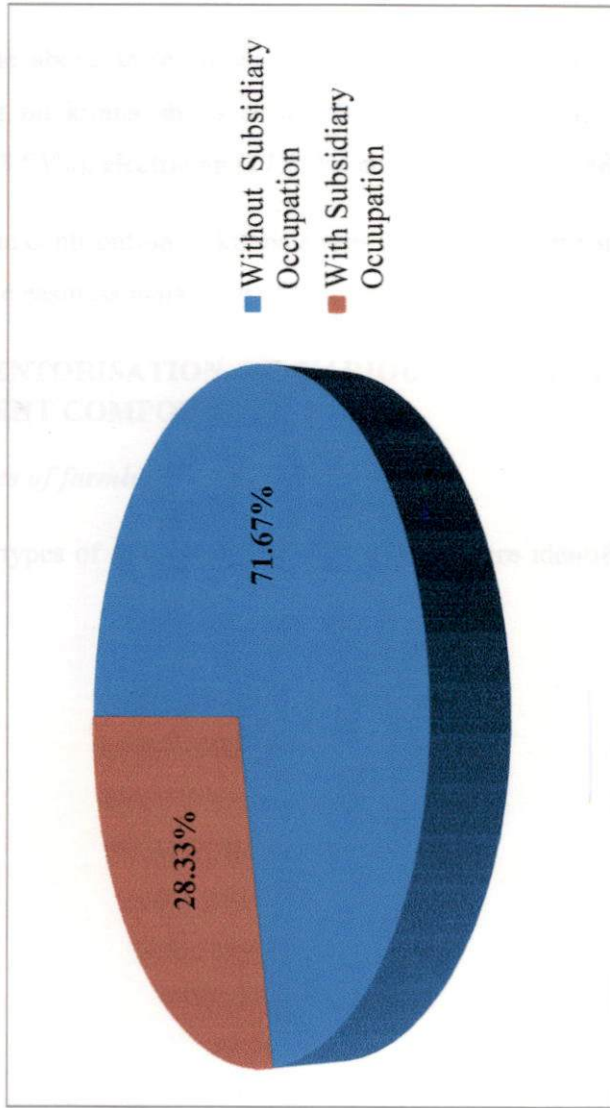


Table 28: Distribution of marginal farmers who practice subsidiary occupation based on different occupation practiced.

Sl no.	Types of occupation (N=17)	No.	%
1.	“Kirana” shops	9	52.94
2.	Auto service	4	23.53
3.	Electrician	3	17.65
4.	LIC Agents	1	5.88

The above table shows that majority of the marginal farmers (52.94%) were depending on kirana shops as a subsidiary occupation. This was followed by auto service (23.53%), electrician (17.65%) and LIC agents (5.88%).

The contribution of kirana shops were larger compared to other occupation. This was for the easiness marketing of their own produce.

4.7 INVENTORISATION OF VARIOUS FARMING SYSTEMS AND THEIR DIFFERENT COMPONENTS.

4.7.1 Types of farming systems

Different types of farming systems of Kuttanad are identified and represented in table 29.

Fig 13: Distribution of marginal farmers based on their subsidiary occupations

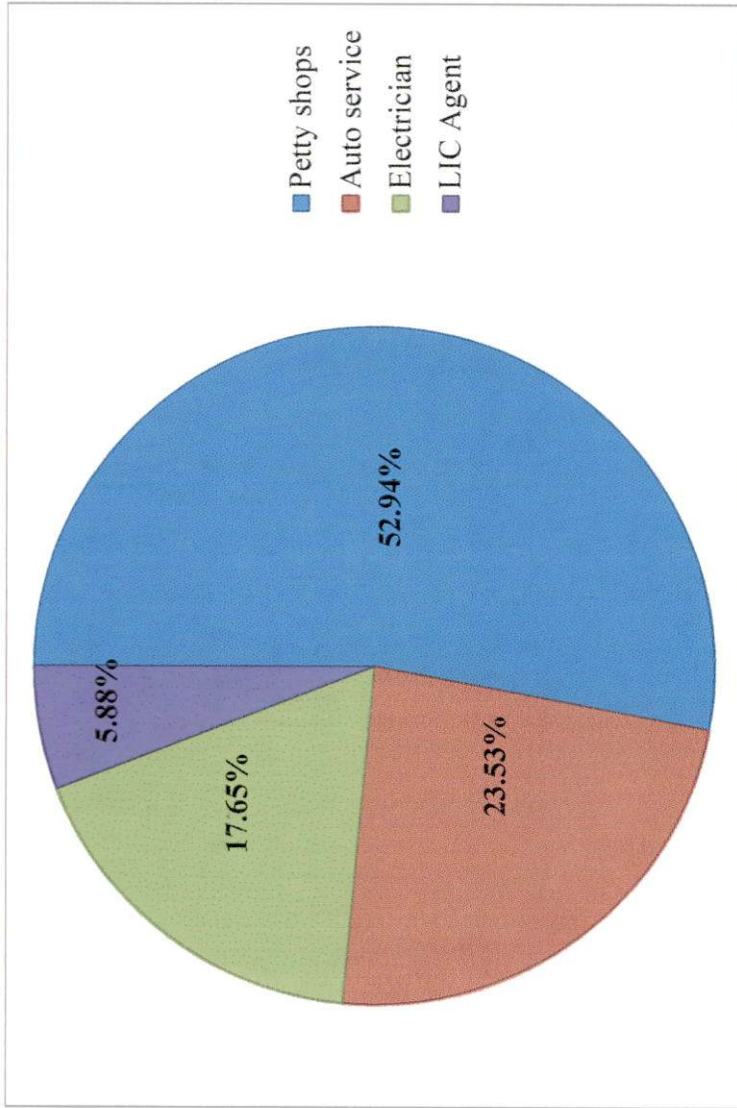


Table 29: Distribution of different farming systems in the selected panchayats.

Sl no.	Panchayat	Rice based farming system		Coconut based farming system		Banana based farming system		Vegetable based farming system	
		No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
1.	Kumarakom (N=40)	23	57.5	9	22.5	5	12.5	3	7.5
2.	Nedumudi (N=40)	26	65	7	17.5	3	7.5	4	10
3.	Niranam (N=40)	19	47.5	8	20	7	17.5	6	15
	Total (120)	68	56.67	24	20	15	12.5	13	10.83

From the above table it can be understood that 56.67 per cent of the total surveyed farming systems in Kuttanad was rice based farming system this was followed by coconut (20%), banana (12.5%) and vegetable (10.83%) based farming systems.

Nedumudi panchayat in Alapuzha district accounts for maximum of the rice based farming system (65%), followed by Kumarakom (57.5%) and Niranam (47.5%) panchayats of Kottayam and Pathanamthitta districts respectively. Majority of the coconut based farming systems (22.5%) are found in the kumarakom panchayat followed by Niranam (20%) and Nedumudi (17.5%) panchayats. Niranam panchayat had majority of the banana and vegetable based farming system.

4.7.2 Components of different farming systems in Kuttanad

The details of different components present in various farming systems (both plant and animal components are represented in table 30 and table 31 respectively.

Fig 14: Major farming systems of Kuttanad

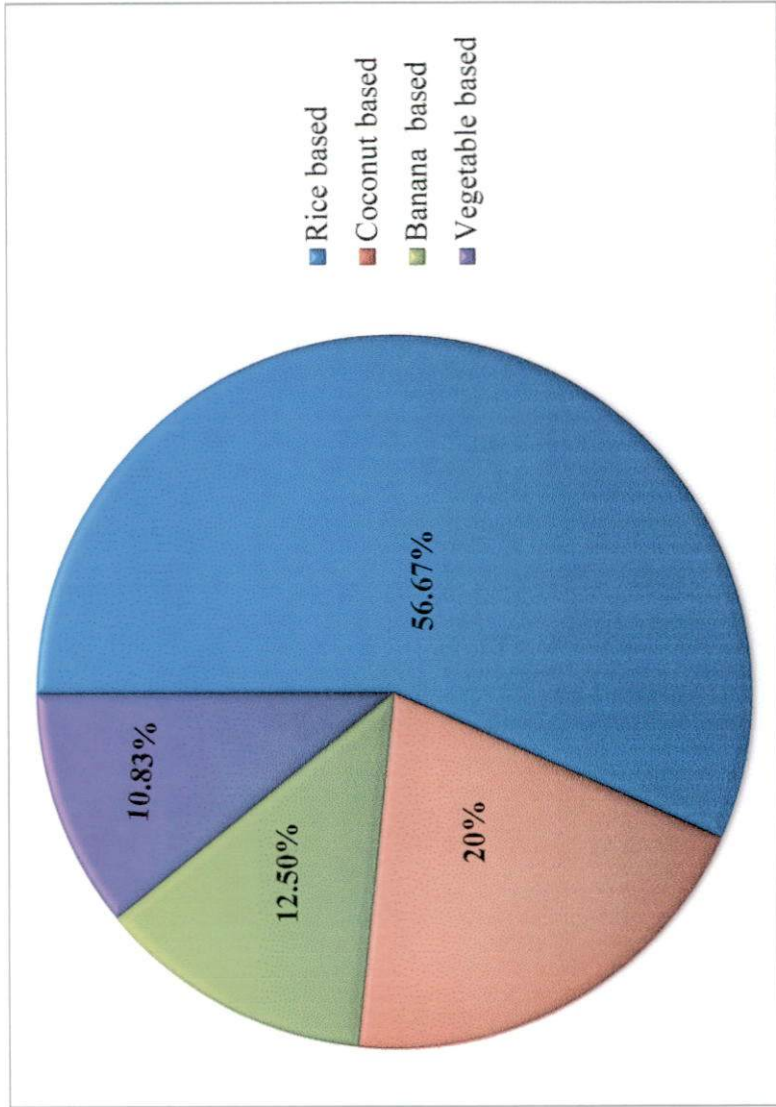
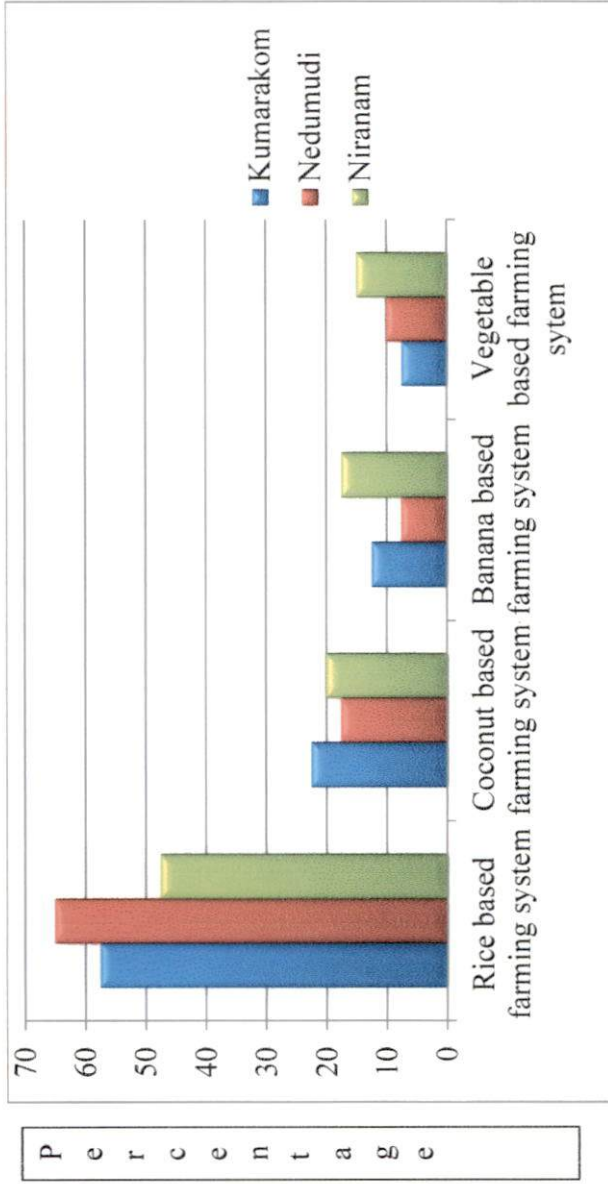


Fig 15: Distribution of different farming systems in the three selected panchayats.



Different types of farming systems

P e r c e n t a g e

Table 30: Details of integrated farming system components inventorised from Kuttanad

CROP COMPONENTS	ANIMAL COMPONENTS
Rice	Poultry (hen, turkey emu, quail)
Coconut	Dairy (cow , buffalo)
Vegetables(cucurbits, amaranthus, cowpea)	Goatry
Banana	Rabbit
Tubers(colocasia , Elephant foot yam)	Piggery
Pepper	Duckery

The table above gives the information about various crop and animal components found in the Kuttanadan fields.

Table 31: Details of important farming systems of Kuttanad

Sl no.	Farming system	Crop component	Animal component
1.	Rice based farming system	Rice	Fish, poultry, duckery, diary, piggery, goatry
2.	Coconut based farming system	Coconut , pepper , tubers (Elephant foot yam, colocasia)	Poultry, fish, dairy , rabbit
3.	Banana based	Banana , vegetables	Dairy, poultry, goatry
4.	Vegetable based	Snake guard , coccinia , amaranthus, cowpea	Dairy , poultry, goatry

Table 31 has an overall representation of the four farming systems found in Kuttanad along with various plant and animal components present in each farming system.

4.7.3 Distribution of various animal components among farmers

The details of different animal components as practiced by farmers are given in table 32.

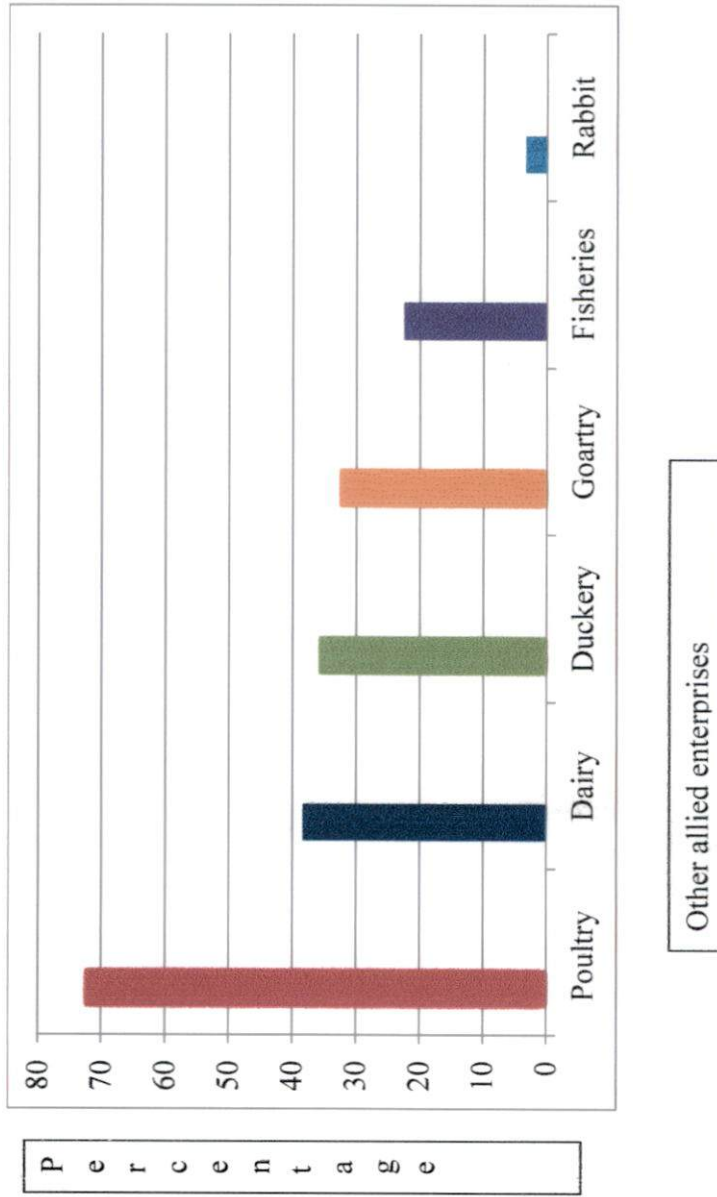
Table 32: Distribution of animal components among farmers

Sl no.	Animal components	No. of farmers practiced (N=120)	Percentage
1.	Poultry	87	72.5
2.	Dairy	52	43.33
3.	Duckery	44	36.67
4.	Goatry	39	32.50
5.	Fisheries	27	22.50
6.	Rabbit	4	3.33
7.	Piggery	3	2.5

Poultry (72.5%) is the major animal enterprise practiced by the farmers followed by dairy (43.33%), duckery (36.67%), goatry(32.50%) and fisheries (22.50%). However rabbit (3.33%) and piggery (2.5%) were the least practiced animal components.

The easiness of practicing backyard poultry along with the increasing demand for eggs and meat makes poultry the most practiced enterprise. While considering the least practiced enterprises like rabbit and piggery, lack of knowledge was the reason for the back fall of rabbit rearing among farmers and social issues were preventing the practice of piggery among them.

Fig 16: Distribution of animal components among farmers.



4.8 CONSTRAINTS PERCIEVED BY THE FARMERS

The main constraints of the Kuttanadan region were ranked by the farmers and the result is presented in table 33.

Table33: Constraints perceived by the farmers of IFS Kuttanad

Sl no.	Constraints	Marginal farmer's rank	Score	Small farmer's rank	Score
1	Lack of irrigation water	1	513	1	505
2	Ecological factors like soil salinity, acidity, flooding etc.	2	478	2	462
3	Scarcity of farm labour	3	407	5	327
4	Lack of technical advice	4	362	3	421
5	High cost of inputs	5	314	4	366
6	Lack of improved variety	8	147	6	276
7	Lack of risk taking ability	6	268	7	224
8	Irregular supply of electricity	7	210	9	145
9	Social factors in adopting piggery, poultry, goatry etc.	9	135	8	152

From the above table it is clear that lack of irrigation water was the major constraint of both marginal and small farmers followed by ecological problems like soil salinity acidity and flooding. However while calculating the spearman's correlation coefficient the value obtained was 0.86 indicating that there was no significance difference between the constraints faced by both the marginal and small farmers.

The illegal opening of Thaneermukkam bund by the locals for fishing and other purpose was the main cause for the inundation of salt water in the fresh water bodies of Kuttanad. This was the reason why the farmers were experiencing lack of irrigation water. The acidity and salinity of soils can also be related with the above mentioned cause.

Summary

5. SUMMARY

India being the second most populous country in the world is struggling hardly to meet the nutritional and food requirements of its growing population. Indian agriculture and its allied sectors like aquaculture, horticulture, dairy, poultry, etc are dominated by small and marginal farmers whose main limiting resource is land. These farmers are also unable to invest more capital to carry out intensive agriculture.

According to the recent studies, India and China holds 70 percent of the world's small farms (IIFSR, 2015). That is China and India accounts about 286 million of small farms out of the 404 million small farms in the world and of which India accounts of 92 million farms. Nearly 70 percent of these farms in India are marginal farms with operational holding size less than 1 ha.

An integrated farming system with available resources accessible to farmers ensures high standard of food production with minimum environmental impact even in highly vulnerable climate. It has revolutionized conventional farming of livestock, aquaculture, poultry, horticulture, agro- industry and allied sector. IFS is a reliable way of obtaining high productivity with substantial nutrient economy in combination with maximum compatibility and replenishment of organic matter by way of effective recycling of organic residues/wastes etc. obtained through the integration of various land-based enterprises

The Kuttanadan region extends to an area of 5600 ha. Kuttanad is one among the two major rice production centres in Kerala the other being Palakkad. Hence rice based farming system is the major farming systems that is found in the Kuttanadan region. However in some localities of the Kuttanadan area we can also find oilseed based cropping system, tuber crop based cropping system, livestock based cropping system etc.

The objective of the study was to study the perception of farmers about the feasibility, utility and constraints of integrated farming systems in Kuttanad along with the assessment of their seasonal employment pattern, employment profile and involvement of family member. Inventorisation of various components of integrated farming systems was also carried out.

The study was conducted in the Kuttanad region which is constituted by the three districts of Kerala namely Kottayam, Alapuzha and Pathanamthitta. One panchayat each was selected from these three districts for the purpose of the study.

Out of the 73 panchayats of Alapuzha district Nedumudi panchayat was selected considering the ample amount of Integrated Farming Systems in this panchayat. Similar pattern was used in the selection of Kumarakom panchayat and Niranam panchayat from the districts of Kottayam and Pathanamthitta respectively.

20 marginal IFS farmers and 20 small IFS farmers were selected from one of the selected panchayat. Therefore 40 IFS farmers were selected from a panchayat. Similar selection procedure was carried out in the other selected panchayats also. So the total number of respondents selected for the study was 120 IFS farmers which included 60 marginal and 60 small IFS farmers.

Data collection was carried out with the help of pre tested interview schedules which were prepared with respect to the objectives of the study. The schedule which was prepared in English was later translated into Malayalam before administrating it to the respondents.

The statistical tools used to carry out the study were quartile deviation, percentage and frequency analysis, single factor ANOVA, Correlation analysis, spearman's correlation analysis.

Salient findings from the study

- Majority of the integrated farming system farmers are having medium level perception irrespective of being marginal or small. There is no significant difference between the perception regarding feasibility of both small and marginal farmers.
- Majority of the integrated farming system farmers are having medium level perception irrespective of being marginal or small. There is no significant difference between the perception regarding feasibility of both small and marginal farmers.

- Majority of the marginal and small farmers are in old age category. None of the farmers are in young age category showing the disinterest of younger generation in agriculture.
- None among both small and marginal farmers are illiterate while in the case of marginal farmers, majority are having middle school education which is high school education for marginal farmers.
- Majority of the farmers irrespective of being marginal or small are having a family size of three to six.
- Medium level economic motivation is observed among majority of the IFS farmers and a significant difference is observed in this aspect between the marginal and small farmers.
- Majority of the IFS farmers are having medium level of aspiration with a noticed significant difference between marginal and small farmers.
- Medium level self confidence, input availability, entrepreneurial behaviour, risk taking ability and mass media contact is also observed among majority of the marginal and small farmers without any noticed significant difference between them.
- Resource recycling is practiced by majority of the small and marginal IFS farmers.
- Majority of the farmers who were categorized as marginal were having a farming experience of 6 to 10 years but majority of the small farmers were having farming experience of 11 to 25 years.
- Medium level competition orientation and achievement motivation was also observed among the farmers with noticed significant difference between marginal and small farmers for these characters.
- Significant positive correlation was observed between the profile characteristics of marginal farmers such as family size, economic motivation, self confidence and resource recycling to the perception of the farmers regarding feasibility of integrated farming system
- Significant positive correlation was observed between economic motivation, level of aspiration, resource recycling and entrepreneurial behaviour of small

farmers to their perception regarding feasibility of the integrated farming systems.

- Profile characters of marginal farmers such as family size, level of aspiration, self confidence, experience in farming, entrepreneurial behaviour and achievement motivation showed a significant positive correlation to their perception regarding utility of integrated farming system.
- Significant positive correlation was observed between economic motivation, level of aspiration, self confidence, orientation towards competition and achievement motivation of small farmers and their perception regarding utility of integrated farming system.
- Involvement of family members was mainly found in activities like harvesting of crops, marketing of produce, purchase of animals and care and management of animals.
- Wives, sons and daughters were identified as the contributors of family labour of which wives were the major contributors.
- Seasonal employment pattern of Kuttanadan farmers varied according to the farming systems practiced by them.
- In the case employment profile, none among the small farmers were having any subsidiary occupation while a minority of marginal farmers are engaged in subsidiary occupations like petty shops, auto services, electrical works and LIC agent jobs.
- Rice based farming system is the major farming system in Kuttanad followed by coconut, banana and vegetable based farming systems.
- The allied enterprises identified from Kuttanad includes, dairy, poultry, duckery, goatry, fisheries, piggery and rabbit rearing.
- The constraints that were perceived as important by both marginal and small farmers were the lack of irrigation water and ecological factors like soil salinity, acidity, flooding etc. There was no significant difference regarding the constraints perceived by marginal and small farmers.

Future line of work

- Work can be conducted in the homesteads with multiple enterprises.
- Research of similar type that assess attitude of farmers of different age group can be done.
- Socio economic analysis and benefit cost ratio in different farming enterprises can be studied.
- Detailed study of various location specific components which can be incorporated in to the farming system can be done.
- Successful models can be developed based on the major crops and the size of holdings.



Plate 1. Demonstration unit on IFS Kuttanad of KVK Kottayam



Plate 2 : Fish cultivation practiced in Kuttanad



Plate 3: Demonstration of the integration of duckery and fisheries along with biogas components.



Plate 4: Rice based farming system of Kuttanad

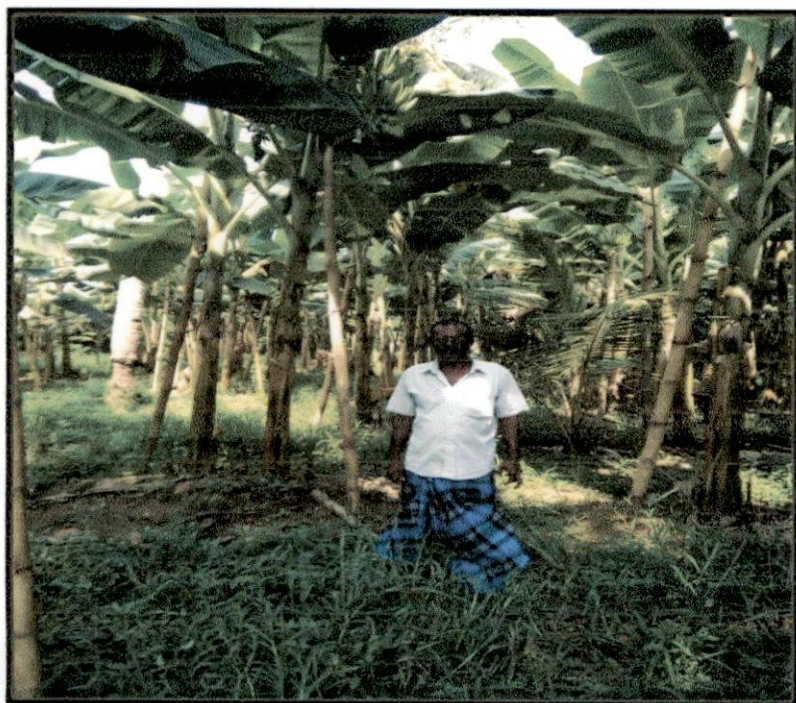


Plate 5: Banana based farming system of Kuttanad



Plate 6: Coconut based farming system of Kuttanad.

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**MULTIDIMENSIONAL ANALYSIS OF FARMERS OF INTEGRATED FARMING
SYSTEMS IN KUTTANAD**

by

MAMATHA G NAIR

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ABSTRACT OF THESIS

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ABSTRACT

The present study entitled as Multidimensional analysis of farmers of integrated farming systems in Kuttanad was conducted in the Kuttanad region which lies in the three districts of Kerala namely Kottayam, Alapuzha and Pathanamthitta. Three panchayats namely Kumarakom, Nedumudi and Niranam were selected from these three districts respectively. The objective of the study was to study the perception of the farmers regarding the feasibility and utility and constraints of the integrated farming systems in Kuttanad. Seasonal employment pattern, employment profile and the involvement of family members were assessed and the components of integrated farming systems were inventorised.

In the present study, from each of the three panchayat 20 marginal and 20 small integrated farming system farmers were selected, making a total of 60 marginal and 60 small farmers. Thus the total number of respondents selected was 120.

Data collection was carried out with the help of a well structured interview schedule. Two dependent variables and 15 independent variables were studied and analysed with the help of various statistical tools like quartile deviation, frequency, percentage, correlation, ANOVA and spearman's rank order correlation.

Perception of the farmers regarding the feasibility and utility of the integrated farming systems were measured using the scale developed by Argade (2015). Majority of farmers in Kuttanad exhibited medium level perception regarding the feasibility and utility of the integrated farming systems. There was no significant difference between the perception of small and marginal farmers regarding the feasibility and utility of the integrated farming systems.

Significant positive correlation was observed between the profile characteristics of marginal farmers such as family size, economic motivation, self confidence and resource recycling to the perception of the farmers regarding feasibility of integrated farming system. Similarly significant positive correlation was observed between economic motivation, level of aspiration, resource recycling and entrepreneurial behaviour of small farmers to their perception regarding feasibility of the integrated farming systems.

Profile characters of marginal farmers such as family size, level of aspiration, self confidence, experience in farming, entrepreneurial behaviour and achievement motivation showed a significant positive correlation to their perception regarding utility of integrated farming system. Likewise a significant positive correlation was observed between economic motivation, level of aspiration, self confidence, orientation towards competition and achievement motivation of small farmers and their perception regarding utility of integrated farming system.

Lack of irrigation water and ecological problems such as soil salinity, acidity and flooding were the major constraints perceived by the farmers of integrated farming systems of Kuttanad. No significant difference was observed between the constraints perceived by small and marginal farmers.

Seasonal employment pattern observed in the three districts differed according to the farming systems prevailing there. However 15% involvement of other state labours were observed in farms of Kumarakom Panchayat.

Farming was identified as the main occupation of the respondents. However a small portion of the marginal farmers (28.33) were depending on subsidiary occupations such as petty shops, auto service, electrical works and agents of LIC.

Involvement of the family members were mainly found in carrying out of the four activities mainly harvesting of crops, marketing of produce, purchase of animals and care and management of animals.

Rice based farming system was identified as the major farming system of Kuttanad followed by coconut, banana and vegetable based farming systems respectively. Poultry was identified as the major animal component followed by dairy, duckery, goatry, fisheries, rabbit and piggery.

So, from the study it can be concluded that majority of the farmers studied are having medium level perception regarding the feasibility and utility of integrated farming system and the most important constrain perceived by them is lack of irrigation water. The extent of involvement of family members were found in four activities in harvesting of crops, marketing of produce, purchase and sale of animals and care and management of animals. Wives and sons were the major contributors of family labour. The seasonal employment pattern identified in Kuttanad varied according to different

farming systems. Rice based farming system was the major farming system in Kuttanad. Allied enterprises like poultry, dairy, duckery, fisheries, goatry, rabbit rearing and piggery were also identified from the farming systems of Kuttanad.

സംഗ്രഹം

കൂട്ടനാടൻ സംമിശ്ര കർഷകരുടെ ബഹുമുഖ പഠനം എന്ന പ്രസ്തുത പഠനം, കൂട്ടനാടൻ ജില്ലകളായ ആലപ്പുഴ, പത്തനംതിട്ട, കോട്ടയം എന്നിവിടങ്ങളിലെ തിരഞ്ഞെടുത്ത പഞ്ചായത്തുകളായ നെടുമുടി, നിരണം, കുമരകം തുടങ്ങിയിടത്താണ് നടത്തപ്പെട്ടത്. സംമിശ്ര കൃഷിയുടെ ഉപയോഗം, സാധ്യത എന്നിവയിൽ കർഷകരുടെ കാഴ്ചപ്പാട്, കൂട്ടനാടൻ സംമിശ്ര കൃഷിയുടെ വെല്ലുവിളികൾ, കാലികമായ തൊഴിൽ ഘടന, കുടുംബാംഗങ്ങളുടെ സഹകരണം എന്നിവയായിരുന്നു പഠനത്തിന്റെ പ്രധാന ഉദ്ദേശം. ഇതു കൂടാതെ കൂട്ടനാടൻ സംമിശ്ര കൃഷിയുടെ പ്രധാന ഘടകങ്ങൾ കണ്ടുപിടിക്കുകയും ചെയ്തു.

പഠനാവശ്യത്തിനായി 120 കർഷകരെയാണ് സമീപിച്ചത്. മുൻകൂർ തയ്യാറാക്കിയ ചോദ്യോത്തരി ഉപയോഗിച്ചാണ് കർഷകരിൽ നിന്ന് വിവരങ്ങൾ ശേഖരിച്ചത്. ആശ്രിത പരിവർത്തിത വസ്തുതകളായ സംമിശ്ര കൃഷിയുടെ സാധ്യതയിലെ കാഴ്ചപ്പാടും ഉപയോഗത്തിലെ കാഴ്ചപ്പാടും 15 സ്വതന്ത്ര പരിവർത്തിത വസ്തുതകളേയും അടിസ്ഥാനമാക്കി നടത്തിയ ഈ പഠനത്തിൽ കൂട്ടനാടൻ കർഷകർ നേരിടുന്ന പ്രശ്നങ്ങളെ മനസ്സിലാക്കാനും സാധിച്ചു.

ശേഖരിച്ച വിവരങ്ങളുടെ അടിസ്ഥാനത്തിൽ ഭൂരിഭാഗം സംമിശ്ര കർഷകരിലും മധ്യമനിലവാരത്തിലുള്ള കാഴ്ചപ്പാടാണ് കാണുന്നത്. മേല്പറഞ്ഞ 15 സ്വതന്ത്ര പരിവർത്തിത വസ്തുതകളിൽ 8 എണ്ണത്തിലും മധ്യമ നിലവാരം തന്നെയാണ് ഭൂരിഭാഗം കർഷകരിലും കാണാൻ സാധിക്കുന്നത്.

ശുദ്ധജലക്ഷാമം, മണ്ണിന്റെ അമ്ളത, ഉപ്പു രസം എന്നിവയാണ് കൂട്ടനാടൻ കർഷകർ നേരിടുന്ന പ്രധാന വെല്ലുവിളികൾ. കാലികമായ തൊഴിൽ ഘടന ജില്ലകൾക്ക് അടിസ്ഥാനമായും കൃഷി വ്യവസ്ഥകൾക്ക് അടിസ്ഥാനമായും മാറുന്നതായാണ് കാണാൻ സാധിച്ചത്. പ്രധാനമായും കുടുംബാംഗങ്ങളുടെ സഹകരണം കണ്ടുവരുന്നത് 4 മേഘലകളായ വിളവെടുപ്പ്, ഉൽപ്പന്ന വിപണനം, കന്നുകാലി കച്ചവടം, കന്നുകാലി പരിപാലനം എന്നിവയിലായിരുന്നു.

ഭൂരിഭാഗം കൂട്ടനാടൻ കർഷകരും നെല്ല് സംബന്ധമായ കൃഷി വ്യവസ്ഥയാണ് പിൻതുടരുന്നത്. ഇതു കൂടാതെ തെങ്ങ്, വാഴ, പച്ചക്കറികൾ എന്നിവ സംബന്ധമായ കൃഷി വ്യവസ്ഥകളും കാണാൻ കഴിഞ്ഞു.

Appendices

APPENDIX 1

INTERVIEW SCHEDULE FOR FARMERS

Multidimensional analysis of farmers of integrated farming systems in Kuttanad.

No.

Date:

Name of Block:

Name of Panchayat:

1. Name of the Respondent:

2. Age

3. Address:

4. Educational status: (please tick (✓) wherever applicable)

Illiterate Can read and write Primary school Middle school

High school College Professional degree

5. Main Occupation:

6. Subsidiary Occupation:

7. Details of family members.

Sl no.	Name	Relation	Age	Occupation

8. Area under IFS

Up to 25 cents 26 to 50 cents 51 cents to 1 acre

1.01 to 2 acres Above 2 acres

9. Details of crops and other enterprises practiced.

Sl no.	Crops cultivated/ Other enterprises	Area/ Number

10. Product Diversification

Sl no.	Products produced

11. Annual income:

164

12. Mass media contact

Sl no.	Particulars	Yes/ No	If Yes Always/ sometimes
1.	Do you listen to radio?		
2.	Do you read newspapers or listen to someone reading a newspaper?		
3.	Do you see television?		
4.	Do you read leaflets related to agriculture?		
5.	Do you read farm magazines?		
6.	Do you see films?		
7.	Do you visit exhibitions		
8.	Others if any?		

13. Input Availability.

Sl no.	Types of inputs	Sources of availability	Ease of Availability		
			Readily available (immediately)	Not readily available (should wait for 1-2 days)	Difficult (will take more than 3 days)
1.	HYV seeds				
2.	Irrigation facilities				
3.	Farm implements				
4.	Organic				

	manure				
5.	Fertilizers				
6.	Plant protection chemicals				
7.	Labour				
8.	Feeds for cattle and other animals in the farm				
9.	Others				

14. Resource recycling is practiced or not:

15. Economic motivation

Sl no.	Statements	SA	A	N	DA	SDA
1.	A farmer should work towards higher yields and economic profit.					
2.	The most successful farmer is the one who makes more profit.					
3.	A farmer should try integration of different components that may help him to earn more profit					
4.	Farmer should grow more food crops both for home consumption and profit					
5.	It is difficult to make good start unless he provides them with economic assistants					
6.	Farmer must earn his living but the most important thing in life cannot be identified in economic returns.					

16. Levels of aspiration

Sl no.	Statements	TRUE	FALSE
1.	Earn higher income through the marketing of different products.		
2.	Develop agricultural land by ensuring sustainability		
3.	To start small enterprises other than agriculture		
4.	To run a petty shop		
5.	Others		

17. Self Confidence

Sl no.	Statements	Agree	Disagree
1.	I have no fear in failing in everything I want to accomplish.		
2.	I feel insecure within myself.		
3.	I can face a difficult situation without worry.		
4.	I am hesitant about starting a new venture.		
5.	I frequently feel unworthy about myself.		
6.	I am confident that I can accommodate to new situations		
7.	I am usually discouraged when the opinions of others differ from my own.		
8.	Several times I have given up the decision of doing a business because I thought of too little of my ability.		
9.	I find hard to keep my mind on a task.		
10.	I have enough faith in my ability.		

18. Experience in farming.

Sl no.	Experience	Response
1	Up to 5 years	
2	6 to 10 years	
3	11 to 25 years	
4	Above 25 years	

19. Entrepreneurial behaviour.

Sl no	Statements	Agree	Disagree
1	I have enough faith in my own ability		
2	I am hesitant about starting / running an enterprise		
3	The key points of success should not be divulged to other entrepreneur		
4	No one keep information on what others are doing.		
5	It is only because of my own effort that I have acquired enough knowledge to start an enterprise		
6	I will start an enterprise only if somebody prompt me.		

20. Orientation towards competition

Sl no.	Statements	SA	A	DA	SDA
1.	The key points in success should not be divulged to other farmers.				
2.	Better yield in comparison to the neighbours brings more prestige.				
3.	It is of no use to keep information on what other farmers are doing.				
4.	Competition should be organized for all the enterprises that are included in the farming system.				
5.	It is not good for a person to become too ambitious in life.				

21. Risk taking ability

Sl no	Statements	SA	A	N	DA	SDA
1.	A farmer should grow a larger number of crops to avoid greater risk involved in growing one or two crops					
2	A farmer should take more chance in making a big profit than to be content with a smaller but less risky profit					
3	A farmer who is willing to take greater risk than the average farmer usually does better financially.					
4	It is good for a person to take risk when he knows his chance of risk is high					
5	It is better for a farmer not to try a new method in the cultivation unless most others in the locality have used it with success.					
6	Trying entirely a new method in IFS involves risk but it is worth					

22. Achievement Motivation

Sl no.	Statements	SA	A	N	DA	SDA
1.	One should enjoy work as much as play					
2.	One should work hard at everything undertakes until he is satisfied with results					

3.	One should succeed in his occupation even if one has been neglectful of his family					
4.	One should have determination and driving ambition to achieve certain things in life even if these qualities make one unpopular.					
5.	Work should come first even if one cannot get rest					
6.	Even if one's interests are in danger, one should concentrate on her job and forget her obligation to others.					
7.	One should set difficult goals for one self and try to reach them.					

23. Farmer's perception on the feasibility of IFS.

Sl no.	Perception statements to measure feasibility of IFS	Farmer's Perception		
		A	N	DA
1.	IFS helps to achieve optimum production level through integration.			
2.	Integrated management practices reduce input needs of farmers to some extent.			
3.	IFS helps to increase income diversification.			
4.	IFS requires high initial investment.			
5.	IFS increases competition for resources among different enterprises.			
6.	IFS farmers have less risk sensation than conventional farmers.			
7.	IFS reduces vulnerability to economic losses.			
8.	Management of IFS is more difficult than conventional farming.			
9.	Risk of crop failure is less in IFS compared to conventional farming.			
10.	IFS brings farm diversity which leads to decrease farm vulnerability.			

24. Farmer's perception on utility of IFS.

Sl no.	Perception statements to measure the utility of IFS farmers	Farmer's perception		
		A	N	DA
1.	IFS ensures food and nutritional security of farm family.			
2.	IFS provides enough scope to employ family members round the year.			
3.	The manure and organic waste obtained from IFS farms reduce fertilizer requirement.			
4.	IFS provides great opportunity to produce diversified products.			
5.	IFS helps to protect environment through recycling of animal waste.			
6.	Every piece of land is effectively utilized in IFS.			
7.	IFS is unable to solve all problems of small and marginal farmers.			
8.	Crop integration helps to mitigate weeds, pest and disease problems.			
9.	IFS helps poor farmers to reduce their vulnerability to climate-related hazards.			
10.	IFS motivates the farmers to adopt new technologies.			

25. Seasonal employment pattern.

Sl no.	Season (farming system based)	Activities performed for major crop	No. of labour days	Allied enterprises practiced	Employment availability from allied enterprises	Involvement of other state employees.
1.	Crop season 1					
2.	Crop season 2					

3.	Crop season 3					
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26. Involvement of Family members

Sl no.	Operations performed	Family member	Response		
			Most often	Sometimes	Never
1.	Preparation of land				
2.	Sowing of crops				
3.	Irrigation activities				
4.	Application of chemicals (Fertilizers/ Plant protection chemicals) and manures.				
5.	Harvesting of crops				
6.	Marketing of produce				
7.	Purchase of farm machineries				
8.	Purchase and sale of animals				
9.	Activities related to animals (milking of cattle, feeding animals etc.)				
10	Others if any specify				

27. Constraints in IFS

Sl no.	Factors	Rank
1.	Lack of technical advice	
2.	Lack of risk taking ability	
3.	Lack of improved variety	
4.	Lack of irrigation water	
5.	High cost of inputs	
6.	Irregular supply of electricity	
7.	Scarcity of farm labour	
8.	Social factor in adopting piggery, poultry, goatry etc	
9.	Ecological factors like soil salinity acidity, flooding etc.	
10.	Others if any (specify).	

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