

TRAINING NEEDS OF BANANA GROWERS IN PALAKKAD DISTRICT OF KERALA

By
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B. Sc. (Hons) Ag.

THESIS SUBMITTED TO THE
ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY
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FOR THE AWARD OF THE DEGREE OF

**MASTER OF SCIENCE IN AGRICULTURE
(AGRICULTURAL EXTENSION)**

CHAIRPERSON: Dr. B. MUKUNDA RAO



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GUNTUR, ANDHRA PRADESH**

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RESHMA.J.MURUGAN

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**MASTER OF SCIENCE IN AGRICULTURE
(AGRICULTURAL EXTENSION)**



2017

DECLARATION

I, **RESHMA.J.MURUGAN**, hereby declare that the thesis entitled, **“TRAINING NEEDS OF BANANA GROWERS IN PALAKKAD DISTRICT OF KERALA”** submitted to **Acharya N. G. Ranga Agricultural University** for the degree of **Master of Science in Agriculture** is the result of original research work done by me. I also declare that no material contained in the thesis has been published earlier in any manner.

Date:

Place:

(RESHMA J MURUGAN)
I.D No. BAM-15-56

CERTIFICATE

Ms. **RESHMA J MURUGAN** has satisfactorily prosecuted the course of research and that the thesis entitled “**TRAINING NEEDS OF BANANA GROWERS IN PALAKKAD DISTRICT OF KERALA**” submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor its part thereof has been previously submitted by her for a degree of any university.

Date:

(B. MUKUNDA RAO)

Place:

Chairperson
Associate Professor
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CERTIFICATE

This is to certify that the thesis entitled “**TRAINING NEEDS OF BANANA GROWERS IN PALAKKAD DISTRICT OF KERALA**” submitted in partial fulfillment of the requirements for the degree of “**Master of Science in Agriculture**” (**AGRICULTURAL EXTENSION**) of the Acharya N.G. Ranga Agricultural University, Guntur, is a record of the bonafide research work carried out by **Ms. RESHMA J MURUGAN** under my guidance and supervision. The subject of the thesis has been approved by the student’s advisory committee.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part has been fully acknowledged. All the assistance and help received during the course of the investigation have been duly acknowledged by the author of the thesis.

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Place : Bapatla

Date

(RESHMA J MURUGAN)

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LIST OF SYMBOLS AND ABBREVIATIONS

<i>et.al,</i>	:	And Others
\bar{X}	:	Arithmetic mean
σ	:	Standard Deviation
%	:	per cent
A	:	Agree
a	:	Intercept
A.M	:	Arithmetic Mean
ANGRAU	:	Acharya N.G.Ranga Agricultural University
etc.	:	etcetera
f	:	Frequency
FA	:	Full Adoption
FYM	:	Farm Yard Manure
GDP	:	Gross Domestic Product
ha	:	Hectare
KVK	:	Krishi Vigyan Kendra
MLR	:	Multiple Linear Regression
n	:	Total number of respondents
NA	:	Non Adoption
NAA	:	Naphthalene Acetic Acid
NGO's	:	Non-Governmental Organizations
NS	:	Non Significant
PA	:	Partial Adoption
PGPR	:	Plant Growth Promoting Rhizobacteria

r	:	Correlation co- efficient
R	:	Co-efficient of multiple determination
S.D	:	Standard Deviation
S.No.	:	Serial Number
SD	:	Strongly Agree
UD	:	Undecided
VFCK	:	Vegetable and Fruits Promotion Council of Kerala
viz.	:	Namely
DA	:	Disagree
SDA	:	Strongly Disagree

ABSTRACT

Name of the Author : **RESHMA.J.MURUGAN**

Title of the Thesis : **TRAINING NEEDS OF BANANA GROWERS
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Banana (*Musa* species) the “queen of tropical fruits” is considered to be one of the oldest fruits known to mankind. Banana is considered as the most important energy providing food and is a good source of mineral, salts and vitamins. Banana produces a more balanced diet than many fruits.

In India, banana is largely grown in Tamil Nadu, Kerala, Maharashtra, Andhra Pradesh and Bihar. It is the second most important fruit crop in India next to mango. Production alone constitutes 32 per cent of the fruit production in India. The contribution of banana to GDP of agriculture in India is 2.80 per cent.

The productivity of banana in Kerala was 13.8 tha^{-1} (Source: Directorate of Economics & Statistics, Kerala) in 2014 where as, it was 46.1 tha^{-1} in Tamil Nadu (Source: National Horticultural Board). This productivity difference is due to lack of information and skills among farmers about the cultivation strategies of banana. Hence, it is required to strengthen human capital through an effective system of extension training and education.

Keeping the above in view, a research study was designed to study the training needs of banana growers in Palakkad district of Kerala. An ex-post facto research design was followed to conduct the study with a total of 120 banana growers selected from three blocks. The data was collected through pre-tested interview schedule, which was subjected for statistical analysis and interpreted.

Findings of the study indicated that majority of the banana growers were middle aged with high school education, marginal land holding, occupation of agriculture + labour as their occupation, 11- 15 years of farming experience, medium annual income, medium level of social participation, extension contact, urban contact, mass media exposure, risk orientation, scientific orientation, market orientation, innovativeness and achievement motivation.

The findings of the study revealed that the plant protection (2.66), organic practices (2.01), nutrient management (1.82), suckers and planting (1.58), post harvest management (1.53), water management (1.49), land preparation (1.34), intercultural practices (1.26), harvesting (1.24) and agro climatic requirements for growing of banana (1.19) were the main areas of training needs in knowledge in their mean rank order of importance.

The study indicated that the nutrient management (2.71), organic practices (2.15), water management (2.02), plant protection (1.96), suckers and planting (1.96), post harvest management (1.62), intercultural practices (1.59) and land preparation (1.56) were the main areas of training needs in skills in their mean rank order of importance.

The findings of the study revealed that majority of the banana growers preferred non institutional training of 10 to 20 members group, one day training, about plant protection management and preferred demonstration and field trip method.

The findings of the study revealed that majority (59.17%) of the banana growers were observed under medium adoption category followed by the remaining under low (22.50%) and high (18.33%) adoption categories in relation to recommended practices of banana.

The correlation analysis indicated that out of 15 selected profile characteristics, 10 of them such as education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation were found to be positive and significant in their relationship with the training needs at 0.01 level of probability, while age and extension contact were found to be negative at 0.01 and 0.05 level of probability, respectively. However land holding, farming experience and annual income were found to be non - significant.

The Multiple Linear Regression Analysis revealed that the selected profile characteristics put together contributed 82.81 per cent of the total variation in the training needs of the banana growers. Extension contact, social participation and scientific orientation of the banana growers had contributed significantly at 0.01 level of probability towards the variation. Remaining 17.19 per cent may be due to extraneous characteristics.

The correlation analysis indicated that out of 15 selected profile characteristics, 10 of them such as education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation were found to be positive and significant in their relationship with the adoption levels of banana growers at 0.01 level of probability , while age was found to be negative at 0.01 level of probability. However land holding, farming experience, annual income and extension contact were found to be non - significant.

The Multiple Linear Regression Analysis revealed that the selected profile characteristics put together contributed 87.14 per cent of the total variation in the adoption levels of the banana growers. Social participation and scientific orientation of the respondents had contributed significantly at 0.05 and 0.01 level of probability respectively, towards the variation. Remaining 12.86 per cent may be due to extraneous characteristics.

The important constraints under bio physical constraints reported by the banana growers in order of their importance were problematic soils, wild boars, natural calamities, inadequate drainage facilities, poor quality of irrigation water and poor water retention capacity of soil. Incidence of insect / pest attack like banana weevil, susceptibility of plant to disease like panama wilt, non availability of suitable high yielding variety and unfavourable weather conditions during fruit formation were the constraints faced by the growers in technological constraints. Constraints like lack of proper knowledge about banana production technology, inadequate contact with extension workers and poor economic conditions of the banana growers were faced by the respondents under socio personal constraints. The important constraints under economic constraints in order of their importance were low profit due to high cost of cultivation, high labour cost, lack of premium price for organic produce, high cost of plant protection chemicals and high cost of manure and fertilizers. Inadequate training facilities, insufficient technical staff, inadequate supply of agricultural inputs from cooperative societies, improper crop insurance schemes, non- availability of adequate credit, non- availability of fertilizers and plant protection chemicals in time were the administrative constraints faced by the banana growers. Constraints like lack of remunerative price, insufficient collection centres at local levels, inadequate knowledge about market intelligence and inadequate transport facilities were marketing constraints faced by the banana growers.

Majority of the banana growers suggested to provide appropriate control measures of diseases and pests (1st rank) followed by timely technical guidance (2nd rank), frequent monitoring of technical staff (3rd rank), establishing soil testing labs in nearby locality (4th rank), provision of fertilizers on subsidy rates (5th rank), establishment of collection centers at the nearest point (6th rank), providing crop insurance (7th rank), conduct training programmes (8th rank), market outlets for organic produce (9th rank), supply of planting materials at a subsidised rate by the Department of Agriculture (10th rank) and maintaining demonstration plots (11th rank).



Chapter-1

Introduction



Chapter-II

Review of literature



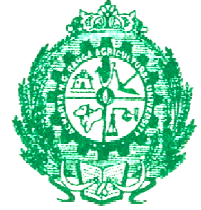
Chapter-III

Material and Methods



Chapter-IV

Results and Discussion



Chapter-V

Summary and Conclusions



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Chapter I

INTRODUCTION

Banana (*Musa* species) the “queen of tropical fruits” is considered to be one of the oldest fruits known to mankind. Banana evolved in the humid tropical regions of South East Asia with India as one of its centres of origin. Modern edible varieties have evolved from the two species – *Musa acuminata* and *Musa balbisiana* and their natural hybrids, originally found in the rain forests of South East Asia. Banana is considered as the most important energy providing food and is a good source of mineral, salts and vitamins. Banana produces a more balanced diet than many fruits. It has enjoyed universal popularity in this country from the times immemorial. It may be one of the reasons why the banana is called “apple of paradise”. It is also an important food item ranking fourth in consumption after rice, wheat and milk. Its year round availability, affordability, varietal range, taste, nutritive and medicinal value makes it the favourite fruit among all classes of people. The fruit is easy to digest, free from fat and cholesterol. Banana powder is used as the first baby food. It helps in reducing the risk of heart diseases when used regularly and is recommended for patients suffering from high blood pressure, arthritis, ulcer, gastroenteritis and kidney disorders. The emerging trend world-wide and also in our country is indicative of a paradigm shift in dietary needs of the people with rise in income, which demands more horticultural produce. Processed products, such as chips, banana puree, jam, jelly, juice, wine and halwa can be made from the fruit. Banana fibre is used to make items like bags, pots and wall hangers. Rope and good quality paper can be prepared from banana waste. Banana leaves are used as healthy and hygienic eating plates. It is also one of the main fruit in international trade. In terms of volume it stands first among exported fruits, and second after citrus fruits in terms of value.

The major banana producing countries in the world are India, China, Philippines. Brazil, Ecuador, Indonesia, Gautemala, Angola, Tanzania and Burundi (FAOSTAT, 2015). India has 8.22 lakh ha area under banana cultivation with a production of 292.21 lakh tonnes in 2015 (Indiastat.com). In India, banana is largely grown in Tamil Nadu, Karnataka, Maharashtra, Gujarat, Andhra Pradesh, Madhya Pradesh, Bihar and Kerala. Kerala has 0.84 lakh ha area under banana cultivation and there is a production of 11.60 lakh tonnes (Indiastat.com).

Area, production and productivity of banana at global, national, state and district level - 2015 (sources: FAOSTAT, Indiatat.com, Agricultural statistics 2015 - Economics and Statistics, Kerala)

	Area (lakh ha)	Production (lakh tonnes)	Productivity (tonnes/ha)
World	50.8	1067.1	21.01
India	8.22	292.21	35.55
Kerala	.84	11.60	13.81
Palakkad	.19	1.75	9.21

It is the second most important fruit crop in India next to mango. Production alone constitutes 32 per cent of the fruit production in India. The contribution of banana to GDP of agriculture in India is 2.80 per cent. It also provides livelihood security to millions of people in primary producing areas, trade and processing. India with rich bio-diversity of banana and plantain, is the largest producer and consumer with production of 292.21lakh tonnes of banana. India's domestic production alone exceeds the entire world trade, with 27.30 per cent share of the total production of banana in the world. The global production of banana is 1067.1lakh tonnes, cultivated in about 50.8 lakh hectares (FAOSTAT, 2014), mostly by small and marginal farmers.

Kerala is a small state in the south west of India contributing to 1.20 per cent of the country's area and 3.10 per cent of the country's population. Agriculture, no doubt, is the foundation of Kerala's economic edifice. The agricultural scenario in Kerala is somewhat unique and distinct from many other States in India in terms of land utilization pattern and the cropping pattern. Kerala's agriculture as a whole is growing in terms of income generation from the mid eighties. This is mainly due to improvement in yield rates and to a some extent, due to shift in cropping pattern to high valued crops. To a large extent this switch over to high value crops helps in optimizing income from the limited land resources. One of the dynamic factors contributing to structural changes in State Domestic Product (SDP) and employment is the changes in the cropping pattern triggered by market opportunities and demand factors. In spite of significant advances in industrial and service sectors, agriculture continues to be the largest provider of employment and livelihood both at the national and state levels.

In Kerala, the conversion of paddy lands is taking place now a days. Most of the conversions start with the shifting of the area to cultivation of vegetables, banana and plantains and tapioca. The area conversion from paddy encouraged the increasing trend of area under banana and other plantains. Banana which occupied 51,275 ha, in 2009-10, reached 58,671 ha in 2010-11 in Kerala and 84,000 ha in 2014-15. (Source: Directorate of Economics & Statistics , Kerala). Palakkad is the one of the most agrarian districts in Kerala, known for paddy cultivation. The district is also called as "the granary of Kerala" and "Rice bowl of Kerala". Paddy is cultivated in around 83,998 hectares in the district and occupies the first position in the production of rice in the state. Palakkad also occupies the first position in the state for the production of banana.

The productivity of banana in Kerala is 13.8 tha^{-1} (Source: Directorate of Economics & Statistics, Kerala) in 2014. Where as, it was 46.1 tha^{-1} in Tamil Nadu (Source: National Horticultural Board). This productivity difference is due to lack of information and skills among farmers about the cultivation strategies of banana. In addition to that, Organic farming is gaining momentum in Kerala nowadays. "Organic farming/Organic agriculture is a unique production management system which promotes and enhances agro-eco system of health including bio diversity, biological cycles and soil biological activity. This is to be accomplished by using on farm agronomic, biological and mechanical methods in exclusion of all systematic off-farm inputs. The larger concentration of organic farmers is in Kannur, Alappuzha and Thrissur districts. Palakkad district has 14 per cent of organic farmers in Kerala. The demand for organic banana is also high from inside and outside Kerala. The farmers are having a little knowledge on organic practices for banana cultivation. The present rate of production could be increased and organic banana could be marketed if the available technologies are utilized by the farmers to their full advantage. The basic problem is not of natural resources but it is of the human resources. Hence, it is required to strengthen human capital through an effective system of extension training and education.

Training is viewed as an investment on human resources. Imparting training effectively to all those who need is essential for accelerating the process of adoption, which would lead for increased production.

Training is the process of improving knowledge, skills and changing the attitude of an individual for doing a specific job. Therefore, training has continued to be the most important device for developing individual's work efficiency.

Training need assessment is the method of determining whether a training need exists and, if it does, what training is required to fill the gap. Training need assessment seeks to identify accurately the levels of the present situation in the target surveys, interviews, observation, secondary data and / or workshop. The gap between the present status and desired status may indicate problems that in turn can be translated into a training need.

Appropriate training programmes can play a critical role in bridging this gap, providing farmers with the new skills and technical knowledge necessary to implement improved methods and to make informed decisions about the best options to suit their needs. Effective training of any kind requires comprehensive knowledge of the training needs of the target group. It is important to identify training needs before trying to implement any training solutions. In many cases, the training needs of farmers are identified by organizations or individuals, often at the national level, without taking into account the specific needs and preferences of farmers themselves. This often leads to a mismatch between training programmes and methods and the specific requirements of farmers in terms of skills, knowledge and interest.

The training needs assessment is a critical activity for training and development function. A training needs assessment identifies the "gap" between current performance and the performance required, and explores the causes and reasons for the gap and methods for closing or eliminating it. A need assessment that takes into account the views of farmers is essential to ensure that the design and development of training curricula meets the needs of those it aims to serve. To be effective and efficient, all training programmes must start with a need assessment. The assessment begins with a need which can be identified in several ways but is generally described as a gap between what is currently in place and what is needed, now and in the future. Need assessment can also be used to assist with competencies and performance of work, problem solving or productive issues and the need to prepare for and respond to future changes.

In India, various training institutions, like Agriculture and Rural Home Science Centers, Schools of Social Services, Khadi and Village Industrial Centers, Rural Development Training Centers, Universities, Agricultural Schools, Government and Voluntary Organizations are involved in providing training on various aspects to the people. Nowadays, that is the reason why farmers' training became an important component of Agricultural Extension. It has become a significant variable, which directly influences the adoption. Hence, it is important to investigate the training needs for banana growers.

1.1 OBJECTIVES OF THE STUDY

1. To study the profile characteristics of banana growers.
2. To find out the training needs of banana growers.
3. To determine the extent of adoption of banana production technology by the banana growers.
4. To find out the relationship between selected profile characteristics of banana growers with their training needs and adoption levels.
5. To study the few successful caselets of banana growers.
6. To study the constraints of banana growers and suggestions to arrive at the banana cultivation strategies.

1.2 SCOPE AND IMPORTANCE OF THE STUDY

The scope of the investigation was confined to the study of the training needs of banana growers in Palakkad district of Kerala. The findings of the present study would also help to understand the training needs of banana growers and adoption of recommended production technologies by the farmers.

It is also believed that the study would contribute to the existing knowledge and theoretical understanding of the transfer of production technology to the banana growers by the extension personnels. Thus, the study would be of great use to the extension administrators, extension personnel and others who are involved directly or indirectly in the transfer of technology. The eventual goal of this type of research is to sharpen the training required for the banana growers regarding cultivation.

Agricultural technology is never completely accepted by the farmers in all respects due to number of constraints faced by them in its adoption, as such there always appears to be a gap between the recommended technology by the scientists and its modified form at the farmer's level. The technological gap is, thus the major problem in the efforts to increase agricultural production in the country. A need of the day is to reduce the technological gap between the agricultural technologies recommended by the scientists and its acceptance by the farmers on their field by solving the constraints faced by them. For overcoming these conditions, new technologies must be adopted with efficient use of resources. Hence, an investigation on constraints faced by banana growers in adoption of banana production technology was also included. It is expected that barriers to some extent in adoption of banana production technology will be pointed out in this study regarding constraints. Suggestions elicited by the banana growers to overcome the constraints in adoption of the recommended practices of banana are also studied. The barriers in adoption of recommended practices can be overcome to an extent by utilization of findings of study regarding suggestions.

1.3 LIMITATIONS OF THE STUDY

1. Being a post graduate research, the investigator has limitations of time, money and other resources.
2. Since the study was designed as an ex-post-facto type, the memory bias on the part of the respondents cannot be ruled out.
3. The area of investigation was restricted to three blocks. Hence, the implications of the study cannot be generalized for larger areas.

1.4 PRESENTATION OF THE STUDY

The report of the study is presented in six chapters. The first chapter dealt with the brief introduction including objectives, scope and limitations of the study. Review of literature is presented in the second chapter. The third chapter dealt with materials and methods in the process of investigation which includes location of the study, selection of the respondents and sampling procedure, selection of variables and their empirical measurements, devices and methods used for collection of data and

statistical tools used. Results and discussion were placed in the fourth chapter. The fifth chapter covers the summary and conclusions with implications of the study. The literature cited was presented by following the guidelines of ANGRAU on thesis presentation. Appendices were provided at the end.

Chapter II

REVIEW OF LITERATURE

The main aim of review of literature is to acquire knowledge on the earlier studies undertaken by the researchers in a given field of study. This will help to find out the available information, which is related to the objectives of the proposed research and assists in delineation of the problem area besides providing a basis for theoretical framework and for interpretation of the findings. It facilitates to find out the gaps in selecting topics for research studies besides fetching the available techniques, which can be used to measure the factors under study and to compare the present results with that of the results of previous research.

An attempt has been made to review the relevant literature on Training needs of banana growers in Palakkad district of Kerala and presented the same in a systematic manner under the following sub headings:

- 2.1 Profile characteristics of the banana growers.
- 2.2 Training needs of banana growers.
- 2.3 The extent of adoption of banana production technology by the banana growers.
- 2.4 Relationship between selected profile characteristics of banana growers with their training needs.
- 2.5 Relationship between selected profile characteristics of banana growers with their adoption levels.
- 2.6 Case lets of few successful banana growers.
- 2.7 Constraints and suggestions elicited by the banana growers.
- 2.8 Hypothesis
- 2.9 Conceptual model of the study

2.1 PROFILE CHARACTERISTICS OF THE BANANA GROWERS.

2.1.1 Age

Mahajan (2000) found that majority (63.33%) of the banana growers belonged to middle age group ranging from 36 to 50 years and rest 27.34 per cent belonged to old age group and 9.33 belonged to young age group.

More (2002) revealed that 40.00 per cent of tissue culture banana growers had their age upto 35 years i.e, young while the conventional cultivators of banana had their age 40 years i.e, middle aged.

Kapse *et al.* (2009) noticed that majority (65.33%) of the banana growers belonged to middle age group, followed by those belonged to old age (19.34%) and young age (15.33%).

Mote and Wadnerkar (2009) revealed that more than half (57.34%) of the banana growers belonged to middle age group, followed by those belonged to young age (24.00%) and old age (18.66%).

Kiran and Shenoy (2010) revealed that more than half (53.00%) of the rice farmers belonged to middle age category followed by those belonging to young (27.00%) and old (20.00%) age categories.

Painkra *et al.* (2010) revealed that more than half (54.17%) of the paddy growers were in the age group of middle age, followed by those belonging to old (23.33 %) and young (22.50 %) age group.

Poonam (2010) indicated that the majority (62.00%) of the banana growers belonged to middle age group (36 to 55 years), about 25.33 per cent respondents were of young age group (upto 35 years) and 12.67 per cent respondents were of old age group (more than 55 years).

Sonawane (2010) revealed that majority (62.51%) of the banana growers were found in the middle age group, followed by those belonged to old age (21.66%) and young age (15.83%).

Bennur (2011) reported that majority (60.83%) of the banana growers were under middle age category followed by 21.67 per cent and 17.50 per cent of banana growers belonged to old age and young age categories, respectively.

Gowda *et al.* (2011) revealed that majority (70.83%) of the sugarcane growers were middle aged, followed by 16.67 per cent and 12.50 per cent of respondents coming under young and old age.

Thiyagarajan (2011) found that almost half (49.20%) of the SRI farmers were found in the young age category, followed by those coming under middle age (27.50%), and old age (23.30%) categories.

Vijay (2011) revealed that a great majority (77.50%) of the banana growers belonged to middle age group, followed by old age (21.66%) and young age (.84%).

Rathode and Mandve (2012) reported that less than half (45.00%) of the paddy farmers belonged to middle age group followed by those belonged to young age (37.50%) and 17.50 per cent belonged to old age group.

Aundhkar *et al.* (2013) observed that nearly two-fifths (38.34%) of the orange growers belonged to middle age, followed by those belonged to young (32.50%) and old (29.16%).

Pandya *et al.* (2014) reported that majority (53.00%) of the farm women belonged to middle age group (36- 50 years), followed by those belonged to young age (27.00%) and old age group (20.00%).

Shivaram (2014) revealed that less than half (45.83%) of the banana growers were middle aged group, followed by those belonged to young age group (31.67%) and old age group (22.50%).

2.1.2 Education

Angait (2009) observed that 58.44 per cent of banana growers were educated upto secondary level while 24.67 per cent of respondents were illiterate, while 16.89 per cent of banana growers were educated up to primary level.

Kapse *et al.* (2009) noticed that 25.33 per cent of the banana growers were educated upto middle school, followed by 22.00 per cent could read and write, 20.00 per cent studied upto primary school, 10.67 per cent educated upto high school level, 8.00 per cent were educated upto college level, 8.00 per cent were illiterate and 6.00 per cent could only read.

Mote and Wadnerkar (2009) revealed that majority (29.34%) of the banana growers had 8th to 10th standard education, followed by Junior High School and above (25.34%), 5th to 7th standard (22.66%), illiterate (16.00%) and upto 4th standard (6.66%).

Varma (2009) reported that 37.50 per cent of the banana growers were middle school educated followed by remaining with primary school (25.00%), functionally literate (16.67%), high school (10.83%) and collegiate education (0.83%). Overall 92.83 per cent of the banana farmers were literate followed by marginal percentage of 9.17 per cent with illiteracy.

Ram *et al.* (2010) revealed that 50.00 per cent of the vegetable growers studied up to graduation and above, followed by those studied upto high school and intermediate (24.70%), middle (18.00%), primary school (6.70%) and 0.6 per cent farmers could read and write. There were no illiterate farmers.

Poonam (2010) found that 38.00 per cent of the banana growers were educated upto higher secondary level and 28.67 per cent were educated upto high school level, followed by 15.33 per cent of the respondents were educated upto college and above level. Whereas, 12.00 per cent respondents had education upto middle school level and only 6.00 per cent of the respondents had education upto primary school level. None of the respondents were found in the category of illiterates.

Sonawane (2010) revealed that nearly half (48.33%) of the banana growers were educated upto graduate and above, followed by almost an equal (46.67%) educated upto higher secondary level. Only 5.00 per cent of them were illiterates.

Arathy (2011) revealed that majority of the rice growers had education upto high school (45.83 %) followed by those coming under higher secondary (20.00%), college level (15.00%), middle school (13.33%), primary school (4.17%), functionally literate (1.67%) and illiterate (0.00%) categories.

Bennur (2011) reported that two-fifths (40.83%) of the banana growers had high school education followed by those educated up to PUC, illiterate, graduation, primary school and middle school with 19.17, 15.83, 13.33, 7.50 and 3.33 per cent, respectively.

Gowda *et al.* (2011) revealed that 33.33 per cent of the sugarcane growers educated up to high school education followed by those with collegiate education (21.67%), while 14.17 per cent belonged to middle school, 12.50 per cent belonged to primary school, 10.83 per cent belonged to illiterates, 4.17 per cent respondents could read and write and 3.33 per cent who could read only.

Vijay (2011) revealed that a little more than two fifths (40.84%) of the banana growers had obtained college level of education, followed by 32.50 per cent, 20.00 per cent and 6.66 per cent of them having higher secondary, secondary and primary level of education, respectively.

Thiyagarajan (2011) revealed that more than two fifths (43.33%) of the SRI farmers educated upto secondary level followed by those coming under category of collegiate education (20.85%), middle education (13.33%), functional literate (10.83%) and primary education (8.33%). A meagre percentage (3.33%) of them were only illiterate.

Aundhkar *et al.* (2013) observed that more than one third (35.83%) of the orange growers had middle class education, followed by those had education upto college and above (34.14%), high school (20.00%). 5.83 per cent were in functional illiterate and 4.16 per cent had primary education.

Kadam *et al.* (2014) revealed that nearly half (48.52%) of the sweet orange growers had primary education while 29.17 per cent could only read and write, followed by educated upto middle school(18.14%) and only very less percentage of them (4.17% each) were educated upto secondary school and were illiterate.

Shivaram (2014) noticed that nearly half (46.67%) of banana growers were educated upto secondary level, followed by those educated up to higher secondary level (29.17%) college level (21.66%) and 2.50 per cent of respondents educated upto primary level and nobody was found in illiterate category.

Naik and Deshmukh (2016) noticed that majority (55.00%) of the banana growers studied upto secondary level followed by those studied upto higher level (20.83%), college education (11.67%), primary education (6.67%) and illiterates (5.83%).

2.1.3 Occupation

Shrivastava (2005) found that 26.87 per cent of the rice growers had involved in farming + business followed by 25.00 per cent respondents who involved in farming + services, whereas 22.50 per cent of the respondents were involved in farming. About 12.50 per cent of the respondents were employed in farming + animal husbandry. A few respondents (7.50%) had their farming + labour, whereas only 5.63 per cent of the respondents were employed in farming + Animal husbandry + services.

Meenagour and Indira (2010) reported that majority (72.00%) of the women vegetable farmers had only agriculture as occupation, followed by 16.50 per cent belonged to agriculture and labour occupation category and 11.50 per cent belonged to agriculture and business category.

Poonam (2010) noticed that majority (66.66%) of the banana growers were involved in farming + others, followed by those involved in farming + animal husbandry+ service (14.00%), farming + business + service (10.67%), farming + service (09.33%) and none of the respondents were found in farming and farming + labour category. Others were mostly cultivating crops such as paddy, vegetables like cabbage, bottle gourd, chilli, tomato etc. and fruit crops like papaya etc.

Gowda *et al.* (2011) clearly indicated that nearly half (49.17%) of the sugarcane growers were dependent only on agriculture. Whereas, 47.50 per cent of the respondents were practicing both agriculture and dairy/ poultry, while 3.33 per cent of respondents practiced agriculture + dairy/ poultry + other occupation.

Pandya *et al.* (2014) reported that majority (60.00%) of the farm women were dealing with farming and animal husbandry as their occupation followed by farming (35.00%) and farming + business (5.00%).

2.1.4 Land holding

Angait (2009) found that majority (66.66%) of the farmers belong to the medium category of land holding, followed by 14.47 per cent belonged to small category of land holding and 19.17 per cent of respondents belong to large category of land holding.

Kapse *et al.* (2009) noticed that nearly half (46.66%) of the banana growers were medium farmers, followed by big farmers (18.00%), semi medium farmers (15.33%), small farmers (12.67%) and marginal farmers (7.34%).

Mote and Wadnerkar (2009) reported that majority (56.00%) of the banana growers had medium land holding, followed by the rest with large (26.66%) and small land holding (17.34%).

Poonam (2010) reported that a great majority (74.00%) of the banana growers had large size of land holding (above 4 ha), followed by 26.00 per cent who belonged under medium size of land holding and none of the respondents were found in marginal and small size of land holding category.

Sonawane (2010) noticed that exactly one-third (33.33%) of the banana growers were in medium size group, followed by 25.83 per cent, 20.84 per cent and 20.00 per cent of them who had small, large and marginal size of land holdings, respectively.

Varma (2009) revealed that nearly half (49.17%) of the banana growers were big farmers, followed by small (45.00%) and marginal (5.83%) farmers.

Arathy (2011) revealed that majority (54.17%) of the rice farmers were marginal farmers followed by 30.00 per cent of being small farmers and 15.83 per cent of them were big farmers.

Bennur (2011) reported more than one third (37.50%) of banana growers belonged to big farmers category, whereas 25.83 per cent of the respondents falling under small farmers followed by falling under medium (19.17%), marginal (9.17%) and semi-medium (8.33%).

Gowda *et al.* (2011) revealed that more than half (52.50%) of the sugarcane growers had small land holding, followed by those with marginal (35.00%) and big land holding (12.50%).

Shivaram (2014) noticed that 42.50 per cent of the banana growers belonged to the category of small land holding between 1.01 to 2.00 ha followed by 30.00 per cent of respondents belonged to the category of semi medium land holding between 2.01 to 4.00 ha, 20.83 per cent of the respondents belonged to marginal land holding category up to 1.00 ha, 6.67 per cent of respondents belonged to medium category between 4.00 to 10.00 ha. And no body was found in big land holding category which is above 10.01 hectares.

Vijay (2011) revealed that slightly less than half (49.16%) of the banana growers fell under the category of medium land holding, followed by those with small (35.00%) and marginal (8.34%) land holding. Only 7.50 per cent of the banana growers fell in the category of big land holding.

Nirmala (2012) observed that more than half of the SRI paddy growers belonged to small farmers (55.83%) category, followed by those belonged to semi medium (30.00%), medium (7.50%), marginal (4.17%) and large (2.50%) farmers categories.

Aundhkar *et al.* (2013) observed that majority (30.84%) of the orange growers had semi medium size of land holding, followed by those with small (25.83%), medium (18.33%), marginal (12.50%) and large (12.50%) land holding.

Aparna *et al.* (2014) reported that majority of papaya growers of the region possessed marginal and medium category of land holdings.

Kadam *et al.* (2014) revealed that two fifths (40.90%) of the sweet orange growers had medium land holding, followed by those with large (30.00%), small (12.50%) , marginal and semi medium (8.30% each) land holding.

Naik and Deshmukh (2016) noticed that 62.53 per cent of the banana growers were in medium land holding category followed by the rest belonging to small land holding category (15.84%) and large land holding category (13.33%). Only 8.3 percent from marginal land holding category.

2.1.5 Farming Experience

Ahire and Thorat (2007) found that two thirds (40.00%) of paddy growers belonged to more than ten years farming experience followed by 5 to 10 years (34.17%) and less than 5 years (25.83%).

Mote and Wadnerkar (2009) noticed that majority (70.67%) of the banana growers had medium farming experience, followed by those with high (18.67%) and low (10.66%) farming experience.

Varma (2009) noticed that majority (65.83%) of the banana farmers had medium level of farming experience followed by the rest coming in the high (27.50%) and low (6.67%) level of farming experience.

Kiran and Shenoy (2010) revealed that majority (44.00%) of the rice farmers had medium farming experience followed by those with low (29.00%) and high (27.00%) farming experience.

Arathy (2011) found that nearly half (49.17 %) of the rice farmers had medium level of farming experience followed by those with high (30.00%) and low (20.83%) farming experience.

Bennur (2011) reported that more than half (56.67%) of the banana growers belonged to high farming experience category followed by those with medium (37.50%) and low farming experience (5.83%).

Nirmala (2012) observed that more than half (52.50%) of the SRI paddy growers had medium farming experience followed by the remaining with low (30.00%) and high (17.50%) farming experience.

Prashanth and Reddy (2012) opined that less than half (45.00%) of the organic cotton farmers had medium level of farming experience followed by those with low (30.00%) and high (25.00%) farming experience.

Onojah *et al.* (2013) revealed that majority (71.40%) of the maize farmers had above 10 years of farming experience. Whereas, only 29.60 per cent had up to 10 years of experience.

Sandhya (2014) revealed that nearly half (48.33%) of the sugarcane farmers had 18-29 years of farming experience followed by 26.67 per cent had of 7-18 years and 25.00 per cent of farmers had 29-40 years of farming experience.

Naik and Deshmukh (2016) noticed that majority (63.33%) of the banana growers belonged to medium farming experience followed by those belonged to low farming experience (20.00%) and high farming experience (16.67%).

2.1.6 Annual Income

Angait (2009) observed that majority (57.50%) of the banana growers belonged to medium income group. While, 24.84 per cent and 21.66 per cent of the respondents belonged to low and high income group, respectively.

Kapse *et al.* (2009) noticed that majority (58.00%) of the banana growers were having medium annual income, followed by those with high (22.66%) and low (19.34%) annual income.

Kaushalkumar (2009) revealed that less than three fourths (71.11%) of the pineapple growers belonged to medium annual income, followed by the rest belonged to high (15.56%) and low (13.33%) annual income.

Mote and Wadnerkar (2009) noticed that majority (64.00%) of the banana growers had medium annual income, followed by those with high annual income (22.64%) and low annual income (13.34%).

Painkra *et al.* (2010) revealed that nearly half (49.17%) of the paddy growers having annual income up to Rs 30,000 followed by 33.33 per cent having annual income in between Rs 30,000 to Rs 60,000 and 17.50 per cent were having annual income of more than Rs 60,000.

Sonawane (2010) noticed that less than half (46.66%) of the banana growers were found with medium annual income, followed by 34.18 per cent and 19.16 per cent with high and low annual income, respectively.

Vijay (2011) revealed that exactly half (50.00%) of the respondents had medium (Rs 50,001 to Rs 1,00,000/-) annual income, followed by 45.83 per cent of them were having high (above Rs 1,00,000/-) annual income. On the other hand, only 4.17 per cent of the respondents had low (upto to Rs 50,000/-) annual income.

Tidke *et al.* (2012) stated that majority (70.00%) of pigeon pea farmers had medium annual income, followed by those with high (16.67%) and low (13.33%) level of annual income.

Aundhkar *et.al* (2013) observed that more than one third (35.00%) of the orange growers were having annual income of Rs 2,00,001 and above, followed by those with income in between Rs 50,001 to Rs 1,00,000 (21.66%), Rs 20,001 – Rs 50,000 (18.33%), Rs 1,50,001 to Rs 2,00,000 (18.33%) and Rs 1,00,001 to Rs 1,50,001 (3.33%) and upto Rs 20,000 (3.33%).

Kiranmayee (2013) disclosed that exactly half (50.00%) of the owner farmers cultivating chilly had high annual income, followed by the rest with medium (40.00%) and low (10.00%) annual income. In case of tenant farmers, a little less than half of the respondents had low (48.33%) annual income, followed by those with medium (43.34%) and high (8.33%) annual income.

Sandhya (2014) reported that almost half (47.50%) of the sugarcane farmers had medium annual income followed by 41.67 percent with low and 10.83 per cent with high annual income.

Shivaram (2014) noticed that majority (71.67%) of banana growers had medium annual income. The high annual income respondents were 7.50 per cent. Whereas, 20.83 per cent had low annual income.

Sriramana (2014) revealed that more than two fifths (43.33%) of cashew growers had low level of annual income followed by those with high (29.17%), and medium (27.50%) levels of annual income.

Naik and Deshmukh (2016) noticed that majority of the banana growers fall under medium level of income (72.50%), while 14.17 per cent were having high level of income and remaining 13.33 per cent were having low level of income .

2.1.7 Social Participation

Santhi (2006) reported that more than two fifths (45.00%) of the SRI farmers had medium level of social participation followed by the remaining with high (31.67%) and low (23.33%) levels of social participation.

Sivanarayana *et al.* (2008) concluded that majority (76.67%) of the cotton farmers were having no membership in any organization followed by 23.33 per cent farmers with membership in more than one organization.

Angait (2009) observed that 60.83 per cent of the respondents had high social participation, followed by 15.84 per cent of the respondents had low social participation and 23.33 per cent had medium social participation.

Kapse *et al.* (2009) revealed that majority of the banana growers were having medium (42.66%) social participation, followed by the remaining with low (37.34%) and high (20.00%) social participation.

Mahatab Ali (2010) found that more than half (53.44%) of the aerobic rice growers belonged to medium social participation followed by 26.56 per cent and 20.00 per cent of them having low and high social participation, respectively.

Poonam (2010) revealed that maximum number of banana growers (48.66%) had membership in one organization followed by 14.67 per cent of respondents had membership in two and more than two organizations and only 04.00 per cent of respondents, were found to belong office bearer's category. However, 32.67 per cent of the respondents were having no membership in any organization.

Arathy (2011) found that 41.66 per cent of the rice farmers had medium social participation followed by those with high (34.17%) and low (24.17%) levels of social participation.

Gowda *et al.* (2011) observed that majority (53.33%) of the sugarcane growers belonged to medium social participation category. Whereas, 35.00 and 11.67 per cent of the respondents belonged to low and high social participation categories, respectively.

Vijay (2011) revealed that nearly half (46.66%) of the banana growers had membership in one organisation, while nearly two fifth (38.34%) of them had membership in more than one organisations. Whereas, only 9.17 per cent of them had no membership in any organisation and a meagre number (5.83%) of the respondents were holding position in organisation.

Tidke *et al.* (2012) found that more than three fourths (76.67%) per cent of the pigeon pea farmers had no social participation, 16.67 per cent of them had membership in one organization and only 6.66 per cent of them had membership in more than one organization.

Devi *et al.* (2013) revealed that majority (67.50%) of the sugarcane farmers had medium social participation, followed by the rest with high (20.83%) and low (11.67%) levels of social participation.

Kumar *et al.* (2013) stated that nearly two thirds (64.44%) of the chickpea farmers had low level of social participation, followed by those with medium (24.45%) and high (11.11%) levels of social participation.

Shivaram (2014) noticed that majority (48.33%) of banana growers had medium social participation, while 30.83 per cent of them had low social participation and 20.84 per cent of the respondents had high social participation.

Sriramana (2014) revealed that majority (56.66%) of the cashew farmers had medium social participation, followed by the rest with low (24.17%) and high (19.17%) levels of social participation.

Naik and Deshmukh (2016) noticed that majority (67.50%) of the banana growers had medium social participation, while 16.67 per cent and 15.83 per cent of banana growers had low and high social participation, respectively.

2.1.8 Extension Contact

Kapse *et al.* (2009) noticed that majority (43.33%) of the banana growers belonged to medium extension contact, followed by those with low (38.00%) and high (18.67%) extension contact.

Varma (2009) noticed that majority (82.50%) of the banana farmers had medium extension agency contact followed by those with low (12.50%) extension agency contact. Whereas, only 5.00 per cent of the respondents had high extension agency contact.

Painkra *et al.*(2010) revealed that the neighbours (28.33%) were the most important sources of information for rice growers under personal localities category followed by input dealers (21.67%) and friends (19.17%) followed by 18.33 per cent under tribal leader category and progressive farmers (12.50%).Under personal cosmopolite sources, rural agricultural extension officers ranked first i.e. 35.00 per cent information sources by the rice growing tribal farmers, followed by co-operative officers which account for 22.50 per cent information sources and NGOs accounts for 10.00 per cent .

Poonam (2010) indicated that majority (64.67%) of the banana growers had medium level of extension contact, followed by 22.67 per cent of the respondents who had low level of extension contact and only 13.33 per cent of the respondents had high level of extension contact.

Sonawane (2010) noticed that nearly three fifths (58.33%) of the banana growers had medium level of extension contact, followed by the remaining with high extension contact (23.34%) and low extension contact (18.33%).

Arathy (2011) reported that less than half (46.67%) of the rice farmers had medium extension contact followed by those with low (32.50%) and high (20.83%) levels of extension contact.

Bennur (2011) noticed that, 45.00 per cent of the banana growers belonged to low extension contact followed by 25.00per cent and 30.00 per cent who belonged to high and medium extension contact categories, respectively.

Vijay (2011) revealed that slightly more than two thirds (67.50%) of the banana growers were found to have medium level of extension contact, followed by 19.16 per cent and 13.34 per cent of the respondents who had high and low level of extension contact, respectively.

Kalyan *et al.* (2012) found that majority (56.67%) of the groundnut farmers had medium extension contact, followed by those with low (26.67%) and high (16.66%) levels of extension contact.

Kumar *et al.* (2012) revealed that more than three - fifths (63.12%) of the paddy growers belonged to medium extension contact, followed by the rest with high (24.38%) and low (12.50%) extension contact.

Tidke *et al.* (2012) observed that more than three-fourths (76.67%) of the pigeon pea farmers had medium extension contact, followed by the remaining with low (13.33%) and high (10.00%) levels of extension contact.

Aundhkar *et.al* (2013) observed that majority (69.16%) of the orange growers had high extension contact, followed by those with medium (25.00%) and low (5.83%) extension contact.

Kiranmayee (2013) indicated that a little more than half (69.16%) of the chilli farmers belonged to medium extension contact category, followed by the rest having high (25.00%) and low (18.33%) extension contact.

Sandhya (2014) indicated that majority (60.83%) of the sugarcane farmers had medium extension contact followed by the remaining with low (20.00%) and (19.17%) high extension contact.

Kumari and Laxmikant (2016) reported that more than two fifths (42.50%) of the beekeepers had low level of extension contact and 40.00 per cent had medium level. The remaining 17.50 per cent had high level of extension contact.

Naik and Deshmukh (2016) noticed that majority of the banana growers belonged to medium extension contact category (82.50%), while 9.17 per cent and 8.33 per cent of them belonged to high and low extension contact category, respectively.

2.1.9 Urban Contact

Prasad (1990) found that majority (65.00%) of the tribal farmers had medium urban contact, while 21.00 per cent had low urban contact and 14.00 per cent had high urban contact.

Babu (1992) reported that majority (59.00%) of the tribal farmers had medium urban contact while 27.00 per cent had high urban contact and 14.00 per cent had low urban contact.

Venkateswarlu (1993) revealed that majority (60.00%) of the betelvine farmers had medium urban contact, followed by 20.83 per cent with low urban contact. Whereas, 19.17 per cent had got high urban contact.

Atchutha Raju (1998) noticed that 60.00 per cent of the betelvine growers had medium urban contact, while 20.83 per cent had low urban contact and 19.17 per cent had high urban contact.

2.1.10 Mass Media Exposure

Ramanna *et al.* (2000) revealed that 48.00 per cent of the hybrid sunflower growers had medium level of mass media exposure while 12.00 and 40.00 per cent of respondents had low and high level of mass media exposure.

Shashidhara (2003) in his study reported that 41.11 per cent of the respondents belonged to medium level of mass media participation, followed by those with low level (35.56%) of mass media participation, whereas 23.33 per cent of respondents were noticed in high mass media participation.

Gopinath (2005) inferred that majority (68.00%) of bengalgram farmers had medium level of mass media exposure followed by those with high (17.33%) and low (14.67%) level of mass media exposure.

Begum (2008) revealed that majority (62.50%) of the groundnut farmers had medium level of massmedia exposure followed by those with high (21.67%) and low (15.83%) levels of mass media exposure.

Leena *et al.* (2008) reported that majority (53.20%) of respondents were having medium mass media exposure followed by less (27.60%) and more (19.20%) from their study on Integrated Pest Management practices adopted by coconut farmers.

Varma (2009) noticed that majority (63.33%) of the banana farmers had medium mass media exposure followed by 21.67 per cent with low and 15.00 per cent of the respondents with high mass media exposure.

Kiran and Shenoy (2010) stated that majority (71.00%) of the SRI paddy farmers were under medium mass media exposure category followed by those with low (15.00%) and high (14.00%) mass media exposure category.

Painkra *et al.* (2010) revealed that 30.84 per cent of the paddy growers possessed radio and 23.33 per cent of farmers attended fairs, while 18.33 per cent of them visited agricultural exhibition, 15.00 per cent of them viewed television followed by reading news paper (12.50 per cent).

Prabhugouda (2011) revealed that a little less than two - thirds (64.17%) of the pomegranate growers had medium mass media exposure followed by the remaining with low (20.00%) and high (15.83%) mass media exposure.

Kiranmayee (2013) revealed that majority (68.34%) of the chilli farmers had medium mass media exposure, followed by the remaining with high (18.33%) and low (13.33%) mass media exposure.

Devi *et al.* (2013) stated that majority (69.17%) of the sugarcane farmers were medium in mass media exposure, followed by those with high (20.00%) and low (10.83%) level of mass media exposure.

Sandhya (2014) indicated that majority (69.17%) of the sugarcane farmers had medium mass media exposure followed by 15.83 per cent with low and 15.00 per cent of the respondents with high mass media exposure.

Sriramana (2014) revealed that majority (52.50%) of the cashew growers had medium mass media exposure followed by those with low (25.00%) and high (22.50%) level of mass media exposure.

Kumari and Laxmikant (2016) revealed that majority (55.00%) of the beekeepers had medium level of exposure to mass media and 26.66 per cent had low level of exposure to mass media. The remaining 18.33 per cent had high level of mass media exposure.

2.1.11 Scientific Orientation

Karpagam (2007) indicated that little less than half (45.00%) of the grape growers had medium scientific orientation, followed by the rest with low (37.50%) and high (17.50%) scientific orientation.

Varma (2009) revealed that 66.67 per cent of the banana farmers had medium scientific orientation followed by those with high (22.50%) and low (10.83%).

Kiran and Shenoy (2010) concluded that 80.00 per cent of the rice farmers had medium level of scientific orientation followed by low (18.00%) and high (2.00%) level of scientific orientation.

Poonam (2010) states that majority of the banana growers (64.00%) had medium level of scientific orientation, followed by 23.33 per cent had low level of scientific orientation while, 12.67 per cent of respondents had high level of scientific orientation regarding banana production technology.

Sonawane (2010) reported that majority (61.66%) of the banana growers had medium level of scientific orientation, followed by 28.34 per cent of banana growers had high level of scientific orientation and rest (10.00%) with low level of scientific orientation.

Arathy (2011) found that 44.17 per cent of the respondents had medium scientific orientation followed by those with high (37.50%) and low (18.33%) levels of scientific orientation.

Bennur (2011) reported that (45.00%) of the banana growers had medium level of scientific orientation followed by 33.33 and 21.67 per cent who had low and high level of scientific orientation, respectively.

Prabhugouda (2011) reported that majority (65.83%) of pomegranate growers had medium scientific orientation followed by the remaining with high (18.83%) and low (15.83%) scientific orientation.

Vijay (2011) revealed that a little more than three - fifths (62.50%) of the banana growers had medium scientific orientation, followed by the rest with high (20.83%) scientific orientation and low (16.67%) scientific orientation.

Kalyan *et al.* (2012) revealed that 44.17 per cent of the groundnut farmers had medium scientific orientation, followed by the rest with low (39.17%) and high (16.66%) levels of scientific orientation.

Tidke *et al.* (2012) found that most (83.33%) of the pigeon pea farmers had medium level of scientific orientation, followed by those with low (13.33%) and high (3.33%) levels of scientific orientation.

Chouhan *et al.* (2013) concluded that more than two-thirds (67.50%) of the pea growers had medium scientific orientation followed by those with high (17.50%) and low (15.00%) levels of scientific orientation.

Kiranmayee (2013) stated that a little more than half of the chilli farmers had medium (53.33%) scientific orientation followed by those with low (26.67%) and high (20.00%) scientific orientation.

Sandhya (2014) revealed that 47.50 per cent of the sugarcane farmers had medium scientific orientation followed by those with high (28.33%) and low (24.17%) levels of scientific orientation.

Sriramana (2014) concluded that majority (57.50%) of cashew growers had medium level of scientific orientation followed by those with low (23.33%) and high (19.17%) levels of scientific orientation.

2.1.12 Risk Orientation

Angait (2009) observed that exactly half (50.00%) of banana growers belonged to low risk orientation category, while 35.00 per cent belonged to medium and only 15.00 per cent of banana growers belong to high risk orientation.

Kaushalkumar (2009) stated that more than half (54.44%) of the pineapple growers had medium level of risk orientation whereas, 27.78 per cent of them had high level of risk orientation and 17.78 per cent of them exhibited low level of risk orientation.

Varma (2009) noticed that 80.83 per cent of the banana farmers had medium risk orientation. The high risk orientation was noticed in case of 10.00 per cent of respondents and remaining 9.17 per cent of respondents were with low risk orientation.

Kiran and Shenoy (2010) reported that majority (86.00%) of the rice farmers had medium risk orientation followed by those with low (10.00%) and high (4.00%) levels of risk orientation respectively.

Patil *et al.* (2010) observed that less than half (45.00%) of the vegetable growers had high risk orientation, followed by those with medium (27.86%) and low (27.14%) risk orientation.

Ram *et al.* (2010) reported that majority (69.30%) of the vegetable growers belonged to medium category of risk orientation, followed by the rest coming under high (17.40%) and low (13.30%) categories of risk orientation.

Sonawane (2010) reported that 53.33 per cent of the banana growers had medium level of risk orientation, followed by 25.83 per cent and 20.84 per cent with high and low level of risk orientation, respectively.

Arathy (2011) reported that majority (61.67%) of the rice growers had medium risk orientation followed by those with high (32.50%) and low (5.83%) risk orientation.

Bennur (2011) reported that 62.50 per cent of the banana growers had high level of risk orientation followed by the rest with medium (28.33%) and low (9.17%) levels of risk orientation, respectively.

Gowda *et al.* (2011) revealed that 73.33 per cent of the sugarcane growers had medium risk orientation followed by the remaining coming under low (18.34%) and high (8.33%) risk orientation categories.

Singh *et al.* (2011) found that a little more than half of the clusterbean growers belonged to medium risk orientation (68.99%), followed by the remaining coming under low (16.77%) and high (14.24%) level of risk orientation.

Vijay (2011) revealed that nearly two - thirds (65.00%) of the banana growers had medium level of risk orientation. Whereas, 16.17 per cent and 15.83 per cent of the respondents had high and low level of risk orientation, respectively.

Kiranmayee (2013) disclosed that more than half of the owner farmers cultivating chilli had medium (60.00%) risk orientation, followed by those with low (25.00%) and high (15.00%) risk orientation. In case of tenant farmers, more than half of the respondents had medium (66.67%) risk orientation, followed by those with high (20.00%) and low (13.33%) risk orientation.

Chinnamnaidu *et al* (2014) reported that majority of the sugarcane farmers in north coastal districts of Andhra Pradesh had medium (58.89%) risk orientation followed by those with high (22.78%) and low (18.33%) risk orientation.

Shivaram (2014) noticed that 61.67 per cent of the banana growers had medium risk orientation, followed by those with 20.00 per cent and 18.33 per cent of them were having low and high risk orientation, respectively.

Sandhya (2014) revealed that 64.17 per cent of the sugarcane farmers had medium level of risk orientation followed by those with low (23.33%) and high (12.50%) levels of risk orientation.

Sriramana (2014) revealed that more than two - fifths (43.33%) of the cashew growers had medium level of risk orientation followed by those with low (31.67%) and high (25.00%) level of risk orientation.

2.1.13 Market Orientation

Satale (2005) revealed that majority (37.00%) of the mango growers had high market orientation, while 36.00 per cent and 27.00 per cent of them had medium and low market orientation.

Varma (2009) revealed that 55.00 per cent of the banana farmers had medium market orientation and 25.00 per cent of respondents belonged to low level market orientation, only 20.00 per cent of respondents belonged to high level of market orientation.

Ambedkar (2010) revealed that 66.66 per cent of the Bengal gram farmers had medium market orientation followed by the remaining with high (21.67%) and low (11.67%) levels of market orientation.

Kalyan (2011) found that less than half (46.66%) of groundnut farmers had medium achievement motivation followed by those with high (38.33%) and low (15.00%) achievement motivation.

Kiranmayee (2013) disclosed that more than half of the owner farmers cultivating chilli had medium (58.33%) market orientation, followed by those with low (21.67%) and high (20.00%) market orientation. In case of tenant farmers, more than half of the respondents had medium (63.34%) market orientation, followed by the remaining with high (23.33%) and low (13.33%) market orientation.

Sandhya (2014) revealed that 62.50 per cent of the sugarcane farmers had medium market orientation followed by the rest with low (23.33%) and high (14.17%) levels of market orientation.

Sriramana (2014) revealed that more than two - fifths (41.67%) of cashew growers had medium market orientation followed by those with low (35.00%) and with high (23.33%) level of market orientation.

Naik and Deshmukh (2016) noticed that majority (46.67%) of the banana growers had medium market orientation followed by 35.00 per cent and 16.33 per cent of the banana growers with high and low market orientation, respectively.

2.1.14 Innovativeness

Kumar (1998) pointed out that, 40.00 per cent of the banana growers had less innovativeness followed by 37.00 per cent of them had medium and 23.00 per cent of them had high innovativeness.

Shashidhara (2003) in his study on socio-economic profile of drip irrigation farmers in Shimoga and Davanagere district of Karnataka found out that, majority of the farmers belonged to medium innovativeness category (47.50%) followed by low (31.66%) and high (20.83%) innovativeness category, respectively.

Suresh (2004) indicated that the milk producers in Chittor district in Andhra Pradesh had medium, high and low innovativeness in the order of 55.00, 24.58 and 20.42 per cent, respectively.

Patil *et al.* (2010) reported that majority (53.57%) of the organic vegetable growers had high innovativeness followed by the rest with medium (32.14%) and low (14.19%) innovativeness.

Ram *et al.* (2010) reported that majority (69.30%) of the vegetable growers had medium innovativeness followed by those with high (20.00%) and low (10.70%) innovativeness.

Gowda *et al.* (2011) reported that majority (68.33%) of sugarcane growers had medium innovativeness, followed by low (22.50%) and high (9.17%) innovativeness categories.

Prabhugouda (2011) revealed that majority (71.67%) of Pomegranate growers had medium innovativeness, followed by those with high (15.00%) and low (13.33%) level of innovativeness.

Vijay (2011) revealed that slightly more than two - fifths (42.50%) of the respondents were highly innovative, followed by the remaining with 33.33 per cent were medium innovative and 8.00 per cent of the respondents were low innovative.

Kalyan *et al.* (2012) found that nearly three - fifths (59.17%) of the groundnut farmers had medium level of innovativeness, followed by the rest with high (20.83%) and low (20.00%) level of innovativeness.

Tidke *et al.* (2012) revealed that 40.00 per cent of the pigeon pea farmers had medium level of innovativeness and an equal percentage coming under low and high level of innovativeness (30.00% each).

Aundhkar *et al.* (2013) observed that majority (41.66%) of the orange growers had medium innovativeness, followed by those with high (38.33%) and low (20.00%) innovativeness.

Devi *et al.* (2013) revealed that almost two - thirds (65.83%) of the sugarcane farmers had medium innovativeness, followed by the remaining with high (17.50%) and low (16.67%) innovativeness.

Kumar *et al.* (2013) concluded that more than two - fifths (43.33%) of the chickpea farmers had medium innovativeness, followed by those with low (32.22%) and high (24.44%) level of innovativeness.

Sandhya (2014) indicated that majority (59.17%) of the sugarcane farmers had medium innovativeness followed by remaining with low (25.00%) and high (15.83%) innovativeness.

Sriramana (2014) revealed that nearly two - fifths (39.17%) had medium level of innovativeness followed by those with low (35.83%) and high (25.00%) level of innovativeness.

Kumari and Laxmikant (2016) observed that majority (59.16%) of the beekeepers had medium level of innovativeness and 25.00 per cent had low level of innovativeness. Only 15.84 per cent had high level of innovativeness.

2.1.15 Achievement motivation

Bennur (2011) observed that 50.83 per cent of the banana growers had medium achievement motivation, followed by 40.00 and 9.17 per cent of respondents having high and low achievement motivation, respectively.

Gowda *et al.* (2011) revealed that 61.67 per cent of sugarcane growers had medium achievement motivation, whereas 24.16 per cent and 14.17 per cent of sugarcane growers were with low and high achievement motivation.

Chinnammaidu *et al.* (2014) reported that majority of the sugarcane farmers in north coastal districts of Andhra Pradesh had medium (65.00%) achievement motivation followed by those with high (19.44%) and low (15.56%) achievement motivation.

Kumar and Jyothi (2014) reported that less than two - thirds of the grape growers of Ranga Reddy district fell under high (63.30%) achievement motivation followed by those with medium (23.30%) and low (13.40%) achievement motivation.

2.2 TRAINING NEEDS OF BANANA GROWERS

Kullayappa *et al.* (2008) revealed that more than two - fifths (43.34%) of the groundnut farmers had medium level of training needs followed by those with high (29.33%) and low (27.33%) levels of training needs.

Khandare *et al.* (2009) reported that majority (55.84%) of the cotton growers were with medium level of training needs of plant protection technology of cotton, followed by those with low (27.50%) and high (16.66%) levels of training needs.

Mande and Nimbalkar (2010) noticed that majority (58.00%) of the farm women needed medium training, while 30.00 percent needed high and 11.23 per cent needed low training in post harvest technology.

Nitnaware *et al.* (2010) observed that about three - fourths (72.00%) of dairy owners had medium training needs in dairy farm followed by 13.33 per cent with low and 14.66 per cent dairy owners with high level of training needs.

Singh *et al.* (2012) reported that majority (56.67%) of the cotton farmers were in the category of high training needs, followed by those with medium (22.50%) and low (20.83%) level of training.

Paswan *et al.* (2013) observed the training needs of the farmers in the six main areas of improved banana cultivation technology. Training need in the area of plant protection measures of improved banana cultivation technology was first preference in case of banana farmers as the average choice score (2.49) was highest in this area. Therefore, this area was ranked first. The training in the area of fertilizer management was perceived by the banana farmers as the second preference, since the average choice score (2.26) of this area was second after the plant protection measures. Similarly, the area such as post-harvest technology (2.21) was perceived by them as third preference so far as the need for training in that area was concerned. The fourth preference for training needs was the area of crop management (2.16) according to the perception of the banana farmers and the areas of irrigation management (2.05) were perceived by them as the fifth preference. The last choice in terms of training need was expressed by the total farmers in the area of pre planting technique (1.86).

Prashanth *et al.* (2013) revealed that majority (64.00%) of the cotton farmers were under high training needs category, followed by those with medium training needs (20.00%) and low training needs (16.00%).

Verma *et al.* (2013) noticed that majority of the marigold growers (61.66%) fell under medium group, while 20.00 per cent and 18.34 per cent of the marigold growers were under high and low groups of training needs, respectively.

Bhise and Kale (2014) reported that majority (39.00%) of the onion growers were in medium training needs, followed by those with low training needs (35.00%) and high training needs (26.00%).

Nath and Patel (2014) revealed that majority (85.00%) of the potato seed growers perceived plant protection measures as their first and top most required need for the training which received 1st rank followed by training need on manures and fertilizer management (72.50%) and seed treatment (67.50%) which received 2nd and 3rd rank, respectively. The sowing method and sowing time was observed as the fourth rank area with 63.33 per cent followed by weed management (42.50%), storage (38.33%), irrigation and drainage (34.17%) and marketing (24.17%) with 5th, 6th, 7th and 8th ranks, respectively.

Pandya *et al.*(2014) reported that majority of the farm women prefer to receive training on specific areas like profitable farming of field crops (1st rank), family health and hygiene (2nd rank) and storage of food grains and pulses (3rd rank).

Kumari and Laxmikant (2016) reported that the training needs of beekeepers was highest in protection of bee pests, diseases and other hazards (85.83%) followed by business of bees (82.50%), beehive products and their extraction processing and medical values (73.33%), management of bee colonies during different seasons (70.83%), essential operations (64.16%) and lowest was observed in selection of site and equipment area.

2.3 THE EXTENT OF ADOPTION OF BANANA PRODUCTION TECHNOLOGY BY THE GROWERS

Mahajan (2000) reported that majority (64.00%) of banana growers found to have adopted recommended practices of banana upto medium extent.

More (2002) reported that majority of banana growers had medium level of adoption of improved cultivation practices of banana.

Varma (2009) revealed that more than three - fourths (75.83%) of the banana growers belonged to medium adoption group. Whereas 14.17% respondents belong to low adoption group followed by 10.00 per cent falling in high adoption group.

Waman and Wagh (2009) noticed that a very large majority (83.33%) of the banana growers were not adopting Ardhapuri variety of banana while a majority of the banana growers were not adopting plant protection measures (60.00%), smudging in banana garden (53.33%), recommended dose of chemical fertilizers and supply of more water during winter season at night time (50.00%). Whereas, 25.00 per cent of the banana growers were not adopting the recommended practices like removal of prenent portion after the formation of fruits, removal of daughter suckers and protection of fingers from sun rays by covering dry leaves.

Poonam (2010) reported that majority (70.00%) of banana growers had medium level of adoption about recommended banana production technology. Whereas, 16.00 per cent and 14.00 per cent of them had low and high level of adoption, respectively

Aundhkar *et al.* (2013) revealed that 55.83 per cent of orange growers had medium adoption level, followed by 33.33 per cent of orange growers had high adoption level of drip irrigation technologies and 10.83 per cent of orange growers had low adoption level of drip irrigation technologies.

Bhat *et al.* (2013) noticed that a majority (67.33%) of the vegetable farmers were under medium adoption category followed by those with low (16.66%) and higher (16.00%) extent of adoption.

Choudhary *et al.* (2014) observed that 51.39 per cent coriander farmers were in the high adoption group, 26.67 per cent in medium adoption group and remaining 21.94 per cent of coriander farmers were observed in the category of low level of adoption about coriander cultivation practices.

Koli and Patel (2014) reported that majority (66.67%) of the coconut growers had medium level of overall adoption regarding recommended practices of coconut followed by 21.30 per cent and 12.03 per cent of the coconut growers had high and low level of overall adoption, respectively.

Kumar *et al.* (2014) observed that more than one third (37.50%) of the pomegranate farmers belonged to high adoption practices for pomegranate cultivation. While, 32.50 per cent of the farmers had low adoption practices followed by medium adoption practices (30.00%).

More *et al.* (2014) reported that 85.00 per cent of the ajwain farmers were included under medium category of adoption of ajwain cultivation practices. Whereas, 7.00 per cent and 8.00 per cent were in low and high adoption categories, respectively.

Nayak *et al.* (2014) observed that more than one third (35.83%) of the arecanut growers belonged to medium adoption category. Whereas, 34.17 per cent and 30.00 per cent of them belonged to low and high adoption categories of overall recommended practices, respectively.

Kumar and Singh (2015) revealed that 46.00 per cent of total rice growers were found to be from medium adoption level group, whereas 32.00 per cent of rice growers were reported from the group of low adoption level and 22.00 per cent rice growers were in the high adoption level.

Kumar *et al.* (2015) reported that a maximum number (44.00%) of grape growers belonged to medium adopters category and only 29.00 per cent of the grape growers fall in high adopters category. Whereas, 27.00 per cent of them had low adoption of recommended practices.

Ram *et al.* (2015) revealed that majority (53.33%) of the farmers had medium level of adoption of ecofriendly technology, followed by 28.00 per cent and 18.67 per cent of them had high and low level of adoption of ecofriendly technologies in paddy cultivation, respectively.

Rani and Selvaraj (2015) noticed that majority (66.67%) of the irrigated farmers were found with high level of adoption behaviour, followed by 33.33 per cent with low level of adoption. As far as rainfed farmers were concerned, more than one third (38.33%) of them were observed with high level of adoption followed by 31.67 per cent with medium and the remaining 30.00 per cent with low level of adoption behaviour.

Jamatia *et al.* (2016) reported that 48.00 per cent of the true potato seed farmers were marginal and 36.67 per cent were small farmers. Whereas, 16.00 per cent of medium farmers and 1.33 per cent of the big farmers have adopted true potato seed technology fully.

2.4 RELATIONSHIP BETWEEN THE PROFILE CHARACTERISTICS OF BANANA GROWERS AND THEIR TRAINING NEEDS

S.No.	Profile characteristics/ Researcher	Year	Relationship	Respondents
1.	Age			
	Sangeetha	2004	Positively Significant	Cotton growers
	Kullayappa <i>et al.</i>	2008	Negatively Non – Significant	Groundnut farmers
	Mote and Wadnerkar	2009	Positively Significant	Banana growers
	Singh <i>et al</i>	2012	Positively Non – Significant	Cotton farmers
	Prashanth <i>et al</i>	2013	Positively Non – Significant	Organic Cotton farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
2.	Education			
	Sangeetha	2004	Positively Significant	Cotton growers
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Mote and Wadnerkar	2009	Positively Significant	Banana growers
	Singh <i>et al</i>	2012	Positively Non – Significant	Cotton farmers
	Prashanth <i>et al</i>	2013	Positively Significant	Organic Cotton farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Kadam <i>et al</i>	2014	Negatively Significant	Sweet orange growers
3.	Occupation			
	Babu	1992	Positively Significant	Mango growers
	Raut <i>et al</i>	1995	Positively Non – Significant	Young farmers
	Janani <i>et al</i>	2014	Negatively Significant	Pulse Seed growers

4.	Land holding			
	Mahajan	2000	Positively Significant	Banana growers
	Singh <i>et al</i>	2012	Positively Non – Significant	Cotton farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Kadam <i>et al</i>	2014	Positively Non – Significant	Sweet orange growers
	Verma <i>et al</i>	2014	Positively Significant	Tribal farmers
5.	Farming Experience			
	Sangeetha	2004	Negatively Significant	Cotton growers
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Singh <i>et al</i>	2012	Positively Non – Significant	Cotton farmers
	Prashanth <i>et al</i>	2013	Positively Non – Significant	Organic Cotton farmers
	Janani <i>et al</i>	2014	Positively Significant	Pulse Seed growers
	Kadam <i>et al</i>	2014	Negatively Significant	Sweet orange growers
6.	Annual income			
	Mote and Wadnerkar	2009	Positively Significant	Banana growers
	Singh <i>et al</i>	2012	Positively Significant	Cotton farmers
	Prashanth <i>et al</i>	2013	Positively Significant	Organic Cotton farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Janani <i>et al</i>	2014	Positively Non – Significant	Pulse Seed growers
	Kadam <i>et al</i>	2014	Positively Non – Significant	Sweet orange growers
7.	Social Participation			
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Singh <i>et al</i>	2012	Positively Non – Significant	Cotton farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Janani <i>et al</i>	2014	Positively Significant	Pulse Seed growers

8.	Extension contact			
	Sangeetha	2004	Positively Significant	Cotton growers
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Singh <i>et al</i>	2012	Positively Non – Significant	Cotton farmers
	Prashanth <i>et al</i>	2013	Positively Non – Significant	Organic Cotton farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Kadam <i>et al</i>	2014	Positively Non – Significant	Sweet orange growers
9.	Urban contact			
	Prasad	1990	Negatively Non – Significant	Tribal farmers
	Babu	1992	Positively Non – Significant	Mango growers
	Atchuta Raju	1998	Positively Significant	Betelvine growers
	Janani <i>et al</i>	2014	Positively Significant	Pulse Seed growers
10.	Mass media exposure			
	Sangeetha	2004	Positively Significant	Cotton growers
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
11.	Scientific orientation			
	Sangeetha	2004	Positively Significant	Cotton growers
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Janani <i>et al</i>	2014	Positively Non – Significant	Pulse Seed growers
12.	Risk orientation			
	Sangeetha	2004	Positively Significant	Cotton growers
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
	Janani <i>et al</i>	2014	Positively Non – Significant	Pulse Seed growers

13.	Market orientation			
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Verma <i>et al</i>	2013	Negatively Significant	Marigold growers
14.	Innovativeness			
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers
	Verma <i>et al</i>	2014	Positively Significant	Tribal farmers
15.	Achievement motivation			
	Kullayappa <i>et al</i>	2008	Positively Significant	Groundnut farmers

2.5 RELATIONSHIP BETWEEN THE PROFILE CHARACTERISTICS OF BANANA GROWERS AND THEIR ADOPTION

S.No.	Profile Characteristics / Researcher	Year	Relationship	Respondents
1.	Age			
	Angait	2009	Negatively Significant	Banana growers
	Kapse <i>et al</i>	2009	Negatively Non –Significant	Banana growers
	Poonam	2010	Negatively Non -Significant	Banana growers
	Bennur	2011	Positively Non -Significant	Banana growers
	Thiyagarajan	2011	Negatively Significant	Rice farmers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Non –Significant	Coconut growers
	Shivaram	2014	Negatively Significant	Banana growers
	Sriramana	2014	Positively Significant	Cashew growers
2.	Education			
	Angait	2009	Positively Significant	Banana growers
	Kapse <i>et al</i>	2009	Positively Significant	Banana growers
	Varma	2009	Positively Significant	Banana growers
	Poonam	2010	Positively Significant	Banana growers
	Bennur	2011	Positively Significant	Banana growers
	Thiyagarajan	2011	Positively Significant	Rice farmers
	Aundhkar <i>et al</i>	2013	Positively Significant	Orange growers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Nayak <i>et al</i>	2014	Positively Significant	Arecanut growers
	Shivaram	2014	Positively Significant	Banana growers
3.	Occupation			
	Manoj <i>et al.</i>	2009	Positively Significant	Adopted village farmers
	Poonam	2010	Negatively Significant	Banana growers
	Singh, B	2013	Negatively Non -Significant	Rabi crop growers
	Nayak <i>et al</i>	2014	Positively Significant	Arecanut growers

4.	Land holding			
	Angait	2009	Positively Non -Significant	Banana growers
	Kapse <i>et al</i>	2009	Positively Significant	Banana growers
	Varma	2009	Positively Significant	Banana growers
	Poonam	2010	Positively Significant	Banana growers
	Bennur	2011	Positively Non –Significant	Banana growers
	Thiyagarajan	2011	Negatively Significant	Rice farmers
	Aundhkar <i>et al</i>	2013	Positively Significant	Orange growers
	Kiranmayee	2013	Positively Non -Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Nayak <i>et al</i>	2014	Positively Non -Significant	Arecanut growers
	Shivaram	2014	Positively Significant	Banana growers
	Sandhya	2014	Positively Non -Significant	Sugarcane farmers
5.	Farming Experience			
	Gopinath	2005	Positively Significant	Bengalgram farmers
	Varma	2009	Positively Non -Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengalgram farmers
	Chouhan <i>et al</i>	2013	Positively Significant	Sugarcane growers
	Kiranmayee	2013	Positively Non –Significant	Chilli farmers
	Sandhya	2014	Positively Significant	Sugarcane farmers
	Sriramana	2014	Positively Significant	Cashew growers
6.	Annual income			
	Kapse <i>et al</i>	2009	Positively Significant	Banana growers
	Poonam	2010	Positively Significant	Banana growers
	Aundhkar <i>et al</i>	2013	Positively Significant	Orange growers
	Chouhan <i>et al</i>	2013	Positively Significant	Sugarcane growers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Nayak <i>et al</i>	2014	Positively Significant	Arecanut growers

	Shivaram	2014	Positively Significant	Banana growers
	Sandhya	2014	Positively Significant	Sugarcane farmers
	Sriramana	2014	Positively Non –Significant	Cashew growers
7.	Social Participation			
	Angait	2009	Positively Significant	Banana growers
	Kapse <i>et al</i>	2009	Positively Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengalgram farmers
	Poonam	2010	Positively Significant	Banana growers
	Singh <i>et al</i>	2010	Positively Non -Significant	Potato growers
	Thiyagarajan	2011	Positively Non -Significant	Rice farmers
	Koli and Patel	2014	Positively Non -Significant	Coconut growers
	Nayak <i>et al</i>	2014	Positively Significant	Arecanut growers
	Shivaram	2014	Positively Significant	Banana growers
	Sriramana	2014	Positively Non -Significant	Cashew growers
8.	Extension contact			
	Kapse <i>et al</i>	2009	Positively Significant	Banana growers
	Varma	2009	Positively Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengal gram farmers
	Poonam	2010	Positively Significant	Banana growers
	Singh <i>et al</i>	2010	Positively Non –Significant	Potato growers
	Bennur	2011	Positively Significant	Banana growers
	Aundhkar <i>et al</i>	2013	Positively Significant	Orange growers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Sandhya	2014	Positively Significant	Sugarcane farmers
	Sriramana	2014	Positively Significant	Cashew growers
9.	Urban contact			
	Venkateswarlu	1993	Positively Significant	Betelvine farmers
	Sumathi and Alagesan	1998	Positively Significant	Groundnut farmers
	Atchuta Raju	1998	Positively Significant	Betelvine growers

10.	Mass media exposure			
	Sumathi and Alagesan	1998	Positively Significant	Groundnut farmers
	Natarajan	2004	Positively Significant	Upland rice growers
	Maraddi and Kumar	2008	Positively Non –Significant	Sugarcane farmers
	Varma	2009	Positively Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengal gram farmers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Sandhya	2014	Positively Significant	Sugarcane farmers
	Sriramana	2014	Positively Significant	Cashew growers
11.	Scientific orientation			
	Varma	2009	Positively Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengal gram farmers
	Poonam	2010	Positively Significant	Banana growers
	Bennur	2011	Positively Significant	Banana growers
	Sivashankar and Shashidhar	2011	Positively Significant	Jasmine growers
	Chouhan <i>et al</i>	2013	Positively Significant	Sugarcane growers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Nayak <i>et al</i>	2014	Positively Significant	Arecanut growers
	Sandhya	2014	Positively Significant	Sugarcane farmers
	Sriramana	2014	Positively Significant	Cashew growers
12.	Risk orientation			
	Angait	2009	Positively Significant	Banana growers
	Varma	2009	Positively Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengal gram farmers

	Singh <i>et al</i>	2010	Positively Non -Significant	Potato growers
	Bennur	2011	Positively Significant	Banana growers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Shivaram	2014	Positively Significant	Banana growers
	Sandhya	2014	Positively Significant	Sugarcane farmers
	Sriramana	2014	Positively Significant	Cashew growers
13.	Market orientation			
	Gopinath	2005	Positively Significant	Bengalgram farmers
	Varma	2009	Positively Non -Significant	Banana growers
	Ambedkar	2010	Positively Significant	Bengal gram farmers
	Kiranmayee	2013	Positively Significant	Chilli farmers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Sandhya	2014	Positively Non -Significant	Sugarcane farmers
	Sriramana	2014	Positively Significant	Cashew growers
14.	Innovativeness			
	Gopinath	2005	Positively Significant	Bengal gram farmers
	Ambedkar	2010	Positively Significant	Bengal gram farmers
	Aundhkar <i>et al</i>	2013	Positively Significant	Orange growers
	Koli and Patel	2014	Positively Significant	Coconut growers
	Sriramana	2014	Positively Significant	Cashew growers
15.	Achievement motivation			
	Bennur	2011	Positively Significant	Banana growers
	Sivashankar and Shashidhar	2011	Positively Non -Significant	Jasmine growers

2.6 CASELETS OF FEW SUCCESSFUL BANANA GROWERS

Frederick-le-play (2002) introduced case study method in social sciences. Case study is a method of scientific social research and a kind of qualitative analysis; it is a comprehensive study of social unit may be a personal, a group, an institution. It aims at studying everything about something, rather than something about everything as in case of statistical methods.

Rosaiah and Rao (2004) reported that negative cash farm income of the household due to crop failure resulting from drought, non-availability or irregular water resources, crop management, non-remunerative prices, to borrow huge amount at high interest rates had contributed to the economic unavailability and financial insolvency of marginal owner-cum-tenant households.

Mahitha (2005) identified the maladies that tend to suicidal deaths of cotton cultivators such as psychological, family maladies, crop production maladies like pest attack, spurious pesticides, dangers of mono-cropping, high rate of interest, lack of irrigation water etc. and suggested remedies like psychiatric counseling, provision of institutional credit, advance information incidence of pests and diseases and checking the quality of pesticides etc.

Swetha (2006) expressed in the vulnerable situation, the major maladies as perceived by prawn farmers were, physical like locating the prawn ponds near to seashore with under developed mangroves, technical like not following scientific method of construction of prawn ponds; followed by economical like fluctuations in price of prawn due to disease attack and psychological like fearful, panicky, hopeless and depressed, followed by social, cultural and political as other vulnerabilities.

2.7 CONSTRAINTS FACED BY THE BANANA GROWERS

Mahajan (2000) indicated that high cost of drip irrigation system (45.30%) and deepening of water table in summer (40.60 %) were the major constraints faced by the banana growers in respect of irrigation.

Varma (2009) noticed that the constraints perceived by the banana farmers were lack of knowledge about recommended suckers/acre, selection of suckers and sucker treatment with chemicals, planting of sucker as per the recommendation and FYM and

fertilizer management. Labour problem was a major constraint in weed control with herbicides, lack of knowledge in identification of symptoms of pests and diseases was a major constraint in plant protection, labour problem for timely operation was another constraint in intercropping system and use of micro nutrients, labour problem in harvesting of the crop, high transport cost in marketing and lack of knowledge on value added products in post harvest technology are other problems.

Sonawane (2010) reported that major constraints faced by banana growers in management of drip irrigation system were : frequent clogging of drippers and micro tubes (100%), high cost of components of DIS (85.00%), lack of timely technical guidance (76.66%), complicated technology (72.50%), frequent breakage/ requirement of parts (65.83%), difficulty in interculturing operations (59.16%), required time to time attention for minor repairs (52.50%), non availability of skilled labours (48.33%), problems of water leakages in the system (43.33%) and additional tank required to get proper pressure (34.16%).

Bennur (2011) observed that the following are the constraints in banana cultivation, 94.17 per cent of the banana growers indicated labour problem, electricity problem (90.83%), Whereas, 90.00 per cent of respondents indicated that non-availability of storage facilities, followed by lack of knowledge about value added products (89.17%) as the main constraints in adoption of recommended banana cultivation practices. Financial problem are cost of tissue culture plants, lack of knowledge about INM, IPM and IDM where other major constraints pointed out by 85.00 per cent, 84.17 per cent and 83.83 per cent of the respondents respectively. Around seventy five per cent of banana growers expressed the constraints of exploitation by middlemen. As much as 45.83 per cent of respondents indicated the constraints of non-availability of chemical fertilizers and non-availability of planting material (30.00%) were the other constraints expressed by the banana growing farmers in cultivation of banana crops.

Prabhugouda (2011) reported the problems faced by Pomogranate growers in percentage rank order of their importance as Bacterial blight (100.00%), difficult to identify disease free planting material (99.17%), lack of knowledge about value added products of Pomegranate (95.83%), high cost of plant protection chemicals (92.50%), non availability of labour for harvesting (91.67%), high cost of chemical fertilizers (87.50%), lack of horticultural training programmes (62.50%), high rate of interest on credit (24.17%) and lack of grading facilities (68.33%).

Vijay (2011) reported that among the technical constraints, the banana growers endorsed major constraints were: frequent clogging of drippers and micro tubes (rank 1), lack of technical know how (rank II), cracking of laterals (rank III), problems of water leakages in the system (rank III), problems of water leakages in the systems (rank IV), difficulty in interculturing (rank V) and complicated technology (rank VI).

Paswan *et al.* (2013) noticed that the main problems faced by the banana growers were low profit due to high cost of cultivation (89.47%) and susceptibility of plants to disease like banana wilt (86.13%). However, only 24.21 per cent felt non-availability of suitable improved variety and 26.31 per cent felt as failure in fruit formation due to unfavourable weather conditions.

Shivaram (2014) reported that lack of knowledge about making products of banana (84.16%), heavy loss during the post harvesting works (83.33%), lack of assured market (80.00%), unavailability of cold store houses (75.00%), damage of crop due to heavy wind (75.00%), low scientific knowledge about banana production technology (69.17%) unavailability of chemical fertilizers in time (67.50%), unavailability of pesticides in time (59.16%), shortage of labour (46.66%), high charges of transportation (36.67%), high cost for the planting by tissue cultured plants (35.83%), high cost for drip irrigation system (33.33%), there is no benefit from fruit crop loan scheme (20.83%) and no benefit from fruit crop insurance scheme (15.83%) were the constraints faced by the banana growers in the following order.

Pawar *et al.* (2016) revealed that in case of preparatory tillage, banana growers faced problems like cost of wages (87.50%) and labour shortage (66.67%), whereas 37.50 per cent of them having lack of scientific knowledge about preparatory tillage. Regarding FYM or compost, 83.33 per cent, 75.00 per cent and 41.66 per cent of banana growers perceived the problems of high cost of FYM, non-availability of FYM at proper time, and lack of scientific knowledge about FYM application respectively. In case of application of chemical fertilizers, high cost of fertilizers (82.50%) and lack of scientific knowledge about fertilizer application (54.16%) were major constraints expressed by the banana growers. Whereas 35.00 per cent of banana growers mentioned they did not get fertilizers at proper time. Regarding intercultural operations, 72.50 per cent, 49.16 per cent and 37.50 per cent banana growers perceived problems of non availability of intercultural machineries at proper time, lack of knowledge about

plants which is required for wind breaks and lack of knowledge about intercultural operations respectively, whereas non availability of labours at proper time reported by 20.83 per cent of the banana growers. In the context of plant protection, high cost of insecticide or pesticide and complexity in use of plant protection measures are the important reasons reported by 65.83 per cent and 51.66 per cent, respectively for non adoption of these practice. Whereas 48.33 per cent and 25 per cent banana growers perceived the problems of non availability of duster and sprayer and lack of scientific knowledge about plant protection, respectively. Regarding irrigation water management, load shedding of electricity (95.83%) and scarcity of water (62.50%) were major constraints expressed by the banana growers. Whereas 37.50 per cent banana growers expressed the problems of lack of knowledge about proper irrigation management. In the context of harvesting , 69.16 per cent and 53.33 per cent banana growers faced the problems of high cost of wages and non availability of labour at proper time, respectively.

SUGGESTIONS ELICITED BY THE BANANA GROWERS.

Varma (2009) noticed that the provision of support price to quality produce, providing fertilizers and chemicals on subsidized rates, provision of good transport facilities, providing good quality of suckers at the cheaper rate, developing standardized control measures for pests and diseases, release of virus resistant varieties, timely technical guidance and soil testing, provision of timely credit facilities, improving crop insurance facility and provision of drip pump sets at subsidy rates are the suggestions elicited.

Sonawane (2010) concluded that the banana growers suggested that cost of components of drip irrigation system should be minimized (85.00%), followed by timely technical guidance should be provided to the farmers (80.83%), training on management of drip irrigation system should be imparted to farmers (74.16%), spare parts of the system should be made available locally at reasonable rates (63.33%), at least guarantee against DIS sets should be provided by company (53.33%), provisions on maintenance and free services from company agents (44.16%), skilled labour should be made available in time (42.25%) and knowledge regarding fertilizer application through drip irrigation should be provided (35.83%).

Bennur (2011) indicated that majority of banana growers (93.83%) suggested to provide proper infrastructure facilities like road, storage and transportation. Other suggestions were intervention of government in resolving power problem (81.67%). Whereas 77.50, 72.50 and 68.53 per cent of respondents suggested supply of planting materials at the subsidized rate by the Department of Horticulture, provide financial support for banana cultivation and establishment of cooperative market for banana growers, respectively. Banana being commercial and highly remunerative crop requires proper care during various crop growth stages. The constraints expressed by the respondents should be tackled by the concerned departments without much delay, otherwise crop growth will be affected and leads to reduction in yield. Easy availability of finance, policy support for entrepreneurs, organizing effective training programmes, promoting cooperatives and improving marketing system will also help to overcome the constraints.

Vijay (2011) revealed that the major suggestions made by the banana growers to overcome the constraints associated with the adoption of DIS in sequential order were : cost of components of DIS should be minimized (rank I), followed by timely technical guidance should be provided to the farmers (rank II), spare parts of the system should be made locally available at reasonable rates (rank III), provisions of regular guidance on guidance on maintenance and free service from company agents (rank IV), training should be imparted for betterment of knowledge/ skill to use the system efficiently and effectively (rank V), increase in subsidy/loan and it should be provided for drip sets (rank VII), provision of regular supervision by company agents (rank VIII) and multipurpose sub mains should be designed so as to use in different crops (rank IX).

Devi (2013) enlisted the major suggestions of sugarcane farmers as: intervention and popularization of suitable and feasible sugarcane harvesters (93.33%), provision of remunerative price (91.67%), improving irrigation facilities (87.50%), followed by training on identification and control of pests and diseases and pest forecasting measures (83.33%), in time payments for the produce (80.83%), regular power supply (76.67%), provision of improved planting material in time (73.33%), provision of proper institutional finance and crop insurance (70.00%), extension activities and training (65.83%), timely and sufficient supply of inputs (56.67%) and development of cost effective technologies (41.67%).

Shivaram (2014) reported that information may be given on other improved varieties of banana (92.50%), to give information about making processed products from banana(91.66%), to provide current market condition regularly (90.23%), chemical fertilizers should be made available in time (87.50%), pesticides may be made available at proper time (84.16%) and need a detail information about planting of tissue culture crops (57.50%) are the suggestions.

Sandhya (2014)observed that Provision of early cash payment with minimum support price to sugarcane (100.00%- 1st rank) was foremost one followed by timely provision of credit facility (88.33%-2nd rank), Organisation of training programmes on various new farming methods of sugarcane (80.00%-3rd rank), timely provision of electricity supply (70.00%-4th rank), timely provision of fertilizers and seeds on subsidized rates (66.67%-5th tank), Timely extension contact is needed (63.33%-6th tank), Installation of bore wells on subsidized rates (56.67%-7th rank), Implementation of crop insurance scheme (52.50%-8th rank), Provision of good transportation facilities (50.00%-9th rank), Provision of harvesting equipments(48.33%-10th rank), Provision of loan at lower interest (40.83%-11th rank), Timely technical guidance (40.00%-12th rank), Provision of effective plant protectionchemicals (30.00%-13th rank) of their importance as perceived by the sugarcane farmers.

Pawar *et al.* (2016) noticed that majority of the banana growers (94.16%) suggested information regarding irrigation should be given in time by extension agencies, whereas 91.66 per cent of banana growers suggested that tissue culture plants should be made available in sufficient quality. While 87.50 per cent of the banana growers suggested that government should provide NADEP and vermicompost unit and pesticide should be provided at low cost suggested by 85.00 per cent of the banana growers. Message alerts through SMS about insect, pest and control measures should be given to farmers in time suggested by 77.50 per cent of the banana growers. Good quality sucker should be supplied to farmers in time suggested by 73.33 per cent banana growers, whereas 62.50 per cent of them suggested to reduce the cost of fertilizer and information regarding proper time of harvesting, marketing should be given in time by extension agencies suggested by 61.66 per cent banana growers. Information regarding low cost intercultural operation should be given by extension agencies, suggestion expressed by 54.16% per cent banana growers, whereas 48.33 per

cent banana growers suggested that training programme should be organised to improve the knowledge regarding land use, proper use of soil and detail package of practices. Government should provide cent per cent subsidy for good quality organic manure suggested by 46.66 per cent banana growers, whereas 43.33 per cent banana growers suggested that fertilizer made available at proper time. Information regarding intercultural operation should be given in time by extension agencies suggested by 40.83 per cent banana growers, information regarding proper time of irrigation should be suggested by 40.00 per cent, whereas 40.00 per cent suggested fungicides for sucker treatment should be made available in rural areas at proper time and farm mechanization should be motivated among the farmers in group by providing machinery on subsidy bases (36.67%).

2.8 HYPOTHESIS

Hypothesis is a guess, a hunch or an assumption of the existence of some facts, which serve to explain the connection of facts in a given situation. Hypothesis guides the researcher through the bewildering jungle of facts to shift, select and synthesize only those that are relevant to problem.

2.8.1 Null Hypothesis

There was no significant relationship between independent variables namely age, education, land holding, occupation, farming experience, annual income, extension contact, social participation, urban contact, mass media exposure, risk orientation, scientific orientation, market orientation, innovativeness and achievement motivation with training needs and adoption of banana growers.

2.8.2 Empirical Hypothesis

There was significant relationship between independent variables namely age, education, land holding, occupation, farming experience, annual income, social participation, extension contact, urban contact, mass media exposure, risk orientation, scientific orientation, market orientation, innovativeness and achievement motivation with training needs and adoption of banana growers.

2.9 CONCEPTUAL MODEL OF THE STUDY

In the light of inference derived from evidences in the literature, conceptual frame work developed for the study which represent the important dimensions and postulated relationship among the variables. The present study entitled “Training needs of banana growers in Palakkad district of Kerala” focused on training needs of banana growers, their adoption levels and to identify constraints and elicit suggestions to overcome them. Fifteen independent variables representing the profile characteristics based on review of literature and through discussion with experts included to examine the extent of relationship with training needs and adoption levels.

Chapter III

MATERIAL AND METHODS

This chapter gives a brief description of the methods and procedures followed in the study. The investigation was carried out with the objective of studying the training needs of banana growers in Palakkad district of Kerala. The research methods and materials used in conducting the study are depicted under the following heads.

3.1 Research design

3.2 Sampling procedure

3.3 Operationalization of the variables and their empirical measurement

3.4 Eliciting constraints and suggestions of banana growers in related to banana cultivation

3.5 Collection of data

3.6 Statistical tools used

3.1 RESEARCH DESIGN

The research design adopted for the present study was *ex-post-facto*, since the variables chosen for the investigation have already taken place. According to Kerlinger (1964), *ex-post-facto* research is a systematic empirical enquiry in which the scientist does not have direct control over the independent variables because either their manifestations have already occurred or they are not inherently manipulated.

3.2 SAMPLING PROCEDURE

3.2.1 Location of the Study

The state of Kerala was selected purposively as the researcher belonged to this state and well acquainted with the regional language i.e., Malayalam which would help to build a good rapport and also facilitates in depth study through personal observation.

3.2.2 Selection of the District

Palakkad district was selected purposively for the following reasons.

1. Palakkad is the district in Kerala which has the highest area under banana cultivation.
2. No similar type of research work was conducted in the district regarding the study on the training needs of banana growers.

3.2.3 Selection of Blocks

Out of 13 blocks in Palakkad, three blocks namely Attapady, Mannarkkad and Sreekrishnapuram were selected purposively for the study, where the area under banana cultivation is high.

3.2.4 Selection of Villages

From each blocks selected, four villages were randomly selected. Thus, a total number of 12 villages were selected from the four blocks.

3.2.5 Selection of the Respondents

Selection of respondents was done by proportionate random sampling, after listing the total number of banana growers in each village selected. Table 3.1 reveals the selection of respondents.

Table 3.1. Particulars of Blocks, Villages and Respondents selected for the study

S. No.	Blocks	Villages	No. of banana growers	No. of banana growers selected
1	Attapady	Agali	300	11
		Kallamala	100	4
		Sholiyur	100	4
		Pudur	120	5
2	Mannarkkad	Thenkara	350	13
		Karakurssy	650	25
		Potassery 1	350	13
		Potassery 2	300	11
3	Sreekrishnapuram	Sreekrishnapuram 1	200	8
		Sreekrishnapuram 2	140	5
		Karimpuzha 1	350	13
		Karimpuzha 2	220	8
	Total		3180	120

3.3 OPERATIONALIZATION OF VARIABLES AND THEIR EMPIRICAL MEASUREMENT

For the research study, fifteen independent and two dependent variables were selected after thorough review of literature and discussion held with experts in the field of extension. The following table 3.2 clearly depicts the different variables selected for the study along with their empirical measurements.

Table 3.2 Variables and their empirical measurement of the study

S. No.	Variables	Instruments used for the study
I	Dependent variables	
1	Training needs	Schedule developed for the study.
2	Adoption	Schedule developed for the study.
II	Independent variables	
1.	Age	Chronological age of the respondents in completed years.
2	Education	Scale developed by Venkataramaiah (1983) used with suitable modification.
3	Occupation	Scale developed by Trivedi (1963) used with suitable modification.
4	Land holding	Scale developed by Venkataramaiah (1983) used with suitable modification.
5	Farming experience	Interval scaling procedure will be adopted for the study.
6	Annual income	Interval scaling adopted for the study.
7	Social participation	Scale developed by Trivedi (1963) used with suitable modification.
8	Extension contact	Procedure developed by Kalkannavar (1999) used with suitable modification.
9	Urban contact	Schedule developed by Satyanarayana (1983) used with suitable modification.
10	Mass media exposure	Schedule developed by Desai (1977) used with suitable modification.
11	Scientific orientation	Scale developed by Supe (1969) used with suitable modification.
12	Risk orientation	Scale developed by Supe (1969) used with suitable modification.
13	Market orientation	Scale developed by Samantha (1977) used with suitable modification.
14	Innovativeness	Schedule developed by Natikar (2001) used with suitable modification.
15	Achievement motivation	Scale developed by Reddy (1976) used with suitable modification.

3.3.1 Measurement of Independent Variables

3.3.1.1 Age

Age was operationalized as the chronological age of the banana growers in completed years. They were asked to indicate their age in completed years. Categorization of the respondents was given below:

S. No.	Age	Score
1.	Young age (< 35years)	1
2.	Middle age (36-58 years)	2
3.	Old age (>58 years)	3

The number of respondents falling under each category was worked out through frequency and percentage.

3.3.1.2 Education

Education was operationalized as the formal schooling attended by the banana growers. They were asked to indicate the educational qualification possessed by them at the time of investigation. The respondents were categorized as per the scores given below:

S. No.	Education	Score
1.	Illiterate	1
2.	Functionally literate	2
3.	Lower Primary school	3
4.	Upper Primary school	4
5.	High school	5
6.	Higher secondary	6
7.	Graduation	7
8.	Post Graduation	8

The number of banana growers falling under each category was worked out through frequency and percentage.

3.3.1.3 Land holding

Land holding has been operationalized as the number of standard acres of land possessed by the banana growers at the time of enquiry. The land holding of the respondents was measured with the help of schedule developed by Venkataramaiah (1983) revised in 2002. To calculate the individual respondent's score with regard to land holding, the scoring pattern adopted was as given below:

S. No	Land holding	Score
1.	Marginal farmers (upto 2.5 acres)	1
2.	Small farmers (2.6 – 5 acres)	2
3.	Semi medium farmers (5.01 – 10 acres)	3
4.	Medium farmers (10.01 – 25 acres)	4
5.	Large farmers (> 25 acres)	5

The number of banana growers falling under each category worked out through frequency and percentage.

3.3.1.4 Occupation

Occupation was operationalized as the nature of job held by the banana growers at the time of investigation. The occupation of the banana growers was measured with the help of schedule developed by Trivedi (1963). It refers to primary family occupation or main source or livelihood. The respondents were categorized based on their occupational patterns given below:

S. No.	Occupation	Score
1.	Agriculture	1
2.	Agriculture + Labour work	2
3.	Agriculture + Animal husbandry	3
4.	Agriculture + Labour work + Animal husbandry	4
5.	Agriculture + Service	5
6.	Agriculture + Business	6
7.	Agriculture + Others	7

The number of banana growers falling under each category was worked out through frequency and percentage.

3.3.1.5 Farming experience

Farming experience was operationalized as the number of years of practical experience gained by the banana growers in banana cultivation. The scoring pattern for measuring this variable was given below:

S. No.	Farming experience	Score
1.	< 5 years	0
2.	6-10 years	1
3.	11-15 years	2
4.	16-20 years	3
5.	21-25 years	4
6.	Above 25 years	5

The number of banana growers falling under each category worked out through frequency and percentage.

3.3.1.6 Annual income

Annual income can be operationalized as the income of the farmers in terms of the returns received from all sources during the year. Total income from various sources was added to obtain the annual income. The scoring patterns for items included were given below:

S. No.	Annual income	Score
1.	Low annual income	1
2.	Medium annual income	2
3.	High annual income	3

The number of respondents falling under each category worked out through frequency and percentage.

3.3.1.7 Social participation

Social participation was operationalized as the degree of involvement of the banana growers in social organizations either as a member or as an office bearer in

one or more organizations. For the purpose of studying the social participation, scale developed by Trivedi (1963) was used with suitable modifications. The modified social participation scale consisted of five items measured to know the membership details and extent of participation. Membership was studied in terms of non-member, member and office bearer. Extent of participation was studied on a three point continuum viz., regular, occasional and never. The scoring pattern adopted is as follows:

Member / Non-member	Score	Extent of participation	Score
Non-member of an organization	1	Regularly	3
Member of an organization	2	Occasionally	2
Office bearer	3	Never	1

By adding the scores of all statements, the individual total score was worked out. The maximum and minimum possible scores of an individual banana growers are 36 and 12, respectively. Based on the total scores, the respondents were classified into three categories using mean and standard deviation as shown below:

S. No.	Social participation	Score
1.	Low social participation	< Mean – SD
2.	Medium social participation	Mean ± SD
3.	High social participation	>Mean+ SD

3.3.1.8 Extension contact

Extension contact was operationalized as the degree to which an individual maintained contact with the personnel of formal or informal sources for the purpose of getting information on the scientific technologies related to banana crop. It was quantified as per the measurement developed by Kalakannavar (1999) with suitable modifications and the scores were assigned as given below.

Frequency of Contact

S.No.	Source	Regularly (3)	Ocassionally (2)	Never (1)
1	Agricultural Assistant			
2	Agricultural Officer			
3	Assistant Director of Agriculture			
4	Scientists of KAU			
5	Friends & relatives			
6	Input dealers			
7	Agri – clinics			
8	NGOs			

This variable was measured in terms of frequency of contacts the individual maintained with change agents and these were measured on three point continuum i.e., regularly, occasionally and never and the scores of three (3), two (2) and one (1) was given respectively. By adding the scores on all the items, the individuals total score was worked out.

Based on mean and S.D; the banana growers were grouped into three categories as follows :

S.No.	Category	Score range
1.	Low Extension Contact	< Mean – S.D.
2.	Medium Extension Contact	Mean \pm S.D.
3.	High Extension Contact	> Mean + S.D.

3.3.1.9 Urban contact

This variable was operationalized according to the definition given by Rogers and Svenning (1969). This is on the basis of extent of contact with outside the village such as visiting nearest town/ city and membership outside the village.

Index developed by Satyanarayana (1983) was adopted with slight modifications which takes into consideration of frequency of visits to towns.

- a. How often do you visit the nearest town ?
- 1. Never () 0
 - 1. Once in a month () 1
 - 2. Once in a fortnight () 2
 - 2. Once in a week () 3
 - 3. Twice in a week () 4
 - 3. More than two times in a week () 5

- b. Please indicate purpose of your visit to the nearest town ?
- 1. On farm work () 4
 - 2. Personal work () 3
 - 3. Social call () 2
 - 4. Entertainment and others () 1

Scores on each item and sub items were summed up to get the total score on urban contact. On the basis of mean and standard deviation, the respondents were grouped into three categories.

S.No.	Category	Score range
1.	Low Urban Contact	< Mean –S.D.
2.	Medium Urban Contact	Mean ± S.D.
3.	High Urban Contact	>Mean + S.D.

3.3.1.10 Mass media exposure

It was operationlized as the extent of exposure of the beneficiaries to the Mass media such as radio, television, newspapers, Agricultural books, information materials and Farm magazines. Mass media exposure scale was developed by Desai (1977) used with suitable modifications. It consists of seven statements used to know the frequency of exposure and was measured as regular, occasionally and never with the scores of 3, 2 and 1. By adding the scores of all items, the individual total score was worked out.

S.No.	SOURCES	Extent of exposure		
		Regularly (3)	Occasionally (2)	Never (1)
	1. Radio programmes 2. Television programmes 3. Newspaper 4. Information materials 5. KissanMelas 6. Mobile text message or calling 7. Internet			

The banana growers were categorized into three groups based on the mean and standard deviation.

S.No.	Category	Scores
1.	Low Mass media exposure	<Mean – S.D
2.	Medium Mass media exposure	Mean ± S.D
3.	High Mass media exposure	>Mean + S.D

3.3.1.11 Scientific orientation

Scientific orientation was operationalized as the degree to which a farmer was oriented towards scientific methods in decision making with respect to banana cultivation. It was measured with the help of scale developed by Supe (1969). The scale consisted of 6 statements of which five were positive and one is negative. The responses for each statement were rated on a three-point continuum which are Agree, Undecided, Disagree. The weightage 3, 2 and 1 were assigned to the response categories in case of positive statements and the scoring was reversed for negative statements. The scoring was done as follows:

The maximum score an individual could obtain on this scale was '18' and the minimum score could be '6'. The respondents were categorized based on the mean and standard deviation.

S.No.	Category	Score
1.	Low Scientific Orientation	<Mean - S.D
2.	Medium Scientific Orientation	Mean \pm S.D
3.	High Scientific Orientation	>Mean + S.D

3.3.1.12 Risk orientation

Risk orientation was operationalised as the degree to which the respondents were oriented towards risk and uncertainty in adopting new farming techniques in banana cultivation. It was measured with the help of scale developed by Supe (1969). It consists of six statements out of which two were negative and four were positive. The responses for each statement were rated on a three-point continuum which are Agree, Undecided and Disagree. The weightage of 3, 2 and 1 were assigned to the response categories in case of positive statements and the scoring was reversed for negative statements.

The score obtained for each statement was summed up to get individual respondents risk orientation score. The maximum and minimum possible score was '18' and '6' respectively and the respondents were classified into three groups on the basis of mean and standard deviation. The beneficiaries were categorized into three groups based on the mean and standard deviation:

S.No.	Category	Scores
1.	Low Risk orientation	<Mean -S.D
2.	Medium Risk orientation	Mean \pm S.D
3.	High Risk orientation	>Mean + S.D

3.3.1.13 Market orientation

Market orientation was operationalized as the judgments taken by the individual banana growers to sell the produce for better price by analyzing various prevailing infrastructural and market intelligence facilities. For the purpose of study, the market orientation scale constructed by Samantha (1977) was used with suitable modifications. The scale consisted of six statements, out of which three statements were positive and three statements were negative. The responses were recorded on three point continuum ranging agree, undecided and disagree with scores of 3, 2 and 1 for positive statements and 1, 2 and 3 for negative statements, respectively. The maximum and minimum possible scores of an individual banana growers were '18' and '6' respectively.

Based on the scores, banana growers were grouped into three categories by using mean and standard deviation.

S. No.	Market orientation	Score
1.	Low market orientation	$>\text{Mean} - \text{SD}$
2.	Medium market orientation	$\text{Mean} \pm \text{SD}$
3.	High market orientation	$<\text{Mean} + \text{SD}$

3.3.1.14 Innovativeness

Operationally, innovativeness was defined as the degree to which a respondent adopts new ideas relatively earlier than others in his/her social system.

The scale developed by Natikar (2001) was adopted with suitable modifications in quantifying the variable. The scale consisted of 8 statements of which three were positive and 3 were negative. The instrument consists of nine statements and responses were on five point continuum viz., Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SDA). The weightage of 5, 4, 3, 2 and 1 were assigned to the response categories in case of positive statements and the scoring was reversed for negative statements.

The total score of the farmers in their innovativeness was arrived by summing up the weightage of responses for each statement. The minimum and maximum score was '8' and '40'. The farmers were categorized into three groups based on inclusive class interval scale method.

S.No.	Category	Scores
1	Low innovativeness	>Mean – SD
2	Medium innovativeness	Mean ± SD
3	High innovativeness	<Mean +SD

3.3.1.15 Achievement Motivation

It refers to striving to do good work with standard of excellence which may be task related, self related or related to other aspect. For quantification of this variable, the scale developed by Reddy (1976) was used. The scale consist of eight statements to be rated on three point continuum namely agree, undecided and disagree with score of 3, 2, and 1 for positive statements and 1, 2 and 3 for negative statements, respectively. The possible score varied from ‘8’ to ‘24’. Considering the score, the respondents were classified into three categories keeping the mean and standard deviation as check.

S.No.	Category	Scores
1.	Low Achievement motivation	>Mean – SD
2.	Medium Achievement motivation	Mean ± SD
3.	High Achievement motivation	<Mean +SD

3.3.2 Dependent Variable

3.3.2.1 Training need

Training needs in knowledge and training needs in skill of banana growers were accessed in main areas and sub areas of banana cultivation as identified by the scientists and progressive farmers. Above main areas on which banana growers needed training were identified for the study purpose. A three point continuum consisting of ‘most needed’, ‘needed’ and ‘least needed’ was used to measure the training needs of farmers in main areas and sub areas of banana cultivation and a score of three, two, and one was given respectively for quantification. The respondents were asked to indicate anyone of three alternative response against each item of the main areas and sub areas depending upon the degree of training they are in need.

The total training need score of particular item was worked out considering the response expressed by all respondents. For instance, for one particular item i.e., plant protection, frequency of response against each point was 83 in most needed 20 in needed and 17 in least needed multiplying the frequency by their respective score value.

The total score of this particular item was worked out as 306, the main score of this particular item was worked out by dividing the total score of the item with total number of respondents. Therefore, the mean score of the plant protection item obtaining is 2.55.

The mean score values, were obtained separately for all main areas and sub areas of banana cultivation. Items were ranked according to mean score values. Highest mean score will get 1st rank, next highest mean score will get the next rank, like that all the ranks were worked out.

3.3.2.2 Adoption

For the purpose of investigation, adoption was operationalized as practising the package of practices by the farmers as recommended by the Department of Horticulture and Kerala Agricultural University.

Package of practices were identified in consultation with senior officials of Department of Horticulture and Scientists of Kerala Agricultural University.

The scheduled practices were administered to the respondents and their responses were in the form of full adoption, partial adoption and non adoption with a weightage of 3,2,1 respectively were obtained. Partial adoption refers to deviation (Differs from standard practices recommended by the department of Horticulture) from the adoption of a particular practice and the practice which was not adopted by the farmers was considered as non- adoption. Thus, the total score of all the package of practices was computed by summing up the scores over all the items.

Based on the adoption scores obtained by each respondent, they were grouped into three categories by using mean and standard deviation.

S. No.	Adoption	Score
1.	Low Adoption	>Mean - SD
2.	Medium Adoption	Mean \pm SD
3.	High Adoption	<Mean +SD

3.4 ELICITING CONSTRAINTS

To identify the major constraints encountered by the banana growers in adoption of various improved production practices of banana, possible constraints were listed out and the respondents were asked to choose those constraints that were appropriate to their situation. The number of growers expressing the same constraints were counted i.e, frequencies were taken and ranked accordingly.

3.4.1 Suggestions to Overcome the Constraints

An attempt was also made to elicit suggestions from respondents to overcome constraints in banana cultivation. Frequencies and percentages were calculated to interpret the results.

3.5 COLLECTION OF DATA

3.5.1 Designing the Interview Schedule

The schedule consists of five parts. The first part dealt with personal, socio-economic and psychological characteristics of the banana growers. The second part dealt with the training needs in knowledge and skill, third with the adoption and fourth with the suggestions on training. The final and fifth part dealt with the constraints and suggestions perceived by the banana growers to overcome them.

3.5.2 Pre-testing of the Schedule

Before giving a final shape to the interview schedule, the schedule was pre-tested with 25.00 per cent of the respondents (banana growers) of the non sample area. In pre-testing, adequate care was taken to select the respondents for required information. Based on the experiences gained in the pre-testing, the interview schedule was modified wherever needed. The final format of the interview schedule was enclosed in the appendices.

3.5.3 Method of Data Collection

Personal interview was conducted under informal atmosphere. Each question was explained to the banana growers with equal emphasis. The onlookers influence and group effect was avoided to considerable extent throughout the study. Informal discussions and observations were also held with banana growers to understand the situation in detail, which in turn was helpful in better interpretation of the results in full context of Training needs.

3.5.4 Preparation of Report

The data thus collected from the banana growers through interview schedule was coded, tabulated, analyzed and presented in the form of tables in order to make findings meaningful and understandable. The findings emerging from the analysis of data were suitably interpreted and conclusions were drawn accordingly.

3.6 STATISTICAL TOOLS USED

To convert the results into findings, few statistical tests were also used as given below for analyzing the data.

3.6.1 Mean (x) and Standard Deviation (SD)

Mean (x) and standard deviation (SD) were computed to distribute the women rice farmers into different characteristics.

Arithmetic mean is defined as the sum of all values of the observations divided by the total number of observations. Symbolically it is represented as \bar{X} .

$$\text{Arithmetic mean } (\bar{X}) = \frac{\sum xi}{n} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

Where

\bar{X} = Arithmetic mean

x_i = Value of i^{th} item of x

Where,

i = 1,2.....n

n = Total numbers of respondents

Standard deviation is the positive square root of the mean of the squared deviations taken from arithmetic mean. It is represented by symbol σ .

$$SD (\sigma) = \sqrt{\frac{1}{n} \left[\sum x^2 - \frac{(\sum x)^2}{n} \right]}$$

$\sum x^2$ = Sum of squares of observations

$(\sum x)^2$ = Square of sum of 'x' values

n = number of observations.

3.6.2 Frequency and Percentages

Frequencies and percentages were used to interpret the categories of personal and socio-economic characteristics of the banana growers. Percentages were also used primarily for analysis of independent and dependent variables and also making simple comparison.

3.6.3 Correlation Coefficient

This test was used to study the relationship between the scores of independent variables and the scores of dependent variables. Correlation coefficient was calculated to find out the degree of relationship between two variables X and Y by using the following formula.

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left[\sum x^2 - \frac{(\sum x)^2}{n} \right] \left[\sum y^2 - \frac{(\sum y)^2}{n} \right]}}$$

r = Correlation coefficient

$\sum x$ = Sum of scores of independent variables

- Σy = Sum of scores of dependent variables
- Σx^2 = Sum of the squares of scores of an independent variables
- Σy^2 = Sum of the squares of scores of a dependent variable
- Σxy = The sum of productivity of x and y
- n = Size of the sample

The calculated 'r' value was verified by using 'r' table value for 5 per cent and 1 per cent level of significance at n – 2 degrees of freedom.

3.6.4 Multiple Linear Regression (MLR)

Multiple linear regression analysis was used to study the effect of independent variables on dependent variables. The following multiple linear regression equation was fitted to the data having 15 parameters.

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Where 'a' was the intercept or constant and b_i 's are partial regression coefficients.

$$b_i = b_1, b_2, \dots, b_8$$

The regression coefficient b_i 's were tested for their significance with the following formula.

$$t_{(n-k-1)} = \frac{|b_i|}{S.E(b_i)}$$

Where

- n = Number of banana growers
- k = Number of independent variables
- S.E (b_i) = Standard error of i^{th} partial regression coefficient
- b_i = i^{th} Partial regression coefficient
- t = Test for significance
- df = Degrees of freedom

Coefficient of Multiple Determinations (R^2) was given by

$$R^2 = \frac{\text{Regression sum of squares (RSS)}}{\text{Total sum of squares (TSS)}}$$

Where

$$\text{RSS} = b_1 \Sigma x_1 y + b_2 \Sigma x_2 y + \dots \dots \dots b_8 \Sigma x_8 y$$

$$\text{and TSS} = \Sigma y^2$$

R^2 value is less than unity where it was expressed in percentage. It measures the extent of variation in dependent variable (y), which can be explained by the independent variables (x_i) together.

Chapter IV

RESULTS AND DISCUSSION

The chapter highlights the results of an investigation and the findings thus arrived are presented and are being discussed in this chapter duly considering the theoretical and available research in the areas of investigation. The presentation of this chapter is grouped under the following sections for the purpose of clarity.

- 4.1 Profile characteristics of the banana growers.
- 4.2 Training needs of banana growers.
- 4.3 The extent of adoption of banana production technology by the banana growers.
- 4.4 Relationship between selected profile characteristics of banana growers with their training needs.
- 4.5 Relationship between selected profile characteristics of banana growers with their adoption levels.
- 4.6 Case lets of few successful banana growers.
- 4.7 Constraints and suggestions elicited by the banana growers.
- 4.8 Empirical model of the study

4.1 PROFILE CHARACTERISTICS OF THE BANANA GROWERS

The distribution of the banana growers into different categories based on their personal, socio-economic and psychological characteristics were presented in this section. The data collected has been presented in the form of tables and interpreted through frequencies and percentages.

4.1.1 Age

On the basis of chronological age, the banana growers were classified into three categories namely young, middle and old age.

Table 4.1. Distribution of the banana growers according to their age

S. No.	Age	Banana growers (120)	
		Frequency	Percentage
1.	Young age (< 35 years)	04	03.33
2.	Middle age (36 - 58 years)	86	71.67
3.	Old age (> 58years)	30	25.00
Total		120	100.00

It is evident from Table 4.1. and Figure. 4.1. that a great majority (71.67%) of the banana growers belong to middle age, followed by the rest coming under old age (25.00%) and young age (3.33%) categories.

A critical observation of the above findings indicated that a greater proportion of the banana growers were middle aged. Usually, middle aged farmers are enthusiastic having more responsibility and efficiency than the younger and older ones. This finding was in conformity with findings of Kapse *et al.* (2009), Poonam (2010), Sonawane (2010), Bennur (2011), Vijay (2011) and Painkra *et al.* (2010).

4.1.2 Education

On the basis of education, the banana growers were classified into eight categories namely illiterate, functionally literate, lower primary school, upper primary school, high school, higher secondary, graduation and post graduation. The results are presented in Table 4.2.

Table 4.2. Distribution of banana growers according to their education

S. No.	Education	Banana growers (120)	
		Frequency	Percentage
1.	Illiterate	04	03.33
2.	Functionally literate	10	08.33
3.	Lower Primary school	22	18.34
4.	Upper Primary school	25	20.83
5.	High school	44	36.67
6.	Higher secondary	10	08.33
7.	Graduation	05	04.17
8.	Post Graduation	0	0.00
Total		120	100.00

From Table 4.2. and Figure. 4.2. it could be inferred that majority (36.67%) of the banana growers belonged to high school level of education followed by the rest belonging to Upper Primary (20.83%), Lower Primary(18.33%), Higher Secondary and Functionally literate (8.33% each), Graduation (4.17%) and Illiterate (3.33%) categories.

Thus it could be inferred that more than three fourth of the banana growers (96.67%) were educated. This is due to the importance given for education by the state government. These findings are some what in agreement with findings of Mote and Wadnerkar (2009).

4.1.3 Occupation

Table 4.3. Distribution of banana growers according to their occupation

S. No.	Occupation	Banana growers (120)	
		Frequency	Percentage
1.	Agriculture	26	21.67
2.	Agriculture + Labour work	12	10.00
3.	Agriculture + Animal husbandry	45	37.50
4.	Agriculture + Labour work + Animal husbandry	05	4.17
5.	Agriculture + Service	20	16.66
6.	Agriculture + Business	12	10.00
7.	Agriculture + Others	00	0.00
Total		120	100.00

From the Table 4.3. and Figure 4.3. it could be observed that majority of the banana growers (37.50%) had Agriculture + Animal husbandry as their main occupation followed by those had Agriculture (21.67%), Agriculture + Service (16.66%), Agriculture + Labour (10.00%), Agriculture + Business (10.00%) and Agriculture + Labour + Animal husbandry (4.17%) as their occupation.

Around one-third of the banana growers were employed in agriculture and animal husbandry. This is because of this requiring less training and was traditionally followed by the farmers. These findings are some what in agreement with findings of Pandya *et al.* (2014).

4.1.4 Land Holding

Table 4.4. Distribution of banana growers according to their land holding

S. No.	Land holding	Banana growers (120)	
		Frequency	Percentage
1.	Marginal (< 2.5 acres)	78	65.00
2.	Small (2.5-5 acres)	35	29.17
3.	Semi-medium (5.01-10 acres)	05	04.17
4.	Medium (10.01- 25 acres)	02	01.66
5.	Large (>25 acres)	00	0.00
Total		120	100.00

It is clear from Table 4.4. and Figure. 4.4. that a great majority of the banana growers had marginal land holding (65.00%) followed by those had small land holding (29.17%), semi medium (4.17%) and medium (1.66%) land holding. This result was in line with the findings of Arathy (2011) and Aparna *et al.* (2014).

In general, family land holdings in Kerala are very small because of very high density of households and land-man ratio is also very small in terms of high population and small land area.

4.1.5 Farming Experience

Table 4.5. Distribution of banana growers according to their farming experience

S. No.	Farming experience	Banana growers (120)	
		Frequency	Percentage
1.	<5 years	04	03.33
2.	6-10 years	26	21.67
3.	11-15 years	33	27.50
4.	16-20 years	20	16.67
5.	21-25years	17	14.17
6.	>25 years	20	16.66
Total		120	100.00

From Table 4.5. and Figure 4.5. it was clear that more than one fourth (27.50%) of the banana growers had farming experience of 11-15 years followed by 21.67 per cent banana growers had 6-10 years of farming experience and 16.67 per cent had farming experience of 16-20 years, 16.66 per cent had farming experience of more than 25 years, 14.17 per cent had farming experience of 21-25 years and 3.33 per cent had farming experience of less than 5 years.

It could be concluded that more than one fourth (27.50%) of the banana growers had farming experience of 11-15 years. It might be due to the shifting of paddy lands to banana cultivation. It could be inferred that their experience could be better exploited to more technologies. This result was in line with the findings of Onojah *et al.* (2013).

4.1.6 Annual Income

Table 4.6. Distribution of banana growers according to their annual income

S. No	Annual income	Banana growers (120)	
		Frequency	Percentage
1.	Low (< Rs 70,000 /-)	35	29.17
2.	Medium (Rs 70,001 – Rs 1,50,000/-)	56	46.67
3.	High (> Rs 1,50,000/-)	29	24.16
Total		120	100.00

It was revealed from the Table 4.6. and Figure 4.6. that less than half (46.67%) of the banana growers had medium annual income ranging from Rs. 70,001 – Rs. 1,50,000 followed by those with annual income below and upto Rs. 70,000 (29.17%) and above Rs. 1,50,000 of annual income (24.16%) .

The present study revealed that around half of the banana growers belonged to medium income category, i.e. between Rs. 70,001 – Rs. 1,50,000. This trend might be due to the fact that majority of the farmers were marginal farmers. Diversification of enterprises would help these farmers to get more financial gains. This result was in agreement with the findings of Angait (2009), Sandhya (2014), Shivaram (2014) and Naik and Deshmukh (2016).

4.1.7 Social Participation

Table 4.7. Distribution of banana growers according to their social participation

S. No.	Social participation	Banana growers (120)	
		Frequency	Percentage
1.	Low (<12.59)	22	18.33
2.	Medium (12.60 – 17.30)	78	65.00
3.	High (> 17.30)	20	16.67
Total		120	100.00
Mean = 14.95		SD = 2.35	

It could be observed from the Table 4.7. and Figure 4.7. that more than half (65.00%) of the banana growers had medium level of social participation while 18.33 per cent and 16.67 per cent had low and high participation, respectively.

Nearly two-third of the banana growers had medium level of social participation. More participation was shown by members who had received higher education and who have better mass media exposure. This result was in line with findings of Angait (2009), Kapse *et al.* (2009), Mahatab Ali (2010), Shivaram (2014), Sriramana (2014) and Naik and Deshmukh (2016).

Table 4.8. Item analysis of banana growers according to their social participation (120)

S. No	Type of organization	Form of membership						Extent of Participation					
		Non – member		Member		Office bearer		Regularly		Occassionally		Never	
		F	%	F	%	F	%	F	%	F	%	F	%
1.	Gram Panchayaths	111	92.50	5	4.17	4	3.33	34	28.33	69	57.50	17	14.17
2.	Cooperative societies	96	80.00	20	16.67	4	3.33	32	26.67	42	35.00	46	38.33
3.	Cooperative Banks	113	94.17	7	5.83	0	0.00	14	11.67	57	47.50	49	40.83
4.	School management	115	95.83	3	2.50	2	1.67	3	2.50	5	4.17	115	95.83
5.	Religious organization	113	94.17	4	3.33	3	2.50	10	8.33	40	33.33	70	58.33

Table 4.8. revealed that 3.33 per cent of the banana growers were office bearers in Gram panchayath and co- operative societies each, followed by religious organization (2.50%), and School management (1.67%). The banana growers were not office bearers in Cooperative Banks.16.67 per cent of the banana growers had membership in co-operative societies, followed by banks (5.83%), panchayaths (4.17%), religious organization (3.33%) and school management (2.50%). 95.83 per cent of the banana growers had no membership in School management in village schools, followed by banks (94.17%), religious organization (94.17%), panchayaths (92.50%) and cooperative societies (80.00%).

It can be also observed that 28.33 per cent of the banana growers had regular participation in panchayaths, followed by co-operative societies (26.67%), banks (11.67%), religious organisation (8.33%) and school management (2.50%). 57.50 per cent of the banana growers had occasional participation in panchayaths followed by banks (47.50%), co- operatives (35.00%), religious organization (33.33%) and school management (4.17%). 95.83 per cent of the banana growers had never participated in school management, religious organization (58.33%), banks (40.83%), co- operative societies (38.33%) and panchayaths (14.17%).

It could be inferred that participation was more for the gram panchayaths and co operative societies by the banana growers. It might be due to that, these institutions directly help the farmers in matters regarding agriculture.

4.1.8 Extension Contact

Table 4.9. Distribution of banana growers according to their extension contact

S. No	Extension contact	Banana growers (120)	
		Frequency	Percentage
1.	Low (<11.72)	22	18.33
2.	Medium (11.73 – 15.66)	76	63.33
3.	High (>15.66)	22	18.33
Total		120	100.00
SD = 1.97		Mean = 13.69	

It could be observed from the Table 4.9. and Figure 4.9. that more than half (63.33%) of the banana growers had medium level of extension contact followed by an equal percentage i.e, 18.33 per cent with low and high extension contact.

The possible reasons attributed to this trend were inadequate field visits by extension personnel and inadequate extension staff. Therefore, there is a need to strengthen the extension organization and create more mobility facilities. This result is in agreement with the findings of Kapse *et al.* (2009), Varma (2009), Poonam (2010), Arathy (2011), Kalyan *et al.* (2010), Tidke *et al.* (2012) and Sandhya (2014).

Table 4.10. Item analysis of banana growers according to their extension contact (120)

S.No.	Source	Regularly		Occasionally		Never	
		F	%	F	%	F	%
1	Agricultural Assistant	42	35.00	60	50.00	18	15.00
2	Agricultural Officer	16	13.33	74	61.67	30	25.00
3	Assistant Director of Agriculture	7	5.83	21	17.50	92	76.67
4	Scientists of KAU	4	3.33	16	13.33	100	83.33
5	Friends & relatives	88	73.33	32	26.67	-	-
6	Input dealers	9	7.50	19	15.83	92	76.67
7	Agri-clinics	-	-	12	10.00	108	90.00
8	NGOs	-	-	14	11.67	106	88.33

Table 4.10. revealed that 73.33 per cent of the banana growers had regular contact with friends & relatives, followed by the rest had regular contact with Agricultural Assistant (35.00%), Agricultural Officer (13.33%), Input dealers (7.50), Assistant Director of Agriculture (5.83) and Scientists (3.33%). None of them had regular contact with Agri – clinics and NGOs.

It can be also observed that 61.67 per cent had occasional contact with Agricultural Officer, followed by those had occasional contact with Agricultural Assistant (50.00%), Friends & relatives (26.67%), Assistant Director of Agriculture (17.50%), Input dealers (15.83%), Scientists (13.33%), NGOs (11.67%) and Agri – clinics (10.00%).

It can also be noticed from table 4.10. that 90.00 per cent of the banana growers had no contact with Agri – clinics, followed by the remaining had no contact with NGOs (88.33%), Scientists (83.33%), Assistant Director of Agriculture (76.67%), Input dealers (76.67%), Agricultural Officer (25.00%) and Agricultural Assistant (15.00%).

It could be inferred that the banana growers had less contact with Agri –clinics. It might be due to the absence of Agri - clinics in the areas. Contact with friends & relatives, Agricultural Officer and Agricultural Assistant seems to be more since growers are free to seek information and they know much better about the growers individually.

4.1.9 Urban Contact

Table 4.11. Distribution of the banana growers according to their urban contact

S. No.	Urban contact	Banana growers (120)	
		Frequency	Percentage
1.	Low (< 3.19)	29	24.17
2.	Medium (3.20 – 6.56)	64	53.33
3.	High (> 6.56)	27	22.50
Total		120	100.00
Mean = 4.88		SD = 1.68	

It could be observed from the Table 4.11. and Figure 4.9. that more than half (53.33%) of the banana growers had medium level of urban contact followed by those with low (22.5%) and high (24.17%) urban contact. This might be due to their limited social contacts and lower income levels and transport facilities in the villages. This result is in agreement with the findings of Venkateswarlu (1993) and Atchuta Raju (1998).

Table 4.12. Frequency of visit to the nearest town (n=120)

Items	Frequency	Percentage
Never	0	0.00
Once in a month	9	7.50
Once in a fortnight	12	10.00
Once in a week	16	13.33
Twice in a week	20	16.67
More than two times in a week	63	52.50
Total	120	100.00

Majority (52.50%) of the banana growers visited the nearest town more than two times in a week, followed by those visiting twice in a week (16.67%), once in a week (13.33%), once in a fortnight (10.00%) and once in a month (7.50%). This might be due to the reason that rural urban differentiation is less in the areas.

Table 4.13. Frequency of purpose of visit to the nearest town (n=120)

Items	Frequency	Percentage
On farm work	24	20.00
Personal work	64	53.33
Social call	18	15.00
Entertainment and others	14	11.67
Total	120	100.00

Majority (53.33%) of the banana growers visits the town for personal work, followed by on farm work (20.00%), social call (15.00%), entertainment and others (11.67%). This trend may be due to that the farmers need to visit the town for agricultural inputs like seeds, pesticides, fertilizers etc. Also, if they employed in any other sector they will be in a need to visit the towns.

4.1.10 Mass Media Exposure

Table 4.14. Distribution of the banana growers according to their mass media exposure

S. No.	Mass media exposure	Banana growers (120)	
		Frequency	Percentage
1.	Low (<12.04)	33	27.50
2.	Medium (12.05 - 15.74)	61	50.83
3.	High (>15.74)	26	21.67
Total		120	100.00
Mean = 13.89		SD = 1.85	

It could be observed from the Table 4.14 and Figure. 4.10. that majority (50.83%) of the banana growers had medium level of mass media exposure followed by the rest with low (27.50%) and high (21.67%) mass media exposure.

This was due to the fact that majority of the respondents were educated and they tend to expose themselves to print media, television programmes etc. This result was in agreement with the findings of Ramanna *et al.* (2000), Shashidhara (2003), Varma (2009), Kiran and Shenoy (2010), Prabhugouda (2011), Sandhya (2014), Sriramana (2014) and Kumari and Laxmikant (2016).

Table 4.15. Frequency of mass media exposure of the banana growers (n=120)

SOURCES	Extent of exposure					
	Regularly		Occasionally		Never	
	F	%	F	%	F	%
Radio programmes	12	10.00	38	31.67	70	58.33
Television programmes	47	39.17	62	51.67	11	9.17
Newspaper	55	45.83	57	47.50	8	6.67
Information materials	19	15.83	80	66.67	21	17.50
Kissan Melas	17	14.17	34	28.33	69	57.50
Mobile text message or calling	85	70.83	29	24.17	6	5.00
Internet	4	3.33	11	9.17	105	87.50

Table 4.15. clearly shows that 70.83 per cent of the banana growers had regular mass media exposure to mobile text message or calling , followed by newspaper (45.83%), television programmes (39.17%), information materials like farm magazines (15.83%), kissan melas (14.17%), radio programmes (10.00%) and internet (3.33%).

It could be noticed from table 4.15 that 66.67 per cent of the banana growers had occasional mass media exposure to information materials like farm magazines, followed by television programmes (51.67%), newspaper (47.50%), radio programmes (31.67%), kissanmelas (28.33%), mobile text message or calling (24.17%) and internet (9.17%).

Table 4.15. also indicates that 87.50 per cent of the banana growers had no mass media exposure to internet, followed by radio programmes (58.33%), kissan melas (57.50%), information materials like farm magazines (17.50%), television programmes (9.17%), newspaper (6.67%) and mobile text message or calling (5.00%).

This trend might be due to the fact that majority of the banana growers were farmers with high school education and so reading newspaper and other information materials like magazines were given importance. Almost every household possessed television, they were keen on watching television. They also make use of the mobile phones for messaging or calling.

4.1.11 Scientific Orientation

Table 4.16. Distribution of banana growers according to their scientific orientation

S. No.	Scientific orientation	Banana growers (120)	
		Frequency	Percentage
1.	Low (<11.69)	21	17.50
2.	Medium (11.70 - 15.78)	78	65.00
3.	High (>15.78)	21	17.50
Total		120	100.00
Mean = 13.74			SD = 2.04

It was evident from the Table 4.16. and Fig. 4.11. that more than half (65.00%) of the banana growers had medium scientific orientation followed by low (17.50%) and high (17.50%) level of scientific orientation. The probable reason for majority having medium scientific orientation might be due to their better education, extension contact and achievement motivation that helped them to develop better scientific orientation.

This result is in agreement with the findings of Arathy (2011), Bennur (2011), Tidke *et al.* (2012) and Sravani (2014).

4.1.12 Risk Orientation

Table 4.17. Distribution of banana growers according to their risk orientation

S. No.	Risk orientation	Banana growers (120)	
		Frequency	Percentage
1.	Low (<12.91)	17	14.17
2.	Medium (12.92- 16.43)	84	70.00
3.	High (>16.43)	19	15.83
Total		120	100.00
Mean = 14.68			SD = 1.75

It could be observed from the Table 4.17. and Figure. 4.12. that more than two third (70.00%) of the banana growers had medium level of risk orientation followed by the remaining with high (15.83%) and low (14.17%) risk orientation.

The possible reason for this trend might be that majority of the banana growers had marginal and small land holding with low and medium annual income. They could not venture to take risk in adopting more recommended improved practices unless the practices were sufficiently demonstrated to show their value. The individuals with more farming experience, better land holding and better income had better risk orientation. Contact with extension personnel by the respondents increases the perception and confidence of the respondents about new technologies.

This result is in agreement with the findings of Kaushalkumar (2009), Varma (2009), Ram *et al.* (2010), Sonawane (2010), Vijay (2011), Arathy (2011) and Chinnamnaidu *et al.* (2014).

4.1.13 Market Orientation

Table 4.18. Distribution of banana growers according to their market orientation

S. No.	Market orientation	Banana growers (120)	
		Frequency	Percentage
1.	Low (< 12.72)	15	12.50
2.	Medium (12.73- 15.45)	91	75.83
3.	High (>15.45)	14	11.67
Total		120	100.00
Mean = 14.09			SD = 1.36

The findings presented in Table 4.18. and Figure 4.13. revealed that 75.83 per cent of the banana growers had medium market orientation followed by the rest with low (12.50%) and high (11.67%) levels of market orientation. Vegetable and Fruits Promotion Council of Kerala (VFPCs) provide better marketing facilities and conduct more fair trades for the banana growers and thus help them to gain a better price for the produce which may be the reason behind the majority of the respondents (75.83%) falling under the medium market orientation category.

This results are in agreement with the findings of Ambedkar (2010), Kiranmayee (2013), Sandhya (2014) and Sriramana (2014).

4.1.14 Innovativeness

Table 4.19. Distribution of the banana growers according to their innovativeness

S. No.	Innovativeness	Banana growers (120)	
		Frequency	Percentage
1.	Low (<24.71)	17	14.17
2.	Medium (24.72 – 29.33)	82	68.33
3.	High (> 29.33)	21	17.50
Total		120	100.00
Mean = 27.03			SD = 2.31

It was evident from the Table 4.19. and Figure 4.14 that more than half (68.33%) of the banana growers had medium innovativeness followed by the rest with high (17.50%) and low (14.17%) level of innovativeness. The probable reason for majority having medium level of innovativeness might be due to their better education, extension contact, scientific orientation and risk orientation that helped them to develop better level of innovativeness.

This result is in agreement with the findings of Suresh (2004), Ram *et al.* (2010), Prabhubouda (2011), Tidke *et al.* (2012) and Aundhkar *et al.* (2013), Devi *et al.* (2013).

4.1.15 Achievement Motivation

Table 4.20. Distribution of banana growers according to their achievement motivation

S. No.	Achievement motivation	Banana growers (120)	
		Frequency	Percentage
1.	Low (< 17.33)	28	23.33
2.	Medium (17.34 – 20.81)	67	55.83
3.	High (> 20.81)	25	20.83
Total		120	100.00
Mean = 19.08			SD = 1.73

It was evident from the Table 4.20. and Figure 4.15. that more than half (55.83%) of the banana growers had medium achievement motivation followed by the remaining with low (23.33%) and high (20.83%) achievement motivation. The probable reason for majority having medium level of innovativeness might be their medium extension contact, medium income, medium mass media exposure and medium risk orientation.

These findings are in agreement with the findings of Gowda *et al.* (2011).

4.2 TRAINING NEEDS OF BANANA GROWERS

4.2.1. Training Needs in Knowledge

Table 4.21. Percent distribution of the items in knowledge according to their level of training need in banana cultivation

S. No.	Training needs in knowledge	Frequency	Percentage
1.	Low (<1.12)	08	17.02
2.	Medium (1.13 – 2.09)	31	65.96
3.	High (>2.09)	08	17.02
Total		47	100.00
Mean = 1.61			SD = 0.48

The mean score more than 2.09 indicates high level of training need, the mean score in the range of 1.13 to 2.09 indicates moderate level of training need and the mean score less than 1.13 indicates the low level of training needs.

Table 4.21. and Table 4.22. showed that the items of high training needs in knowledge were high density planting, organic manures, application of micronutrient, diagnosis of important insect pests, diagnosis of important diseases, management measures for insects and diseases, application of recommended nutrients and application of recommended management practices for pests and diseases. The items under moderate training needs in knowledge were required soils for banana cultivation, sowing time, digging pits for planting, size of pits, use of rotovator to break clods, selection of variety, type of suckers, selection of suckers, method of planting, dosage of fertilizers (NPK 100 - 200 - 400 g / plant /year), method of application of fertilizer,

time of application of fertilizers, application of liquid fertilizers through drip irrigation, *in situ* green manuring, application of biofertilizers, pre harvest bunch spray, application of growth regulators, no. of irrigations to be given to banana crop, irrigation interval, method of irrigation (drip, furrow, basin) methods of drip irrigation, propping, bunch cover, application of herbicides, intercropping with cucumber, amaranthus or elephant foot yam, harrowing and earthing up, organic certification of products, time and method, grading, storage and marketing. Low training need items were required temperature for banana cultivation, required relative humidity for banana cultivation, required mean Sea level for banana cultivation, sucker treatment, mulching, desuckering, packing and transportation were the items under low training needs in knowledge of banana growers.

Training needs in knowledge of banana growers in main areas and specific items under each main area

In this study training needs in knowledge of banana growers were identified in the main areas as well as specific items in it. The training needs in knowledge were expressed in terms of most needed, needed and least needed. Based on the score i.e, total scores and mean scores were calculated and ranks were given.

Training needs in knowledge of banana growers in main areas

A perusal of table 4.22. indicated that the plant protection (2.66), organic practices (2.01), nutrient management (1.82), suckers and planting (1.58), post harvest management (1.53), water management (1.49), land preparation (1.34), intercultural practices (1.26), harvesting (1.24) and agro climatic requirements for growing of banana (1.19) were the main areas in training needs of knowledge of banana growers in their respective order.

Training needs in knowledge of banana growers in specific items under each main area:

Plant protection

A close examination of table 4.22. reveals that the banana growers gave preference to management measures for insects and diseases (2.93), diagnosis of important insect pests (2.71) and diagnosis of important diseases (2.35) and were ranked in the respective order. The foremost priority was given to training needs in knowledge in banana cultivation on the aspect of management measures for insects and

diseases. This might be due to lack of adequate knowledge on the control measures of pests and diseases. Pests and diseases cause a considerable damage to the crop. The banana growers are not able to identify the symptoms in the plants caused by pests, diseases or nematodes.

Organic practices

A critical review of the table 4.22. revealed that the banana growers gave preference in application of recommended nutrients (2.22), followed by application of recommended management practices for pests and diseases (2.16) and organic certification of products (1.66) and were ranked in the respective order. The first priority was given for application of recommended nutrients . The demand for organic banana is also high from inside and outside Kerala. The farmers are having a little knowledge on organic practices of recommended nutrients for banana cultivation and hence these are the training needs.

Nutrient management

A perusal of table 4.22. indicated that the preference was given to application of micronutrients (2.34), followed by organic manures (2.22), application of liquid fertilizers through drip irrigation (2.05), dosage of fertilizers (NPK 100 - 200 - 400 g / plant /year) (2.04),method of application of fertilizer (1.90) , time of application of fertilizers (1.77), application of biofertilizers (1.70), pre harvest bunch spray (1.56), application of growth regulators (1.47) and insitu green manuring (1.14) were given preference by the banana growers and ranked in the respective order. The highest level of training need were for the application of micronutrient. Micronutrient doses and usage is not known to much of the banana growers and they show interest in keeping the soil nutrient rich and this might be the reason for highest level of training need in this area.

Suckers and planting

Table 4.22. revealed that, high density planting, type of suckers(1.73), sucker treatment (1.55), suitable varieties of banana to the local area (Nendran, Poovan, Palayamkodan, Chenkadali, Njalipoovan, Monthan) (1.53), method of planting (1.15) and method of sowing (1.06) were ranked in respective order. In the suckers and planting, banana growers gave highest priority to high density planting (2.43), as the

cultivation practices were not well known by the growers even though they have meagre idea about it. As sucker treatment helps to reduce the incidence of pests and diseases, the training on knowledge about the pesticides and other materials for treatment is also inevitable. Most of the banana growers were growing a particular variety of banana based on a preconceived idea and did not know much about others. New varieties released cause confusion in the minds of the growers who are not in a position to decide as to which variety should be grown. So selection of suitable varieties becomes a problem for the growers and it is the training need also. This is why suitable varieties was considered as one of those areas in which training is needed. Method of planting and method of sowing were least preferred by growers and it might be due to the fact that they possess adequate knowledge in these areas.

Post harvest management

It is evident from the table 4.22. that the banana growers gave preference to marketing (1.97), grading (1.93), storage (1.59), transportation (1.12), packing (1.04) and were ranked in the respective order. The highest level of training need was marketing. Mostly banana growers sell the produce to nearby markets, through VPCs or through middlemen. Marketing centers are lacking in many of the areas. These might be the reasons for highest level of training need in marketing. Grading increases the price of the produce. Proper grading and sorting should be carried out for the same. In order to save the bunches, adequate knowledge in storage is essential. Poor knowledge in storage leads to quick disposal due to its perishable nature. The banana growers have inadequate knowledge about the chemicals used to induce or delay ripening in storage . It will be due to these facts that grading and storage were ranked 2nd and 3rd. Least preference was given to transportation and packing and this might be due to the fact that most of the growers sold their products immediately after harvest, directly from farm.

Water management

Table 4.22. revealed that methods of drip irrigation (1.95), no. of irrigations to be given to banana crop (1.67), irrigation interval (1.46) and method of irrigation (drip, furrow, basin)(1.37) were ranked in the respective order. In the water management category, methods of drip irrigation was given the highest priority by the banana growers as drip irrigation is an efficient way of water discharge to plants and growers have less knowledge on it. Also the knowledge on number of irrigations, irrigation interval and method of irrigation will help the banana growers in managing the irrigation water efficiently. This might be the reason for the training need in these areas.

Land preparation

It is evident from the table 4.22. that use of rotovator to break clods (1.45) , size of pits (1.29) and digging pits for planting (1.28) were ranked in following order. In the category of land preparation, the highest priority was given to use the rotovator to break clods (1.45), as they might have felt that their traditional implements are inferior for breaking clods. Least priority was given to size of pits (1.29) and digging pits for planting (1.28) and it might be due to adequate knowledge of growers in these areas.

Intercultural practices

It is evident from the table 4.22. that the banana growers gave preference to application of herbicides (1.63), propping (1.41), intercropping with cucumber, amaranthus or elephant foot yam (1.33), bunch cover (1.18), harrowing and earthing up (1.13), mulching (1.07) and desuckering (1.05) and were ranked in the respective order. Banana growers gave first preference to application of herbicides, and it might be due to the fact that the herbicides usage reduces the labour work. Least priority was given for mulching and desuckering and it might be due to adequate knowledge of growers in these areas.

Harvesting

It is evident from the table 4.22. that the banana growers, in the training needs, gave preference to the harvesting time and method (1.24) as they have a little knowledge on harvesting time and method.

Agro climatic requirements for growing of banana

A close examination of table 4.22. revealed that suitable soils for banana cultivation (1.62), Season (1.19), Temperature (1.08), Relative humidity (1.04) and Mean Sea Level (1.02) were ranked in the respective order in the agro climatic requirements for growing of banana category, suitable soils for banana cultivation was given highest priority as they might have thought it had a significance with yield. Least preference was given to mean sea level and might be due to their awareness

4.2.2 Training Needs in Skills

Training needs in skills of banana growers in main areas and specific items under each main area

In this study training needs in skills of banana growers were identified in the main areas as well as specific items in it. The training needs in skills was expressed in terms of most needed, needed and least needed. Based on the score i.e, total scores and mean scores were calculated and ranks were given.

Table 4.23. Percent distribution of the items in skills according to their level of training need in banana cultivation

S. No.	Training needs in skills	Frequency	Percentage
1.	Low (<1.43)	06	20.00
2.	Medium (1.44 – 2.43)	18	60.00
3.	High (>2.43)	06	20.00
Total		30	100.00
Mean = 1.94			SD = 0.499

The mean score more than 2.43 indicated high level of training need, the mean score in the range of 1.44 to 2.43 indicated moderate level of training need and the mean score less than 1.44 indicated low level of training needs in skills.

Table 4.23. and table 4.24. revealed the items of high level of training need in skills as High density planting, soil test based fertilizer application, method of application of fertilizers, fertigation, sucker treatment with biofertilizers, and use of

botanical pesticides. Items like digging pits for planting, installation of drip system, formation of irrigation channels, selection of healthy suckers, sucker treatment, mechanization in drip irrigation system, irrigation at critical stages, propping, preparation and use of herbicides, preparation and use of pesticides, handling of insecticides and fungicides, use of biocontrol agents, method of application of nutrients, application of recommended management practices for pests and diseases, techniques in getting organic certification, grading, storage and marketing were under moderate level of training. Low level of training need items were method of planting, desuckering, harrowing and earthing up, maintenance of plant protection equipments, packing and transportation.

Training needs in skills of banana growers in main areas

A perusal of table 4.24. indicated that the nutrient management (2.71), organic practices (2.15), water management (2.02), plant protection (1.96), suckers and planting (1.96), post harvest management (1.62), intercultural practices (1.59) and land preparation (1.56) were the main training areas in their respective order.

Training needs in skills of banana growers inspecific items under each main area:

Nutrient management

A critical look at the table 4.24. revealed that banana growers gave their preference to soil test based fertilizer application (2.97), fertigation (2.68) and method of application of fertilizers (2.47) in the respective mean rank order. Highest priority was given to soil test based fertilizer application in nutrient management area. Fertilizer is the important input which will increase the yield and care must be taken to apply the recommended fertilizer at the right time, right method and in right dose, so as to avoid harm to the crop and wastage of fertilizer. In view of importance of these, they felt the requirement of training in this area.

Organic practices

It is evident from the table 4.24. that the banana growers gave preference to use of botanical pesticides (2.58), sucker treatment with biofertilizers (2.47), application of recommended management practices for pests and diseases (2.37), techniques in

getting organic certification (2.02), use of biocontrol agents (1.74) and method of application of nutrients (1.73) were ranked in the respective order. The first priority is given for use of botanical pesticides. The farmers are having a little skill on use of botanical pesticides for banana cultivation. So, training on use of botanical pesticides is given first rank in the organic practices category. Least priority was given to method of application of nutrients, as they might have better skill on this aspect.

Water management

A perusal of table 4.24. indicated that banana growers gave preference to irrigation at critical stages (2.11) and mechanization in drip irrigation system (1.93) and were ranked in the respective order. In the water management category, irrigation at critical stages is given first priority. Water is a non monetary input. The skills involved in irrigation at critical stages will help the farmers to get more yield. This might be the reason that farmers felt a need for training in this skill area.

Plant protection

A good look at the table 4.24. revealed that banana growers gave their preference in preparation and use of pesticides (2.4), handling of insecticides and fungicides (1.83), maintenance of plant protection equipments (1.43) and were ranked in the respective order. Preparation and use of pesticides was given foremost priority in the plant protection area and this might be due to their poor skills in this area. Least priority was given for maintenance of plant protection equipments as they might have better skill on this aspect.

Suckers and planting

It is evident from the table 4.24. that banana growers gave preference to high density planting (2.78), sucker treatment (2.04), selection of healthy suckers (1.82) and method of sowing (1.17) and were ranked in the respective order. The foremost priority in Suckers and planting is given to High density planting. It is not much adopted by the banana growers as the cultivation practice is not well known by the growers even though they have meagre idea about it, may be due to this training is needed in this area. Method of sowing was given least priority and this may be due to the fact that the growers follow what they think is most suitable method.

Post harvest management

A good look at the table 4.24. revealed that the banana growers gave their preference for marketing (2.07), grading (1.95), storage (1.77), packing (1.16) and transportation(1.13) and were ranked in the respective order. Since the banana growers are lacking skills in marketing area, the highest priority was given for marketing in the category of post harvest technology. Least priority was given for transportation as the product is immediately sold in the farm itself for most of the cases.

Intercultural practices

A close examination of table 4.24. revealed that banana growers gave preference for preparation and use of herbicides (2.00), propping (1.80), desuckering (1.27) and harrowing and earthing up (1.27) and were ranked in the respective order. In the category of intercultural practices, preparation and use of herbicides was given foremost priority and this might be due to their poor skills in this area. Least priority was given to harrowing and earthing up as it was followed by growers since it is a traditional practice.

Land preparation

A close examination of table 4.24. revealed that banana growers gave preference for installation of drip system (2.00), digging pits for planting (1.58) and formation of irrigation channels (1.52) and were ranked in their respective order. The highest priority was given for installation of drip system in the land preparation category and this might be due to their poor skills in matters related to drip irrigation system. Formation of irrigation channels was given the least priority and this might be due to their awareness in this aspect.

4.2.3 Suggestions from Banana Growers for Making Training Programmes More Effective

Suggestions of banana growers on various aspects of training such as type, size of training group, duration, month, method and place of training programmes were presented under this sub heading. For the training to be more effective the above mentioned aspects should also be covered, as it describes the interest and convenience of the banana growers in effective participation in training programmes.

4.2.3.1 Type of training

Table 4.25. Distribution of banana growers according to their preference to the type of training

S. No.	Type of training	Banana growers (120)	
		Frequency	Percentage
1.	Institutional	35	29.17
2.	Non institutional	85	70.83
	Total	120	100.00

From Table 4.25. and Figure. 4.16. it is evident that 70.83 per cent of banana growers preferred non institutional training whereas, 29.17 per cent of the banana growers preferred institutional training. Institutional training is formal and may not be able to express their ideas freely. Non institutional training is informal training where they not only feel homely but also save a lot of time and money. Conducting training camps at the villages will enable many farmers to participate since training will not interfere with day to day routine work. Hence many of the banana growers preferred non institutional trainings.

4.2.3.2 Size of training group

Table 4.26. Distribution of banana growers according to their preference to the size of training group

S. No.	Size of training group	Banana growers (120)	
		Frequency	Percentage
1.	Below 10 members	10	8.33
2.	10- 20 members	88	73.33
3.	Between 21-30 members	22	18.34
	Total	120	100.00

Table 4.26. and Figure 4.17. showed majority (73.33%) of the banana growers expressed that training group of 10-20 members is ideal group for training, 18.34 per cent of growers felt between 21-30 members size of group is good for training and 8.33 per cent of growers preferred below 10 members size of group is good for training. Small groups always help the learners to know the techniques more effectively.

4.2.3.3 Duration of training

Table 4.27. Distribution of banana growers according to their preference to the duration of training

S. No.	Duration of training	Banana growers (120)	
		Frequency	Percentage
1.	One day training	57	47.50
2.	Two days training	35	29.16
3.	Three days training	20	16.67
4.	Training for one week	8	6.67
	Total	120	100

From Table 4.27. and Figure 4.18. it is evident that 47.50 per cent of banana growers preferred training for one day. The table further revealed that 29.16 per cent, 16.67 per cent and 6.67 per cent of banana growers preferred training for two days, three days and one week respectively in that order of preference. Respondents felt that more than one day will affect their routine work of field operations.

4.2.3.4 Time of training

Table 4.28. Distribution of banana growers according to their preference to the time of training

S. No.	Time of training	Banana growers (120)	
		Frequency	Percentage
1.	At the time of planting	0.00	0.00
2.	Raising of plant	12	10.00
3.	Plant protection management	99	82.50
4.	Post harvest technology	9	7.5
	Total	120	100

Table 4.28. and Figure 4.19. showed majority (82.50%) of the banana growers expressed that training at the time of Plant protection management is needed more, followed by raising of plant (10.00%) and post harvest technology (7.50%). No banana growers preferred for training at the time of planting. Respondents felt that pests and diseases incidence is a major cause of crop loss. So majority of banana growers would like to have training for plant protection management.

4.2.3.5 Method of training

Table 4.29. Distribution of banana growers according to their preference to the method of training

S. No.	Method of training	Banana growers (120)	
		Frequency	Percentage
1.	Lecture and discussion	36	30.00
2.	Demonstration and field trip	70	58.34
3.	Audio visual aids	4	03.33
4.	Tour	10	08.33
	Total	120	100.00

From Table 4.29. and Figure 4.20. it is evident that majority (58.34%) of banana growers preferred demonstration and field trip method followed by lecture and discussion (30.00%), tour (8.33%) and audio visual aids (3.33%). Majority preferred demonstration and field trip method as it provides better understanding by seeing the techniques or practices directly.

4.3 EXTENT OF ADOPTION OF BANANA PRODUCTION TECHNOLOGY BY THE GROWERS

The third objective of the investigation is to study the extent of adoption of banana production technology by banana growers. The responses against the recommended practices were collected and the findings on categorization of respondents are presented in table 4.3.1.

4.3.1 Extent of Adoption

Table 4.30. Distribution of the banana growers on the basis of their extent of overall adoption

S. No.	Adoption	Banana growers (120)	
		Frequency	Percentage
1	Low (<55.74)	27	22.50
2	Medium (55.75- 68.53)	71	59.17
3	High (>68.53)	22	18.33
	Total	120	100.00
Mean = 62.14		SD = 6.39	

Table 4.30. and Figure 4.21. described that majority (59.17%) of the banana growers were observed under medium adoption category followed by the remaining coming under low (22.50%) and high (18.33%) adoption categories in relation to adoption of recommended practices of banana, Lack of training, medium annual income, medium extension contact, mass media exposure and risk orientation. Hence, authorities should orient their attention in imparting more training to farmers, conduct farmers field school and arranging field trips to demonstration plots, inculcate the urge to achieve more and more yield from the field and raise their economic conditions to increase the extent of adoption of recommended practices to a high level from the present medium level. This result is in agreement with the findings of Nayak *et al.* (2014), More *et al.* (2014) and Kumar and Singh (2015).

Results furnished in the Table 4.31. revealed the fully adopted crop production technology by banana growers in percentage rank order of their decreasing importance and they are; desuckering (removal of side suckers) till the emergence of bunch (70.83%), sucker treatment with bavistin @ 0.1% (45.83%), use of suitable varieties of banana (45.00%), mulching with paddy straw or dry leaves etc (42.50%), intercropping with cucumber, amaranthus or elephant foot yam (41.67%), application of neemcake @ 1kg /pit (41.67%), application of FYM @ 10 kg/plant (40.00%), sucker treatment with cowdung (30.00%), *in situ* green manuring with cowpea and daincha (28.33%), application of NPK in the ratio of 100 - 200 - 400 g / plant /year (16.67%), method of application of fertilizers (60- 70 cm around the plant in two equal split doses.) (16.67%), management measures for control of pests and diseases (16.67%), propping with bamboo sticks or ropes (15.00%), time of application of fertilizers (Two months after planting and four months after planting) (12.50%), application of biofertilizers like rhizobacteria, azotobacter etc (11.67%), application of vermicompost @ 2 kg /pit (10.00%), bunch cover with dry leaves or plastic covers (10.00%), soaking the suckers in *Pseudomonas fluorescens* solution (2%) for 30 minutes before planting to control rhizome weevil (10.00%), application of micronutrients like ZnSO₄ (0.5%) and CuSO₄ (0.2%) (8.33%), application of herbicide like glyphosate @ 0.4 kg/ha (8.33%), neem oil emulsion @ 3 % in mud slurry for swabbing (7.50%), spraying neemazal (1% EC) on the pseudostem (7.50%), soil test based fertilizer application (6.67%), grading (6.67%), swabbing mud slurry around pseudostem (4.17%), application of growth regulators like ethylene, NAA etc. (4.17%), application of panchagavya 3% as foliar

spray three times at third, sixth and ninth month after planting (3.33%), spraying of 1 % Bordeaux mixture for sigatoka disease control (3.33%), spraying of *Beauveria bassiana* @ 1×10^7 spores/ml against pseudostem weevil (3.33%), application of organic manures and *Trichoderma harzianum* (100:1) in the pit before planting to control rhizome weevil (3.33%), storage (3.30%), high density planting (5000 plants/ha.) (2.50%), application of liquid fertilizers through drip irrigation (fertigation) (2.50%), and pre harvest bunch spray with 3% K_2SO_4 (2.50%) and none had adopted N, P and K biofertilizers – PGPR mix 1 @ 50 -100 g / pit, application of tapioca leaf extract (nanma, menma) and packing fully.

It also revealed that the partially adopted crop production technology by banana growers in the percentage rank order of their decreasing importance are; application of NPK in the ratio of 100 - 200 - 400 g / plant /year (83.33%), method of application of fertilizers (60- 70 cm around the plant in two equal split doses.) (83.33%), management measures for insects and diseases (83.33%), time of application of fertilizers (Two months after planting and four months after planting) (79.17%), spraying of 1 % Bordeaux mixture for sigatoka disease control (73.33%), swabbing mud slurry around pseudostem (71.67%), application of herbicide like glyphosate @ 0.4 kg/ha (66.67%), sucker treatment with cowdung (66.67%), bunch cover with dry leaves or plastic covers (65.67%), propping with bamboo sticks or ropes (63.33%), application of biofertilizers like rhizobacteria, azotobacter etc (62.50 %), grading (61.67%), application of FYM @ 10 Kg/plant (56.67%), use of suitable varieties of banana (Nendran, Poovan, Palayamkodan, Chenkadali, Njalipoovan, Monthan) (55.00%), mulching with paddy straw or dry leaves etc (54.17%), intercropping with cucumber, amaranthus or elephant foot yam (52.50 %), neem oil emulsion @ 3 % in mud slurry for swabbing (52.50%), sucker treatment with bavistin @ 0.1% (47.50%), *in situ* green manuring with cowpea and daincha (46.67%), soaking the suckers in *Pseudomonas fluorescens* solution (2%) for 30 minutes before planting to control rhizome weevil (46.67%), pre harvest bunch spray with 3% K_2SO_4 (45.83%), application of micronutrients like $ZnSO_4$ (0.5%) and $CuSO_4$ (0.2%) (33.33%), soil test based fertilizer application (33.33), high density planting (5000 plants / ha.) (30.83%), desuckering (removal of side suckers) till the emergence of bunch (29.17%), application of neemcake @ 1kg /pit (29.17%), application of vermicompost @ 2 kg /pit (28.33%), application of growth regulators like ethylene, NAA etc. (25.00%), spraying of 1 % Bordeaux mixture for sigatoka

disease control (23.33%), application of organic manures and *Trichoderma harzianum* (100:1) in the pit before planting to control rhizome weevil. (23.33%), spraying of *Beauveria bassiana* @ 1×10^7 spores/ml against pseudostem weevil (13.33%), application of panchagavya 3% as foliar spray three times at third, sixth and ninth month after planting (10.00%), packing (9.17%), spraying neemazal (1% EC) on the pseudostem (8.33%), storage (8.33%), N, P and K biofertilizers – PGPR mix 1 @ 50 - 100 g / pit (6.67%), application of liquid fertilizers through drip irrigation (fertigation) (5.00%) and application of tapioca leaf extract (nanma, menma) (4.17 %).

It, further, revealed that selected production technology which are not adopted by the banana growers in the percentage order of their decreasing importance are; application of tapioca leaf extract (nanma, menma) (95.83%), N, P and K biofertilizers – PGPR mix 1 @ 50 -100 g / pit (93.33%), application of liquid fertilizers through drip irrigation (fertigation) (92.50%), packing (90.83%), storage (88.33%), neemazal (1% EC) on the pseudostem (84.17%), application of panchagavya 3% as foliar spray three times at third, sixth and ninth month after planting (86.67%), spraying of *Beauveria bassiana* @ 1×10^7 spores/ml against pseudostem weevil (83.33%), application of organic manures and *Trichoderma harzianum* (100:1) in the pit before planting to control rhizome weevil (73.33%), spraying of 1 % Bordeaux mixture for sigatoka disease control (73.33%), application of growth regulators like ethylene, NAA etc (70.83%), high density planting (5000 plants/ha.), application of vermicompost @ 2 kg /pit (61.67%), soil test based fertilizer application (60.00%), application of micronutrients like $ZnSO_4$ (0.5%) and $CuSO_4$ (0.2%) (58.33%), pre harvest bunch spray with 3% K_2SO_4 (51.67%), soaking the suckers in *Pseudomonas fluorescens* solution (2%) for 30 minutes before planting to control rhizome weevil (43.33%), neem oil emulsion @ 3 % in mud slurry for swabbing (40.00%), grading (31.67%), application of neemcake @ 1kg /pit (29.17%), application of biofertilizers like rhizobacteria, azotobacter etc (25.83%), *in situ* green manuring with cowpea and daincha (25.00%), application of herbicide like glyphosate @ 0.4 kg/ha (25.00%), bunch cover with dry leaves or plastic covers (24.17%), swabbing mud slurry around pseudostem (24.17%), propping with bamboo sticks or ropes (20.83%), time of application of fertilizers (Two months after planting and four months after planting) (8.33%), sucker treatment with bavistin @ 0.1% (6.67%), intercropping with cucumber, amaranthus or elephant foot yam (5.83%) and mulching with paddy straw or dry leaves etc (3.33%), sucker treatment with cowdung (3.33%) and application of FYM @ 10 kg/plant (3.33%).

It is quite evident from the present findings that the simple technologies are relatively adopted to greater extent as compared to complex technologies.

There is a full adoption of desuckering (removal of side suckers) till the emergence of bunch by most of the growers as it is traditional practice and requires less skills. Use of suitable varieties of banana (Nendran, Poovan, Palayamkudan, Chenkadali, Njalipoovan, Monthan), sucker treatment with bavistin @ 0.1%, mulching with paddy straw or dry leaves etc, *in situ* green manuring with cowpea and daincha, application of herbicide like glyphosate @ 0.4 kg/ha, management measures for insects and pests, method of application of fertilizers (60- 70 cm around the plant in two equal split doses), time of application of fertilizers (Two months after planting and four months after planting), application of biofertilizers like rhizobacteria, azotobacter etc, application of neem cake @ 1 kg/pit, application of FYM @ 10 kg /plant, swabbing mud slurry around pseudostem, neem oil emulsion @ 3 % in mud slurry for swabbing and grading are adopted by most of the banana growers fully or partially. This might be due to the fact that these practices require less training on knowledge and skills and also these are traditionally practiced ones. Application of NPK in the ratio of 100 - 200 - 400 g / plant /year is also carried out partially only by most of the banana growers. This might be due to the technological gap and medium extension contact. Propping with bamboo sticks or ropes and bunch cover with dry leaves or plastic covers were partially carried out by most of the banana growers as they see it as a costly affair. Intercropping with cucumber, amaranthus or elephant foot yam are done fully and partially by most of the banana growers, as it will provide an additional income.

Majority of the banana growers were not adopting the practices like high density planting (5000 plants / ha.), soil test based fertilizer application, spraying of *Beauveria bassiana* @ 1×10^7 spores/ml against pseudostem weevil, application of organic manures and *Trichoderma harzianum* (100:1) in the pit before planting to control rhizome weevil, soaking the suckers in *Pseudomonas fluorescens* solution (2%) for 30 minutes before planting to control rhizome weevil, application of liquid fertilizers through drip irrigation (fertigation), application of micronutrients like ZnSO₄ (0.5%) and CuSO₄ (0.2%), pre harvest bunch spray with 3% K₂SO₄, application of growth regulators like ethylene, NAA etc, application of vermicompost @ 2 kg /pit, N, P and K biofertilizers – PGPR mix 1 @ 50 -100 g / pit, application of panchagavya

3% as foliar spray three times at third, sixth and ninth month after planting, application of tapioca leaf extract (nanma, menma), spraying of 1 % Bordeaux mixture for sigatoka disease control, neemazal (1% EC) on the pseudostem, storage and packing.

Majority of the banana growers were not adopting the high density planting, as the technology is not much familiar with them and haven't undergone any training regarding this aspect. Majority of the banana growers were not following soil test based fertilizer application due to the lack of soil testing centers in the near by areas. Lack of knowledge about complexity of innovations such as recommended quantity of growth regulators for application, pre harvest bunch spray, application of micronutrient, use of biocontrol agents like beauvaria, trichoderma and pseudomonas etc causes least adoption of these items. spraying of 1 % Bordeaux mixture for sigatoka disease control and neemazal (1% EC) on the pseudostem were found to be less effective by the growers, when infestation is more and so adoption is less for it. Application of panchagavya 3% as foliar spray three times at third, sixth and ninth month after planting is seen as costly affair among the growers and so few growers are only adopting it. Fertigation is not carried out by a large majority of the banana growers as drip irrigation is done by very few since setting up of drip irrigation system itself needs a huge investment. PGPR Mix -1 , vermicompost , menma and nanma are not used by majority of the banana growers as the availability is not upto the demand. Storage and packing is not carried out by majority of the banana growers as the produce is sold immediately at the time of harvest or it is marketed through VFPCs.

4.4 RELATIONSHIP BETWEEN SELECTED PROFILE CHARACTERISTICS OF BANANA GROWERS WITH THEIR TRAINING NEEDS

4.4.1 Correlation Coefficient of Profile Characteristics of Banana Growers with their Training Needs

An attempt has been made to find out the relationship between profile characteristics namely, age, education, occupation, land holding, farming experience, annual income, social participation, extension contact, urban contact, mass media exposure, scientific orientation risk orientation, market orientation, innovativeness and achievement motivation with their training needs.

Null hypothesis

There was no relationship between the profile characteristics of banana growers (Independent variables) and their training needs (Dependent variable). The results are presented in tables and the relationship between each independent variable with the dependant variable is discussed below.

Table 4.32. Relationship between profile characteristics of banana growers with their training needs (n= 120)

S. No.	Characteristics	'r' values
1.	Age	-0.281**
2.	Education	0.733**
3.	Occupation	0.285**
4.	Land holding	0.058 NS
4.	Occupation	0.285**
5.	Farming experience	-0.063 NS
6.	Annual income	0.121 NS
7.	Extension contact	-0.203*
8.	Social participation	0.761**
9.	Urban contact	0.609**
10.	Mass media exposure	0.691**
11.	Scientific orientation	0.812**
12.	Risk orientation	0.610**
13.	Market orientation	0.469**
14.	Innovativeness	0.472**
15.	Achievement motivation	0.264**

** Significant at 0.01 level of probability

NS = Non- significant

* Significant at 0.05 level of probability

From the Table 4.32. it could be observed that all computed correlation coefficient ('r') values of education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation with the training need were found to be positively significant at 0.01 level of probability and age and extension contact

negatively significant at 0.01 and 0.05 level of probability respectively. Whereas the computed values of correlation coefficient (r) of land holding, farming experience and annual income were found to be non significant.

From the above result, it could be concluded that higher the education, occupation, social participation, urban contact, mass media exposure, risk orientation, scientific orientation, market orientation, innovativeness and achievement motivation, lesser the age and extension contact, higher would be the training need.

4.4.1.1. Age versus training need

A perusal of Table 4.32. observed that there was a negative and significant correlation between age and the training need of the banana growers. It might be due to the fact that young aged group people are showing much interest to undertake new methods and techniques and so they need training in many of the aspects, while aged group people show less interest in new methods and rarely are accepting new technology. This result was in line with the findings of Verma *et al* (2013).

4.4.1.2. Education versus training need

Table 4.32. showed that there was a positive and significant correlation between education and the training need of the banana growers. Educated persons take initiative for new methods and technology more. So, they express training needs in the areas which they see important. This result was in line with the findings of Mote and Wadnerkar (2009), Kullayappa Naik (2006) and Prashanth *et al* (2013).

4.4.1.3. Occupation versus training need

Table 4.32. revealed that there was a positive and significant correlation between occupation and the training need of the banana growers. Generally, farmers with farming as their prime occupation felt more need for training in the main areas of banana cultivation as they depend mostly on the income from agriculture. This result was in line with the findings of Babu (1992).

4.4.1.4. Land holding versus training need

Table 4.32. indicated that there was no significant relationship between land holding and training need of the banana growers. It might be due to the reason that banana growers irrespective of their land holding had the same adoption levels. This result was in line with the findings of Singh *et al* (2012) and Kadam *et al* (2014)

4.4.1.5. Farming experience versus training need

Table 4.32. indicated that there was no significant relationship between farming experience and training need of the banana growers. It might be due to the fact that training needs on new methods are required by both experienced farmers and less experienced farmers. This result was in line with the findings of Singh *et al* (2012), Prashanth *et al* (2013).

4.4.1.6. Annual income versus training need

Table 4.32. showed that there was no significant relationship between annual income and training need of the banana growers. It might be due to the reason that banana growers irrespective of their annual income perceived training needs. This result was in line with the findings of Kadam *et al* (2014) and Janani *et al* (2014)

4.4.1.7. Extension contact versus training need

A perusal of Table 4.32. observed that there was a negative and significant correlation between extension contact and the training need of the banana growers. Extension contact had substantial effect in reducing the training needs. More extension contact of the individual increase the knowledge and skill levels. The knowledge gained through these contacts helps him in solving the field problems more effectively and in understanding the technology properly. So banana growers with more extension contact perceived less training needs. This result was in line with the findings of Verma *et al* (2013).

4.4.1.8. Social participation versus training need

Table 4.32. revealed that there was a positive and significant correlation between social participation and the training need of the banana growers. It can be inferred that banana growers with high social participation can naturally be aware of various new methods and practices and their effective utilization. The general exposure of the growers was improved due to enhanced participation which will improve their self-confidence and seek more information and showed interest in learning new things. This result was in line with the findings of Janani *et al* (2014).

4.4.1.9. Urban contact versus training need

Table 4.32. indicated that there was a positive and significant correlation between urban contact and the training need of the banana growers. The respondents visiting nearby towns not only on personal works but also with the agricultural purpose might come across news regarding new methods and techniques in agriculture. They also showed interest in knowing more about it and its adoption with much enthusiasm. So when urban contact is more, they will have more training needs. This result was in line with the findings of Janani *et al* (2014).

4.4.1.10. Mass media exposure versus training need

Table 4.32. revealed that there was a positive and significant correlation between mass media exposure and the training need of the banana growers. Exposure to mass media helps in bringing increased awareness amongst the individuals about the latest developments in the fields of their working. This will encourage them to get trained on important aspects and also new technologies. This result was in line with the findings of Sangeetha (2004) and Kullayappa Naik (2006).

4.4.1.11. Scientific orientation versus training need

Table 4.32. showed that there was a positive and significant correlation between scientific orientation and the training need of the banana growers. Respondents having more scientific orientation will have more training needs as they better understand scientific practices and importance of training. They are also influenced by the extension agency, mass media etc. This result was in line with the findings of Sangeetha (2004) and Kullayappa Naik (2006).

4.4.1.12. Risk orientation versus training need

Table 4.32. revealed that there was a positive and significant correlation between risk orientation and the training need of the banana growers. Risk orientation is expressed as the degree to which a farmer is oriented to take risk and has courage to face uncertainties in banana cultivation. It seems that respondents with lower risk orientation have exhibited lower training needs and vice versa. This result was in line with the findings of Sangeetha (2004) and Kullayappa Naik (2006).

4.4.1.13. Market orientation versus training need

Table 4.32. indicated that there was a positive and significant correlation between market orientation and the training need of the banana growers. Generally, the farmer oriented towards better market of their produces possessed high risk bearing ability for understanding advanced technologies. So when farmers have better market orientation, their training need will be high. This result was in line with the findings of Kullayappa Naik (2006).

4.4.1.14. Innovativeness versus training need

Table 4.32. showed that there was a positive and significant correlation between innovativeness and training need of the banana growers. Innovativeness encourages the respondents to adopt new ideas. For they perceive innovative training as an inevitable element for increasing the knowledge and skill on the particular ideas. So when the innovativeness level is high, high will be training needs. This result was in line with the findings of Kullayappa Naik (2006) and Verma *et al* (2014).

4.4.1.15. Achievement motivation versus training need

Table 4.32. revealed that there was a positive and significant correlation between achievement motivation and the training need of the banana growers. Achievement motivation will increase the risk orientation and adoption of new scientific methods and technologies and it is seen that those having high achievement motivation will have high training needs as they are alert in imbibing new technologies. This result was in line with the findings of Kullayappa Naik (2006).

4.4.2 Multiple Linear Regression of Profile Characteristics with Training needs of Banana Growers

Table 4.33. Multiple linear regression of personal, socio-economic and psychological characteristics with training needs of the banana growers (n=120)

S. No	Independent variables	Regression coefficient	Standard error	t- value
1.	Age	-0.013	0.068	-0.187 ^{NS}
2.	Education	0.230	0.651	0.354 ^{NS}
3.	Occupation	0.008	0.318	0.026 ^{NS}
4.	Land holding	-0.024	0.799	-0.030 ^{NS}
5.	Farming experience	-0.084	0.056	-1.490 ^{NS}
6.	Annual income	-0.000	0.000	-1.221 ^{NS}
7.	Extension contact	-1.321	0.239	-5.533 ^{**}
8.	Social participation	1.841	0.352	5.224 ^{**}
9.	Urban contact	0.327	0.396	0.824 ^{NS}
10.	Mass media exposure	-0.346	0.450	-0.769 ^{NS}
11.	Scientific orientation	2.242	0.372	6.033 ^{**}
12.	Risk orientation	0.312	0.372	0.838 ^{NS}
13.	Market orientation	0.551	0.426	1.293 ^{NS}
14.	Innovativeness	0.313	0.257	1.215 ^{NS}
15.	Achievement motivation	-0.140	0.336	-0.418 ^{NS}

A= 82.811

R²= 82.789

** Significant at 0.01 level of probability

NS = Non- significant

* Significant at 0.05 level of probability

$$Y = 82.811 - 0.0127X_1 + 0.2304X_2 - 0.0238 X_3 + 0.0083X_4 - 0.0843X_5 - 0.0000X_6 - 1.3211X_7^{**} + 1.8409X_8^{**} + 0.3265X_9 - 0.3462X_{10} + 0.3118X_{11} + 2.2422X_{12}^{**} + 0.5509X_{13} + 0.3129X_{14} - 0.1403X_{15}$$

Table 4.33. observed that the fifteen independent variables with the training needs by the banana growers taken on Multiple Linear Regression Analysis gave the R² (Co-efficient of multiple determination) value of 82.811. Hence, it could be inferred that the selected independent variables put together contribute 82.81 per cent of the total variation in the training of the banana growers. The independent variables like

extension contact, social participation and scientific orientation of the respondents had contributed significantly at 0.01 level of probability towards the variation in the training needs of the banana growers.

It could be concluded from the findings that extension contact, social participation, and scientific orientation had contributed significantly to the training needs of the banana growers.

4.5. RELATIONSHIP BETWEEN SELECTED PROFILE CHARACTERISTICS OF BANANA GROWERS WITH THEIR ADOPTION LEVELS

4.5.1 Relationship between the profile characteristics with adoption of the banana growers

(n= 120)

Table 4.34. Relationship between profile characteristics of banana growers with their adoption levels

S. No.	Characteristics	'r' values
1.	Age	-0.264**
2.	Education	0.780**
3.	Occupation	0.260**
4.	Land holding	0.096NS
5.	Farming experience	0.004 NS
6.	Annual income	0.176 NS
7.	Extension contact	0.061 NS
8.	Social participation	0.783**
9.	Urban contact	0.649**
10.	Mass media exposure	0.800**
11.	Scientific orientation	0.885**
12.	Risk orientation	0.653**
13.	Market orientation	0.488**
14.	Innovativeness	0.497**
15.	Achievement motivation	0.281**

** Significant at 0.01 level of probability

NS = Non- significant

* Significant at 0.05 level of probability

Table 4.34. clearly indicated that all computed correlation coefficient ('r') value of education, occupation, social participation, urban contact, mass media exposure, risk orientation, scientific orientation, market orientation, innovativeness and achievement motivation with training needs were found to be positively significant at 0.01 levels of probability and age found to be negatively significant at 0.01 level of probability. Whereas, land holding, farming experience, annual income and extension contact were found to be non significant.

From the above result it could be concluded that higher the education, occupation, social participation, urban contact, mass media exposure, risk orientation, scientific orientation, market orientation, innovativeness and achievement motivation, higher would be adoption.

4.5.1.1. Age versus adoption

A perusal of Table 4.34. observed that there was a negative and significant correlation between age and the adoption of banana growers. It might be due to the fact that less aged growers had better scientific orientation and risk orientation and it made them to adopt the production technology better than aged ones. This result was in line with the findings of Thiyagarajan (2011).

4.5.1.2. Education versus adoption

A perusal of Table 4.34. revealed that there was a positive and significant correlation between education and the adoption of the banana growers. With more education, farmers have more information seeking habits resulting better access to farm information sources to know latest recommended practices. Another fact is that the educated persons had better understanding of new innovations which might have made them to accept and adopt new practices. Hence, the above relationship was noticed. This result was in line with the findings of Kiranmayi (2013), Koli and Patel (2014), Nayak *et al* (2014), Aundhkar *et al* (2014) and Sravani (2014).

4.5.1.3. Occupation versus adoption

A perusal of Table 4.34. revealed that there was a positive and significant correlation between education and the adoption of banana growers. Because of more number of occupation made the individual to have more exposure to farm information

sources which improves the knowledge, created more awareness about recommended practices and more contacts with extension personnel which in turn lead to increase in the level of adoption. This result was in line with the findings of Manoj *et al.* (2009) and Nayak *et al* (2014).

4.5.1.4. Land holding versus adoption

Table 4.34. indicated that there was no significant relationship between land holding and adoption of banana growers. It might be due to the reason that banana growers irrespective of their land holding had the same training needs and so with the adoption levels. This result was in line with the findings of Bennur (2011), Kiranmayi (2013), Nayak *et al* (2014), and Sravani (2014).

4.5.1.5. Farming experience versus adoption

Table 4.34. indicated that there was no significant relationship between farming experience and adoption of the banana growers. Less experienced banana growers also adopt the different cultivation practices on par with the much experienced banana growers. This might be due to their better education, scientific orientation and risk orientation. This result was in line with the findings of Kiranmayi (2013).

4.5.1.6. Annual income versus adoption

Table 4.34. indicated that there was no significant relationship between annual income and adoption of the banana growers. Low income group and high income group were found to have same adoption levels. This might be due to their better education, scientific orientation and extension contact and social participation. This result was in line with the findings of Sriramana (2014).

4.5.1.7. Extension contact versus adoption

Table 4.34. indicated that there was no significant relationship between extension contact and adoption of the banana growers. Majority of the respondents belong to medium extension contact category and medium adoption levels and thereby adoption level in some degree is positively associated with extension contact but not having a significant relationship. People having good extension contact need not always adopt the new technologies. This might be due to the fact that banana growers used to visit the agricultural offices etc mainly for subsidies and grants and technological awareness are less. This result was in line with the findings of Singh *et al* (2010).

4.5.1.8. Social participation versus adoption

It is clear from Table 4.34. observed that there was a positive and significant correlation between social participation and the adoption of banana growers. It can be inferred that banana growers with high social participation can naturally be aware of various new methods and practices and their effective utilization. The general exposure of the growers was improved due to enhanced participation which will improve their self-confidence and adoption levels. This result was in line with the findings of Kapse *et al* (2009), Ambedkar (2010) and Nayak *et al* (2014).

4.5.1.9. Urban contact versus adoption

Table 4.34. clearly showed that there was a positive and significant correlation between urban contact and the adoption of the banana growers. The respondents visited the nearby towns for agricultural clarifications rather than mere social and recreational aspects. Hence, it can be said that adoption of banana practices of production had positive and significant association with urban contact. This result was in line with the findings of Sumathi and Alagesan (1998) and Atchuta Raju (1998).

4.5.1.10. Mass media exposure versus adoption

A perusal of Table 4.34. clearly indicated that there was a positive and significant correlation between mass media exposure and the adoption of banana growers. Increased mass media exposure by different sources provide an opportunity for repeated exposure to latest technology. These sources expose the respondents to various improved practices which act as motivating factors for adoption of new technology. Hence, this type of relationship was observed. This result was in line with the findings of Ambedkar (2010), Kiranmayee (2013), Koli and Patel (2014), Sravani (2014) and Sriramana (2014).

4.5.1.11. Scientific orientation versus adoption

A perusal of Table 4.34. clearly exposed that there was a positive and significant correlation between scientific orientation and adoption of banana growers. Farmers having high scientific orientation might be motivated to expose to different information sources to know latest information about banana production technology with an intention to put it into practice. Hence, the above relationship was recorded. This result was in line with the findings of Ambedkar (2010), Bennur (2011), Chouhan *et al* (2013), Koli and Patel, Nayak *et al* (2014) and Sravani (2014).

4.5.1.12. Risk orientation versus adoption

A critical look at Table 4.34. revealed that there was a positive and significant correlation between risk orientation and the adoption of banana growers. Risk orientation is expressed as the degree to which a farmer is oriented to take risk and has courage to face uncertainties in banana cultivation. A farmer who is having high risk orientation will naturally adopt the complex and new practices. Hence, the above relationship was observed. This result was in line with the findings of Ambedkar (2010), Bennur (2011), Kiranmayee (2013), Koli and Patel (2014) and Sravani (2014).

4.5.1.13. Market orientation versus adoption

A close observation of Table 4.34. indicated that there was a positive and significant correlation between market orientation and the adoption of banana growers. Market orientation was operationalized as judgement taken by an individual banana grower to sell his produce for better price by analysing various prevailing infrastructural and market intelligence. Hence, the farmer with high market orientation had more knowledge and favourable attitude towards scientific recommendation and certainly he will adopt the recommended practices. This result was in line with the findings of Ambedkar (2010), Kiranmayee (2013), Koli and Patel (2014), Sravani (2014) and Sriramana (2014).

4.5.1.14. Innovativeness versus adoption

A perusal of Table 4.34. revealed that there was a positive and significant correlation between innovativeness and the adoption of the banana growers. Innovativeness encourages the respondents to gather information about new techniques and adopt new ideas as they possess better scientific orientation and risk orientation. This result was in line with the findings of Ambedkar (2010), Koli and Patel(2014), Aundhkar *et al* (2014) and Sriramana (2014).

4.5.1.15. Achievement motivation versus adoption

A perusal of Table 4.34. showed that there was a positive and significant correlation between achievement motivation and the adoption of banana growers. Achievement motivation will increase the risk orientation of banana growers and thus their adoption levels for the production technology will increase. So, when achievement motivation is high, high will be the adoption levels. This result was in line with the findings of Bennur (2011).

4.5.2 Multiple Linear Regression Analysis of Profile characteristics with Adoption Levels of Banana Growers

Table 4.35 Multiple linear regression analysis of profile characteristics with adoption levels of the banana growers (n=120)

S. No.	Independent Variables	Regression coefficient	Standard error	t- value
1.	Age	-0.044	0.035	-1.254 ^{NS}
2.	Education	0.506	0.338	1.497 ^{NS}
3.	Occupation	-0.114	0.165	-0.689 ^{NS}
4.	Land holding	-0.063	0.415	-0.151 ^{NS}
5.	Farming experience	-0.012	0.029	-0.394 ^{NS}
6.	Annual income	0.000	0.000	0.093 ^{NS}
7.	Extension contact	0.145	0.124	1.165 ^{NS}
8.	Social participation	0.449	0.183	2.451*
9.	Urban contact	0.192	0.206	0.935 ^{NS}
10.	Mass media exposure	0.335	0.234	1.433 ^{NS}
11.	Scientific orientation	1.613	0.194	8.358**
12.	Risk orientation	0.009	0.193	0.044 ^{NS}
13.	Market orientation	0.197	0.221	0.889 ^{NS}
14.	Innovativeness	0.157	0.134	1.176 ^{NS}
15.	Achievement motivation	0.138	0.174	0.793 ^{NS}

A= 16.511

R²= 87.139

** Significant at 0.01 level of probability

NS = Non- significant

* Significant at 0.05 level of probability

$$Y = -16.511 - 0.0443X_1 + 0.5059X_2 - 0.0626X_3 - 0.1139X_4 - 0.0116X_5 + 1.45E-07X_6 + 0.1445X_7 + 0.4486X_8^* + 0.1924X_9 + 0.3351X_{10} + 0.0085X_{11} + 1.6134X_{12}^{**} + 0.1968X_{13} + 0.1574X_{14} + 0.1383X_{15}$$

Table 4.35. observed that fifteen independent variables with adoption by banana growers on Multiple Linear Regression Analysis revealed the R^2 (Co-efficient of multiple determination) value of 87.139. Hence, it could be inferred that the selected profile characteristics put together contribute 87.14 per cent of the total variation in the adoption of the banana growers. Social participation and scientific orientation of the respondents have contributed significantly at 0.05 level of probability and 0.01 level of probability respectively towards the variation in the adoption of the banana growers.

It could be concluded from the findings that social participation and scientific orientation of the respondents had contributed significantly to the adoption behaviour of the banana growers.

4.6 CASELETS OF FEW SUCCESSFUL BANANA GROWERS

4.6.1 Cultivation to Enterprise

Mr. Johny aged 42 lives in Kallamala village.. His main occupation is agriculture. He is a farmer who cultivates banana. He posses a land holding of 6.5 acres, in which three acres of land is leased in. He has a farming experience of 18 years. He cultivates nendran variety of banana, one of the most important commercial variety of banana grown in kerala. The variety is grown for both fruit and vegetable purpose. The long thick fruits with good keeping quality makes nendran widely acceptable among consumers. He is also growing intercrops like yam and amaranthus. Irrigation for his farm is done through canals. He has good contact with Agricultural officers and Agricultural assistants and so he got technical guidance for banana cultivation. Plant protection measures are carried out by him timely. He used to participate in Kissanmela, agricultural exhibitions, training programmes and demonstrations. His annual income is Rs 3 lakhs per year.

He used to sell his produce through VFPKs and in near by markets. As it is a remote village, the storage facilities are much limited so that he was thinking to move towards an enterprise related to processing. He opted banana chips making entriprise as it is a hot moving item made from banana fruit. The kudumbasree unit who perform the

banana chips making activity inspired him as it was a successful one. He collected information regarding banana chopping machine etc by visiting units in Ernakulam and Kollam districts and also his neighbour krishthudas also help him to gather relevant details regarding starting up of this enterprise.

Banana chopping machine was purchased by him from coimbatore at the cost of Rs 45,000/-. He started the banana chips making unit two years back. Seven to eight labours are employed in this unit. Wages for women is Rs.350 /- per day and Rs.500/- per men. The main steps involved in processing are removing the outer skin of banana, dropping the peeled out banana into banana chopping machine from where it is sliced and automatically sent to boiling oil, and then the fried chips are collected from frying pan. Later, they are allowed to cool and followed by salting. Then, it is packed and sealed.

As the size of frying pan is small, about 50 Kg banana chips only made daily. If sufficient raw materials are not available from his farm alone then banana is also purchased from other farmers. He sells chips @ Rs 110/- per Kg of whole sale price. Price may vary according to the banana bunch rate. He is marketing his product locally and mannarkkad and palakkad town. Local orders are increasing day by day.

4.6.2 Seedling Sales by Grower

Rajunarayanan is banana grower aged 38 from Srikrishnapuram village of palakkad. He is a graduate in Malayalam. He possesses a land holding of 16 acres. His main occupation is agriculture. He also got three milching cows. He has a farming experience of only 12 years. He cultivates nendran variety of banana and also poovan. He used to purchase seedlings from coimbatore of Tamil Nadu, Irrigation for his farm is done through drip irrigation. No intercropping is done in his farm. His annual income is Rs 8 lakhs. He used to keep in contact with Agricultural Officers and Agricultural Assistants, and Director of Agriculture and he used to get timely advices. He is one of the members of the Srikrishnapuram cooperative bank and he has got good social participation.

He is marketing his produce through VFPCs and also to the town through middlemen. After harvesting, the produce is immediately taken over from the farm by the collecting agents. He also supplies suckers to the nearby areas and also towns. He maintains his nursery with utmost care. Mostly he uses organic manures like cow dung,

neem cake, vermi compost etc. Cow dung is easily available as he has got animal husbandry also. He goes for chemical spraying to control pests and diseases only if controlling is not possible through organic practices. If infestation is severe organic practices cannot control the pests and diseases effectively. Sucker treatment with cow dung is carried out by him before planting. There is a good demand for his fruits locally and in town and also the suckers. One sucker costs Rs 10.

4.6.3 Woman Who Succeeded as Banana Grower

Flossy Paulose is a woman farmer aged 60 from Pottasery village of Palakkad. She has a husband and three children. She and her husband, both are involved in farming activities, eventhough her husband is employed. She posses a landholding of 1.5 acres. She has got a milching cow. She has farming experience of 40 years. Irrigation for farm is done through sprinkler irrigation system. She cultivates nendran variety of banana and also chenkadali. She is a panchayath member of pottasery II and also a member of co operative society. Her annual income is Rs 2.5 lakhs. She has good contact with Agricultural officers and Agricultural assistants. She used to subscribe agricultural magazines like karshakasree, karshakan etc. Mostly she tries to avoid chemical usage. For weevil attack, she sprays a solution made of capsin, tobacco and soap. Soil test based fertilizer application is carried out by her.

She has got a small chips making unit. Chips are sold in local area only. Banana fruit is sold through VFPCCK as she is a VFPCCK member and also sold in nearby markets. She used to sell banana in bulk to the kudumbasree units marketing banana halwa which is an innovative product

4.6.4 High Density Planting - the Cost Effective Techniques in Banana Cultivation

Stanley Thomas is a banana grower aged 52 from Thenkara village of Palakkad district. He has a wife and three children. He posses a land holding of 4 acres. His main occupation is agriculture and business. He has also got a poultry unit. He has a farming experience of only 15 years. He cultivates nendran variety of banana and also chenkadali and poovan. He used to purchase seedlings from coimbatore in Tamil Nadu. Irrigation for his farm is done through sprinkler irrigation system. Intercropping with turmeric and tuber crops are carried out by him. In coconut farms, as intercrop banana

is planted for 1 acre. His annual income is Rs 10 lakhs. He used to keep in contact with the Agricultural Officers and Agricultural Assistants and also Input Dealers, other Extension Personnels etc. to get timely advices. He used to participate in Kissanmela, agricultural exhibitions, training programmes and demonstrations.

High density planting and ratooning which are the cost effective techniques in banana cultivation are followed by him. Soil testing is carried out by him every year and judicious application of fertilizers are done. Legunious green manure crops like cowpea is raised in banana basins along with planting of banana suckers and uprooted and incorporated at flowering time to sustain soil health. Moisture conservation pits are dug out in the fields for storing water during rain, which would have otherwise lost by runoff. Storage capacity is increased by filling it with organic materials. The microsite enriched moisture conservation pits are widely used for planting banana suckers. Along with cowdung and compost, poultry maures are also applied to the crop, as he maintains a poultry unit. He is marketing his produce through VFPCs and also to the town through middlemen. After harvesting, the produce is immediately taken over from the farm by the collecting agents.

4.7 CONSTRAINTS AND SUGGESTIONS ELICITED BY THE BANANA GROWERS

4.7.1 Constraints Elicited by the Banana Growers

It was found that several constraints were encountered by the banana growers in banana cultivation and they are given rank in Table 4.36 and discussed below:

4.7.1.1 Bio- physical constraints

The important constraints reported by the banana growers in order of their importance were problematic soils, wild boars, natural calamities, inadequate drainage facilities, poor quality of irrigation water and poor water retention capacity of soil.

Problematic soils are difficult to rectify as soil testing centers are lacking in many areas. Attack of wild boars are reducing the yields heavily. Natural calamities like heavy wind and flood also causes crop losses. Hence, it is necessary to provide facilities for soil testing through mobile soil testing laboratories and also training on control measures against wild boars. Steps should also be taken for the insurance facilities in reach of farmers.

4.7.1.2 Technological Constraints

Incidence of insect / pest attack like banana weevil, susceptibility of plant to diseases like panama wilt, non availability of suitable high yielding variety and failure in fruit formations due to unfavourable weather conditions were the constraints faced by the respondents.

Due to the incidence of pests and diseases the yield get reduced. Hence, care should be taken by the concerned to guide the farmers on plant protection and supply the effective plant protection chemicals. Improved varieties should be made available to the farmers by the state government.

4.7.1.3 Socio personal constraints

Constraints like lack of proper knowledge about banana production technology, inadequate contact with extension workers and poor economic conditions of farmers were faced by the respondents.

To serve the farming community, the extension staff should have frequent contact with the farmers. The extension personnel have to maintain regular contacts on a scheduled time known to the farmers and have to give suggestions and classify the farmers doubts, which motivate the farmers to practice new technologies.

4.7.1.4 Economic constraints

The important constraints reported by the respondents in order of their importance were low profit due to high cost of cultivation, high labour cost, lack of premium price for organic produce, high cost of plant protection chemicals and high cost of manure and fertilizers. Steps should be taken by the government to supply fertilizers on subsidy at an affordable cost to the farmers. Separate market outlets should be setup for the organic produce by the state government and export should be promoted.

4.7.1.5 Administrative constraints

Inadequate training facilities, insufficient technical staff, inadequate supply of agricultural inputs from cooperatives, improper crop insurance schemes, non-availability of adequate credit, non- availability of fertilizers and plant protection

chemicals in time were the constraints faced by the banana growers. Training is necessary to the farmers for adoption of an innovation properly. Hence, there is a need for providing training to the farmers on large scale. At the same time, sufficient technical staff is needed to guide the farmers at field level. Steps should be taken by government for providing sufficient, timely and easily available credit to needed banana growers through banks. Non availability of plant protection chemicals in time and non- availability of fertilizers in time were the other identified constraints. Steps should be taken by the government for providing sufficient, timely and easily available plant protection chemicals and fertilizers to the needed banana growers through co-operative societies. Since, availability of inputs is a critical factor for adoption, ensured input supply is essential along with extension thrust.

4.7.1.6 Marketing constraints

Constraints like lack of remunerative price, insufficient collection centres at local levels, inadequate knowledge about market intelligence and inadequate transport facilities were faced by the banana growers. VFPCs should be made active and government should take initiatives for this in the state. Government should provide regulated markets and reasonable price for produce to relieve the farmers from the clutches of intermediaries. Establishment of nearby collection centers in villages will help the farmers to reduce transportation charges and also better storage. At the same time, the government has to provide incentives for export marketing to get good price for the produce.

4.7.2 Suggestions Elicited by the Banana Growers

The respondents were also asked to give suggestions to overcome the constraints in banana cultivation and are furnished in Table 4.37.

Table 4.37. indicated that appropriate control measures of diseases and pests (1st rank) followed timely technical guidance (2nd rank), frequent monitoring of technical staff (3rd rank), establishing soil testing labs in nearby locality (4th rank), provision of fertilizers on subsidy rates (5th rank), establishment of collection centers at the nearest point (6th rank), providing crop insurance (7th rank), conduct training programmes (8th rank), market outlets for organic produce (9th rank), supply of planting materials at a subsidised rate by the Department of agriculture (10th rank) and maintaining

demonstration plots (11th rank) were the suggestions elicited by the banana growers to overcome the constraints in banana cultivation, so as to adopt the technologies as per recommendation.

Incidence of diseases and pests is one of the major causes for yield losses. Exact control measures of diseases and pests and timely technical guidance will help the farmers to control the diseases like panama wilt and pests like rhizome weevil, pseudostem weevil etc efficiently. Frequent monitoring of technical staff will give the farmers to solve the technical problems immediately and also confidence in adopting the new techniques. Establishing nearby soil testing labs will help the farmers to get their soil to be tested. Also it helps the farmers to follow the soil test based fertilizer application. Provision of fertilizers on subsidy rates will help the farmers to provide sufficient nutrients to the plants and keeping the cost of cultivation less. Establishment of nearby collection centers will reduce the post harvest losses to the banana growers and helps to fetch better prices for their produces. Crop insurance will help the farmers to overcome the uncertainties regarding crop production and so insurance facilities should be made available for the banana growers. Conducting training programmes will increase the knowledge and skills of the banana growers in cultivation aspects and new techniques. It also improves the efficiency of the banana growers. Market outlets for organic produce will help the banana growers to attain a premium price for the organic produces. Supply of planting materials at a subsidised rate by the Department of agriculture will enable the banana growers to obtain healthy seedlings at reasonable cost, since availability of good quality of planting materials is an issue. Maintaining demonstration plots will help to make the farmers understand well about the new practices or technology and their results in a better way.

4.8 EMPIRICAL MODEL OF THE STUDY

The Figure 4.22. indicated that the personal, socio-economic and psychological characteristics of the banana growers *viz.*, age, education, occupation, social participation, extension contact, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation had significant correlation with training needs. Therefore it was concluded that all those characteristics of the banana growers will influence their training needs.

So it could be implied that except land holding, farming experience and annual income, rest all other 12 variables in the figure were significantly associated with training needs of banana growers.

The Figure 4.23. indicated that the personal, socio-economic and psychological characteristics of the banana growers *viz.*, age, education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation had significant correlation with training needs. Therefore it was concluded that all those characteristics of the banana growers will influence their adoption levels.

So it could be implied that except land holding, farming experience, annual income and extension contact, rest all other 11 variables in the figure were significantly associated with adoption levels of banana growers.

Chapter V

SUMMARY AND CONCLUSIONS

It is imperative that the farmers needs to be trained to keep them abreast of the latest innovations available so as to maintain its quality and stability in production. Training is vital and essential to induce motivation, create confidence and inculcate efficiency in an individual. Training only can bridge the enormous gap between the remarkable yield achieved by the scientists and that obtained by the farmers. It was therefore, thought opportune to study the training needs of banana growers in terms of training needs and adoption.

The specific objectives of the study were:

1. To study the profile characteristics of banana growers.
2. To find out the training needs of banana growers.
3. To determine the extent of adoption of banana production technology by the banana growers.
4. To find out the relationship between selected profile characteristics of banana growers with their training needs and adoption levels.
5. To study the few successful caselets of banana growers.
6. To study the constraints of banana growers and suggestions to overcome those problems.

Based on the extensive review of literature, discussion with experts, a study was conducted in three blocks of Palakkad district of Kerala. The independent variables covering profile characteristics of banana growers *viz.*, age, education, occupation, land holding, farming experience, annual income, social participation, extension contact, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation were selected and dependent variable *i.e.* training needs and adoption levels were measured with the help of schedule developed.

Data was collected through a well structured interview schedule which was developed keeping in view of the objectives of the study. The collected data was coded, classified and tabulated. Finally, the statistical tests like frequency, percentage, mean, standard deviation, correlation coefficient and multiple linear regression were used for meaningful findings and for drawing conclusions.

SALIENT FINDINGS OF THE STUDY

5.1 PROFILE CHARACTERISTICS OF BANANA GROWERS

Detailed analysis of profile characteristics of farmers indicated that a great majority of banana growers belong to middle age (71.67%), followed by the rest coming under old age (25.00%) and young age (3.33%) categories.

Majority (36.67%) of the banana growers belonged to high school level of education followed by the rest belonging to Upper Primary (20.83%), Lower Primary(18.33%), Higher Secondary and Functionally literate 8.33 per cent each, Graduation(4.17%) and Illiterate (3.33%) categories.

Majority of the banana growers (37.50%) had Agriculture + Animal husbandry as their main occupation followed by those with Agriculture (21.67%), Agriculture +Service (16.66%), Agriculture + Labour (12.00%), Agriculture +Business (12.00%) and Agriculture + Labour + Animal husbandry (5.00%) as their occupation.

Majority of the banana growers had marginal land holding (65.00%) followed by small land holding (29.17%), semi medium (4.17%) and medium (1.66%).

Majority (27.50%) of the banana growers had farming experience of 11-15 years followed by 21.67 per cent banana growers who had 6-10 years of farming experience and 16.67 per cent had farming experience of 16-20 years, 16.66 per cent had farming experience of more than 25 years, 14.17 per cent had farming experience of 21-25 years and 3.33 per cent had farming experience of less than 5 years.

Majority (46.67%) of the banana growers had medium annual income ranging from Rs 70,001 – Rs 1,50,000 followed by those with annual income below and upto Rs 70,000 (29.17%) and above Rs 1,50,000 of annual income (24.16%) .

More than half (65.00%) of the banana growers had medium level of social participation. While, 18.33 per cent and 16.67 per cent had low and high participation, respectively.

More than half (63.33%) of the banana growers had medium level of extension contact followed by an equal percentage of low (18.33) and high (18.33) extension contact.

More than half (53.33%) of the banana growers had medium level of urban contact followed by those with low (22.5%) and high (24.17%) urban contact.

Majority (50.83%) of the banana growers had medium level of mass media exposure followed by the remaining with low (27.50%) and high (21.67%) mass media exposure.

More than two third (70.00%) of the banana growers had medium level of risk orientation followed by the rest with high (15.83%) and low (14.17%) risk orientation.

More than half (65.00%) of the banana growers had medium scientific orientation followed by the rest with low (17.50%) and high (17.50%) level of scientific orientation.

Majority (75.83%) of the banana growers had medium market orientation followed by the rest with low (12.50%) and high (11.67%) levels of market orientation.

More than half (68.33%) of the banana growers had medium innovativeness followed by those with high (17.50%) and low (14.17%) level of innovativeness.

More than half (55.83%) of the banana growers had medium achievement motivation followed by the remaining with low (23.33%) and high (20.83%) achievement motivation.

5.2 TRAINING NEEDS OF BANANA GROWERS

5.2.1 Training Needs of Knowledge Items

Preference of training is first for high density planting, organic manures, application of micronutrient, diagnosis of important insect pests, diagnosis of important diseases, management measures for insects and diseases, application of recommended

nutrients and application of recommended management practices for pests and diseases. The items under moderate training needs were required soils for banana cultivation, sowing time, digging pits for planting, size of pits, use of rotovator to break clods, selection of variety, type of suckers, selection of suckers, method of planting, recommended NPK 100 - 200 - 400 g / plant /year, method of application of fertilizers, time of application of fertilizers, application of liquid fertilizers through drip irrigation, insitu green manuring, application of biofertilizers, pre harvest bunch spray, application of growth regulators, number of irrigations to be given for banana crop, irrigation interval, methods of irrigation (drip, furrow, basin), propping, bunch cover, application of herbicides, intercropping with cucumber, amaranthus or elephant foot yam, harrowing and earthing up, organic certification of products, time and method, grading, storage and marketing. Low training needs were required temperature for banana cultivation, required relative humidity for banana cultivation, required mean Sea level for banana cultivation, sucker treatment, mulching, desuckering, packing and transportation were the low training needs of banana growers.

5.2.2 Training Needs of Skilled Items

Items of high level of training need in skills were High density planting, soil test based fertilizer application, method of application of fertilizers, fertigation, sucker treatment with biofertilizers, and use of botanical pesticides. Items like digging pits for planting, installation of drip system, formation of irrigation channels, selection of healthy suckers, sucker treatment, mechanization in drip irrigation system, irrigation at critical stages, propping, preparation and use of herbicides, preparation and use of pesticides, handling of insecticides and fungicides, , use of biocontrol agents, method of application of nutrients, application of recommended management practices for pest and diseases, techniques in getting organic certification, grading, storage and marketing were under moderate level of training needs. Low level of training needs were method of planting, desuckering, harrowing and earthing up, maintenance of plant protection equipments, packing and transportation.

5.2.3 Suggestions for training

Majority (70.83%) of banana growers preferred non institutional training whereas, 29.17 per cent of the banana growers preferred institutional training.

Majority (73.33%) of the banana growers expressed that training group of 10-20 members is ideal group for training, 18.34 per cent of growers felt between 21-30 members size of group is good for training and 8.33 per cent of growers preferred below 10 members size of group is good for training.

Majority (47.50%) of banana growers preferred training for one day. 29.16 per cent, 16.67 per cent and 6.67 per cent of banana growers preferred training for two days, three days and one week respectively.

Majority (82.50%) of the banana growers expressed that training at the time of Plant protection management is needed more, followed by raising of plant (10.00%) and post harvest technology (7.50%).

Majority (58.34%) of banana growers preferred demonstration and field trip method followed by lecture and discussion (30.00%), tour (8.33%) and audio visual aids (3.33%).

5.3 ADOPTION LEVELS OF BANANA GROWERS

Majority (59.17%) of banana growers observed under medium adoption category followed by the remaining under low (22.50%) and high (18.33%) adoption categories in relation to adoption of recommended practices of banana.

There is a 100 per cent adoption in desuckering (removal of side suckers) till the emergence of bunch by most of the growers as it is traditional practice and requires less skills. Use of suitable varieties of banana (Nendran, Poovan, Palayamkodan, Chenkadali, Njalipoovan, Monthan), sucker treatment with bavistin @ 0.1%, mulching with paddy straw or dry leaves etc, *in situ* green manuring with cowpea and daincha, application of herbicide like glyphosate @ 0.4 kg/ha, management measures for insects and pests, method of application of fertilizers (60- 70 cm around the plant in two equal split doses), time of application of fertilizers (Two months after planting and four months after planting), application of biofertilizers like rhizobacteria, azotobacter etc, application of neem cake @ 1 kg/pit, application of FYM @ 10 kg /plant, swabbing mud slurry around pseudostem, neem oil emulsion @ 3 % in mud slurry for swabbing and grading are adopted by most of the banana growers fully or partially. This might be due to the fact that these practices required less training on knowledge and skills and

these are traditional practice. Application of NPK in the ratio of 100 - 200 - 400 g / plant /year is also carried out partially only by most of the banana growers. This might be due to the technological gap and medium extension contact. Propping with bamboo sticks or ropes and bunch cover with dry leaves or plastic covers were partially carried out by most of the banana growers as they see it as a costly affair. Intercropping with cucumber, amaranthus or elephant foot yam are done fully and partially by most of the banana growers, as it will provide an additional income.

Majority of the banana growers were not adopting the practices like high density planting (5000 plants / ha.), soil test based fertilizer application, spraying of *Beauveria bassiana* @ 1×10^7 spores/ml against pseudostem weevil, application of organic manures and *Trichoderma harzianum* (100:1) in the pit before planting to control rhizome weevil, soaking the suckers in *Pseudomonas fluorescens* solution (2%) for 30 minutes before planting to control rhizome weevil, application of liquid fertilizers through drip irrigation (fertigation), application of micronutrients like ZnSO₄ (0.5%) and CuSO₄ (0.2%), pre harvest bunch spray with 3% K₂SO₄, application of growth regulators like ethylene, NAA etc, application of vermicompost @ 2 kg /pit, N, P and K biofertilizers – PGPR mix 1 @ 50 -100 g / pit, application of panchagavya 3% as foliar spray three times at third, sixth and ninth month after planting, application of tapioca leaf extract (nanma, menma), spraying of 1 % Bordeaux mixture for sigatoka disease control, neemazal (1% EC) on the pseudostem, storage and packing.

5.4 RELATIONSHIP BETWEEN THE PROFILE CHARACTERISTICS AND THE TRAINING NEEDS OF BANANA GROWERS

Out of 15 profile characteristics, ten of them such as education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation were found to be positive and significant in their relationship with the training needs at 0.01 level of probability, while age and extension contact were found to be negative at 0.01 and 0.05 level of probability respectively. Whereas land holding, farming experience and annual income were found to be non - significant.

The Multiple Linear Regression Analysis revealed that the selected independent variables put together contribute 82.81 per cent of the total variation in the training needs of the banana growers. Extension contact, social participation and scientific

orientation of the respondents had contributed significantly at 0.01 level of probability towards the variation in the training needs of banana growers. Remaining, 17.19 per cent may be due to extraneous characteristics.

5.4 RELATIONSHIP BETWEEN THE PROFILE CHARACTERISTICS AND THE ADOPTION LEVELS OF BANANA GROWERS

Out of 15 profile characteristics, 10 of them such as education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation were found to be positive and significant in their relationship with the adoption levels of banana growers at 0.01 level of probability, while age was found to be negative at 0.01 level of probability. Whereas, land holding, farming experience, annual income and extension contact were found to be non - significant.

The Multiple Linear Regression Analysis revealed that the selected profile characteristics put together contribute 87.14 per cent of the total variation in the adoption levels of the banana growers. Social participation and scientific orientation of the respondents had contributed significantly at 0.05 and 0.01 level of probability respectively, towards the variation in the adoption levels of banana growers. Remaining 12.86 per cent may be due to extraneous characteristics.

5.5 CASELETS OF FEW SUCCESSFUL BANANA GROWERS

Mr. Johny from Kallamala village cultivate nendran variety of banana in 6 acres of land. As it is a remote village, the storage facilities are much limited so that he was thinking to move towards an enterprise related to processing. He opted banana chips making enterprise as it is a hot moving item made from banana fruit. Rajunarayanan is banana grower aged 38 from Srikrishnapuram village of palakkad. He posses a land holding of 16 acres. He is marketing his produce through VFPCs and also to the town through middlemen. After harvesting, the produce is immediately taken over from the farm by the collecting agents. He also supplies plantlings to the nearby areas and also towns. Flossy Paulose is a woman farmer aged 60 from Pottasery village of Palakkad. She cultivates nendran variety of banana and also chenkadali. Her annual income is Rs 2.5 lakhs. She has got a small chips making unit. Chips are sold in local area only. She

used to sell banana in bulk to the kudumbasree units marketing banana halwa which is an innovative product. Stanley Thomas is a banana grower aged 52 from Thenkara village of Palakkad district. He possesses a land holding of 4 acres. His annual income is Rs 10 lakhs. High density planting and ratooning which are the cost effective techniques in banana cultivation are followed by him. Soil testing is carried out by him every year and judicious application of fertilizers are done. After harvesting, the produce is immediately taken over from the farm by the collecting agents.

5.6 CONSTRAINTS AND SUGGESTIONS ELICITED BY BANANA GROWERS

5.6.1 Constraints Faced by the Banana Growers in Cultivation

The important constraints under bio physical constraints reported by the banana growers in the order of their importance were problematic soils, wild boars, natural calamities, inadequate drainage facilities, poor quality of irrigation water and poor water retention capacity of soil. Incidence of insects / pests attack like banana weevil, susceptibility of plants to diseases like panama wilt, non availability of suitable high yielding varieties and unfavourable weather conditions during fruit formation were the constraints faced by the growers as technological constraints. Constraints like lack of proper knowledge about banana production technology, inadequate contact with extension workers and poor economic conditions of the banana growers were faced by the respondents under socio personal constraints. The important constraints under economic constraints given by the respondents in order of their importance were low profit due to high cost of cultivation, high labour cost, lack of premium price for organic produce, high cost of plant protection chemicals and high cost of manure and fertilizers. Inadequate training facilities, insufficient technical staff, inadequate supply of agricultural inputs from cooperative societies, improper crop insurance schemes, non- availability of adequate credit, non- availability of fertilizers and plant protection chemicals in time were the administrative constraints faced by the banana growers. Constraints like lack of remunerative price, insufficient collection centres at local levels, inadequate knowledge about market intelligence and inadequate transport facilities were marketing constraints faced by the banana growers.

5.6.2 Suggestions Elicited by the Banana Growers

Majority of the banana growers suggested appropriate control measures of diseases and pests (1st rank) followed by timely technical guidance (2nd rank), frequent monitoring of technical staff (3rd rank), establishing soil testing labs in nearby locality (4th rank), provision of fertilizers on subsidy rates (5th rank), establishment of collection centers at the nearest point (6th rank), providing crop insurance (7th rank), conduct training programmes (8th rank), market outlets for organic produce (9th rank), supply of planting materials at a subsidised rate by the Department of agriculture (10th rank) and maintaining demonstration plots (11th rank) were the suggestions.

IMPLICATIONS OF THE STUDY

1. The findings of the study will be useful to the extension administrators, extension personnel and others who are involved directly or indirectly in the transfer of technology related to banana cultivation. Also it will be an excellent source to the extension students as reference material since very few studies are available in the area of training needs.
2. An overview of the findings revealed that most of the banana growers were almost medium in their profile characteristics. Hence, the extension functionaries need to bestow attention on medium level of profile characteristics of banana growers rather than others.
3. The study indicated that majority of the banana growers are middle aged and educated therefore efforts should be taken to make them to attend more number of training programmes, meetings, group discussions to update the training needs of growers and also to improve the adoption levels.
4. A great majority of the banana growers had marginal land holding which dramatically indicated that majority of the growers were of medium income. So, the extension functionaries should pay more attention in increasing their socio-economic status.
5. Majority (27.50%) of the banana growers had farming experience of 11-15 years. It might be due to the shifting of paddy lands to banana cultivation. It could be inferred that their experience could be better exploited to more technologies.

6. Around half of the banana growers belonged to medium income category, i.e. between Rs.70,001 – Rs1,50,000 and agriculture + animal husbandry as main occupation. This trend might be due to the fact that majority of the farmers were marginal farmers. Diversification of enterprises would help these farmers to get more financial gains.
7. Most of the banana growers belonged to medium category of innovativeness. It means, still there is a need to expose the farmers to recent developments in horticulture technologies and motivate them to adopt new technologies.
8. Most of the banana growers belonged to medium category of extension contact. Therefore there is a need to strengthen the extension organization and create more mobility facilities.
9. Majority (65.96%) of the respondents had moderate level of training needs, followed by those with high level and low level of training needs (17.02 % each) in knowledge related to banana cultivation.
10. The findings of the study revealed that majority of the banana growers preferred non institutional training of 10 to 20 members group, one day training, about plant protection management and preferred demonstration and field trip method. This should be taken into account while conducting training programmes.
11. The findings of the study revealed that majority (59.17%) of the banana growers were observed under medium adoption category followed by the remaining under low (22.50%) and high (18.33%) adoption categories in relation to recommended practices of banana. Lack of training, medium annual income, medium extension contact, mass media exposure and risk orientation might be the reasons for majority of them falling under medium adoption group. Hence, authorities should orient their attention in imparting more training to farmers, conduct farmers field school and arranging field trips to demonstration plots, inculcate the urge to achieve more and more yield from the field and raise their economic conditions to increase the extent of adoption of recommended practices to a high level from the present medium level.
12. Majority of the banana growers were not adopting high density planting, as the technology is not much familiar with them and haven't undergone any training regarding this aspect.

13. Majority of the banana growers were not following soil test based fertilizer application due to the lack of soil testing centers in their near by areas
14. Factors like age, education, occupation, social participation, extension contact, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation influenced the training needs of banana growers. Hence any improvement on these characteristics may bring significant change in the training needs of banana growers.
15. Factors like age, education, occupation, social participation, urban contact, mass media exposure, scientific orientation, risk orientation, market orientation, innovativeness and achievement motivation influenced the adoption levels of banana growers. Hence, any improvement on these characteristics may bring significant change in the adoption levels of banana growers.
16. The study inferred that majority of the banana growers expressed constraints under bio physical constraints like problematic soils, wild boars, natural calamities, inadequate drainage facilities, poor quality of irrigation water and poor water retention capacity of soil. Incidence of insects / pests attack like banana weevil, susceptibility of plant to diseases like panama wilt, non availability of suitable high yielding variety and unfavourable weather conditions during fruit formation were the constraints faced by the growers as technological constraints. Constraints like lack of proper knowledge about banana production technology, inadequate contact with extension workers and poor economic conditions of the banana growers were faced by the respondents under socio personal constraints. The important constraints under economic constraints given by the respondents in the order of their importance were low profit due to high cost of cultivation, high labour cost, lack of premium price for organic produce, high cost of plant protection chemicals and high cost of manure and fertilizers. Inadequate training facilities, insufficient technical staff, inadequate supply of agricultural inputs from cooperative societies, improper crop insurance schemes, non- availability of adequate credit, non- availability of fertilizers and plant protection chemicals in time were the administrative constraints faced by banana growers. Constraints like lack of remunerative price, insufficient collection centres at local levels, inadequate knowledge about market intelligence and inadequate transport facilities were marketing constraints faced by the banana growers. Hence authorities should concentrate on resolving these problems.

17. Majority of the banana growers suggested appropriate control measures of diseases and pests (1st rank) followed by timely technical guidance (2nd rank), frequent monitoring of technical staff (3rd rank), establishing soil testing labs in nearby locality (4th rank), provision of fertilizers on subsidy rates (5th rank), establishment of collection centers at the nearest point (6th rank), providing crop insurance (7th rank), conduct training programmes (8th rank), market outlets for organic produce (9th rank), supply of planting materials at a subsidised rate by the Department of agriculture (10th rank) and maintaining demonstration plots (11th rank). So, the department of agriculture should also consider the above suggestions given by banana growers.

SUGGESTIONS FOR FUTURE RESEARCH

1. The investigation was conducted in Palakkad district of Kerala. Similar studies may be undertaken in other districts, so that influence can be generalized to a greater extent.
2. The study was confined to small sample of banana growers cultivating banana. The study can be taken up with large sample size covering other districts.
3. Similar studies can be conducted after a conclusive period of five years to assess the training needs of banana growers.
4. Similar type of training needs study may be undertaken for extension functionaries, scientists and also other farming community.
5. The study included only selected independent variables. Further studies may be conducted with some more independent variables to probe their impact on the dependent variable.

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Note: The literature is cited as per the “Thesis Guidelines” prescribed by Acharya N. G. Ranga Agricultural University, Lam, Guntur.

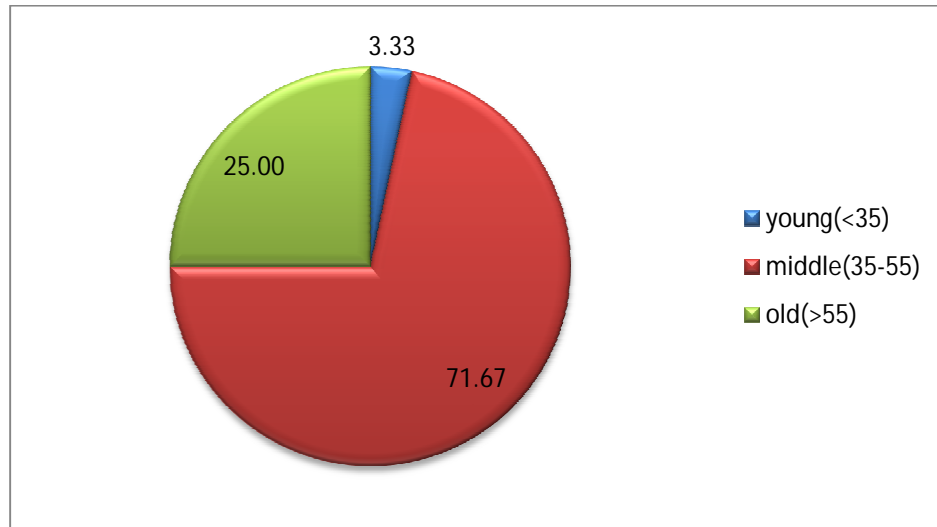


Fig. 4.1 Distribution of banana growers according to their age

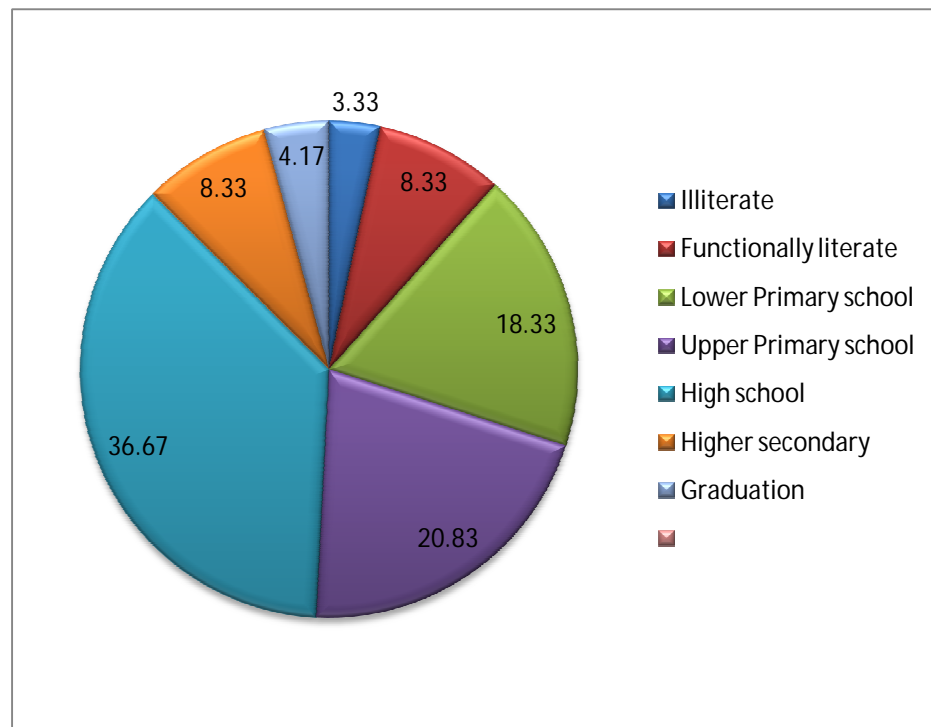


Fig. 4.2 Distribution of banana growers according to their education

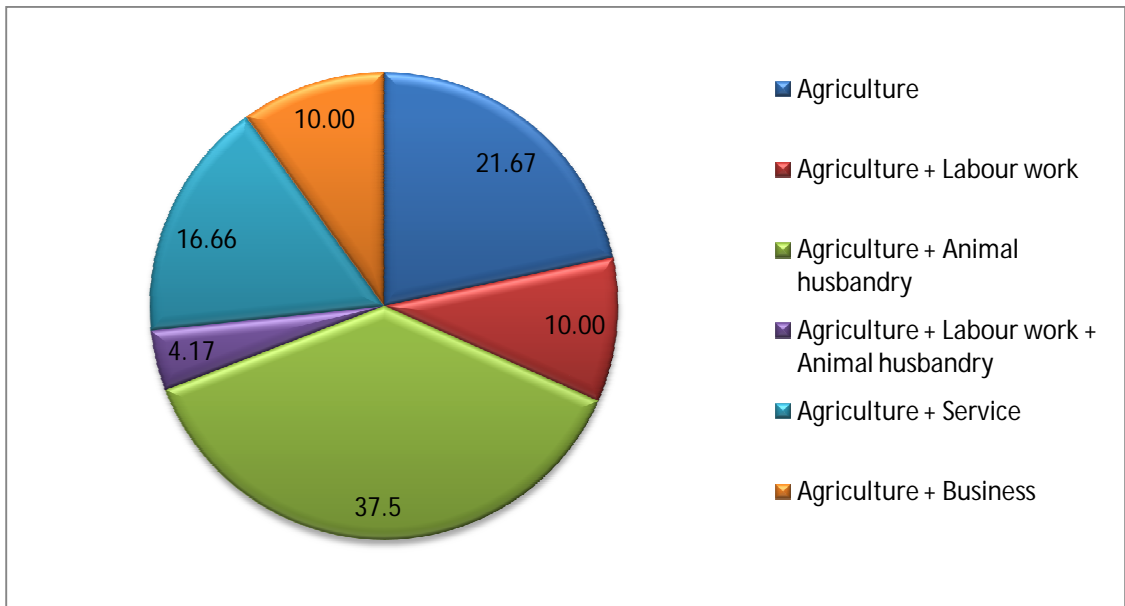


Fig. 4.3 Distribution of banana growers according to their occupation

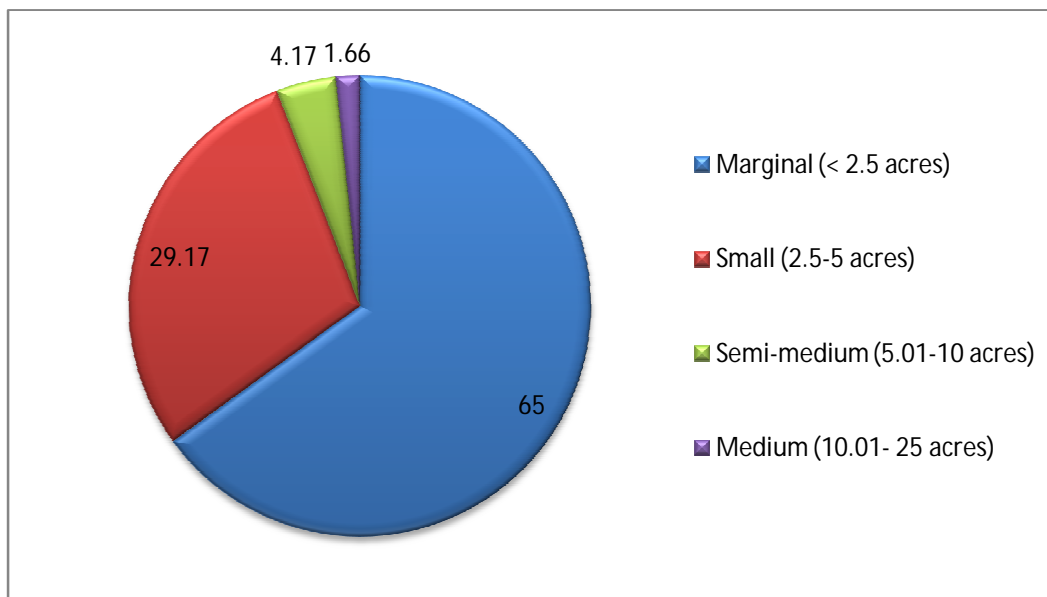


Fig. 4.4 Distribution of banana growers according to their land holding

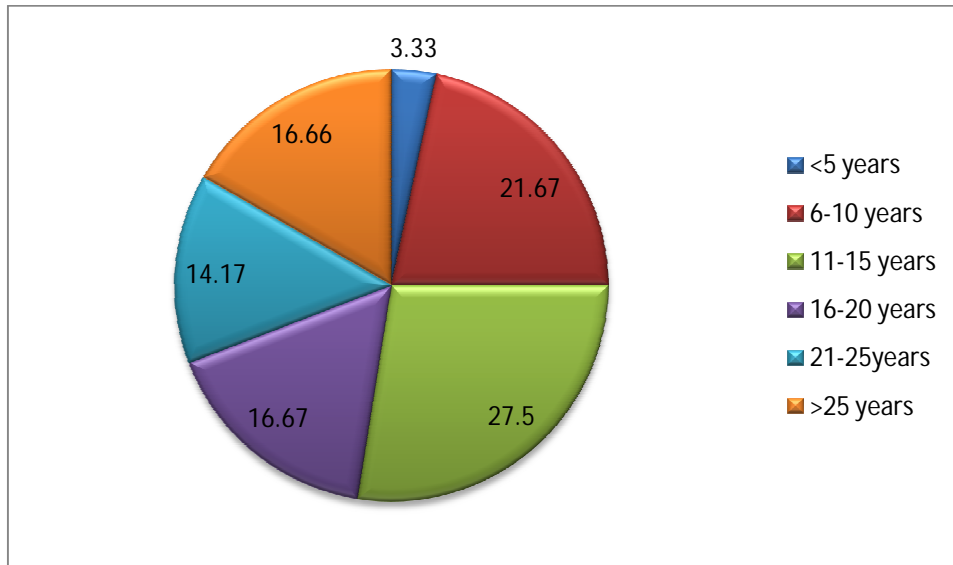


Fig. 4.5 Distribution of banana growers according to their farming experience

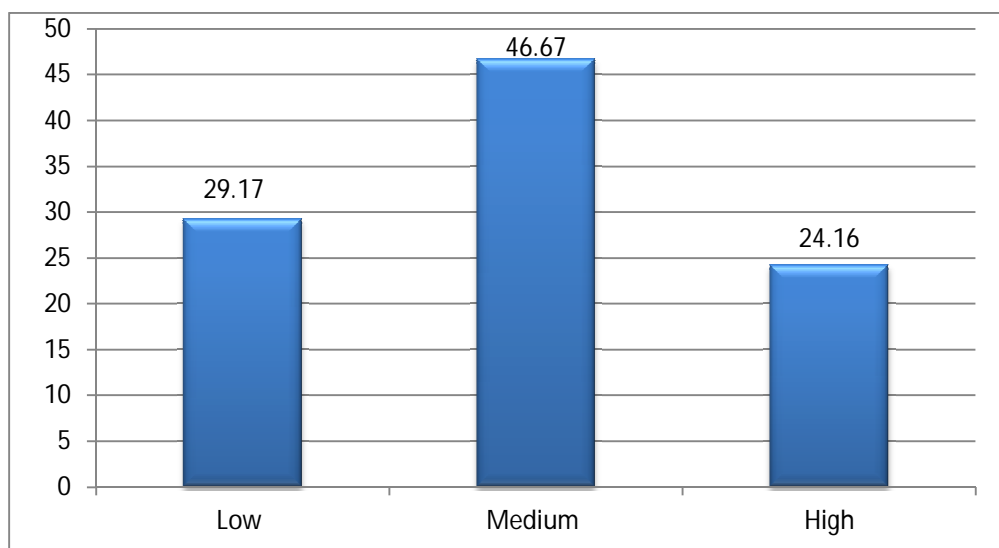


Fig. 4.6 Distribution of banana growers according to their annual income

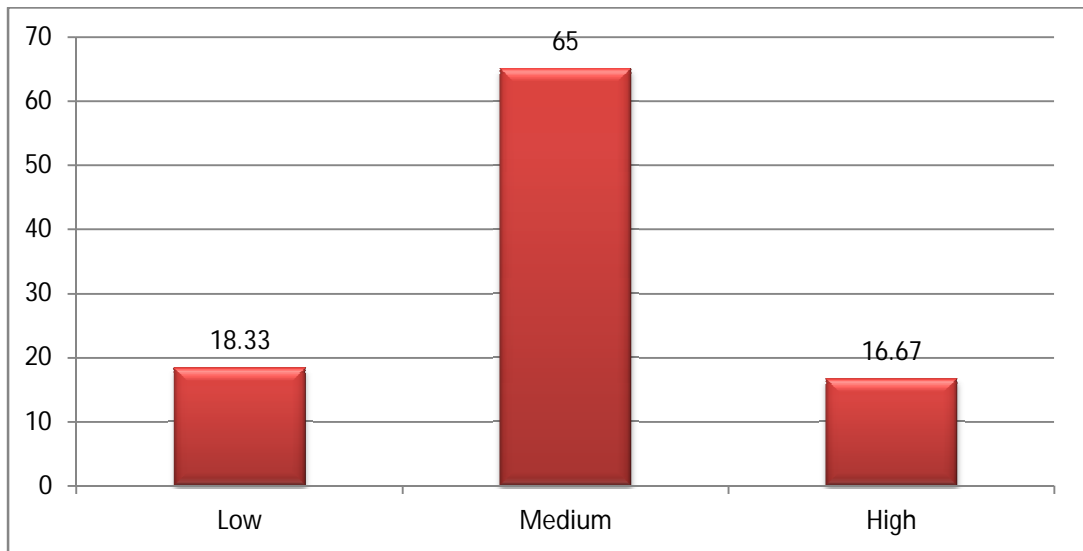


Fig. 4.7 Distribution of banana growers according to their social participation

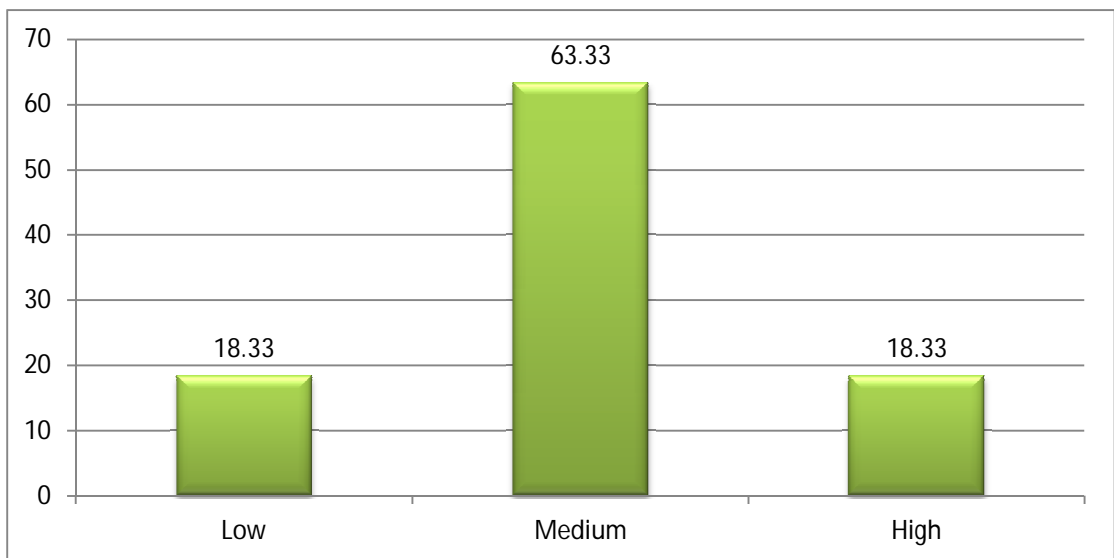


Fig. 4.8 Distribution of banana growers according to extension contact

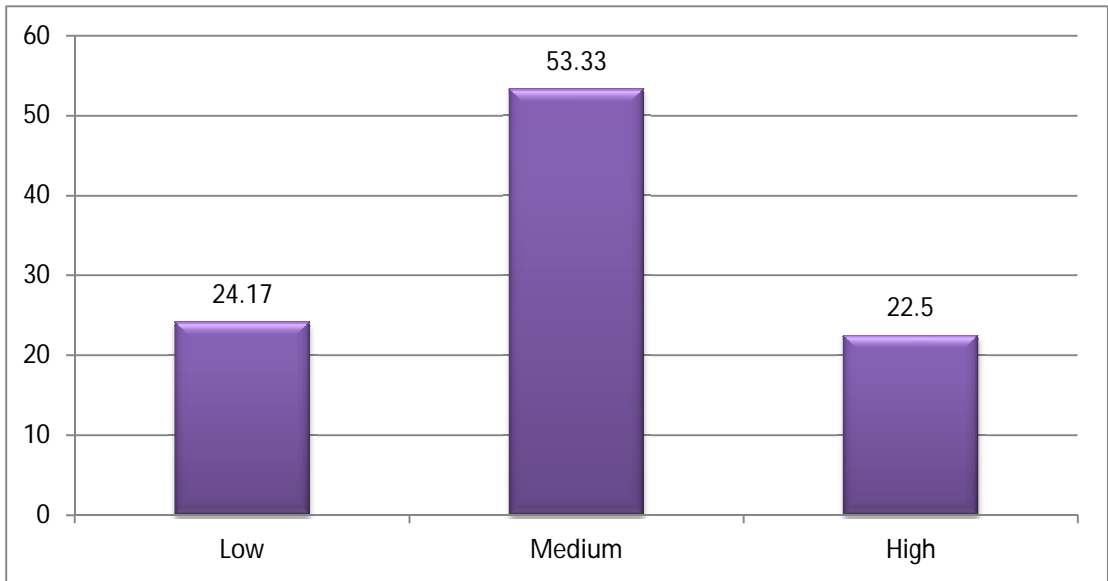


Fig. 4.9 Distribution of banana growers according to urban contact

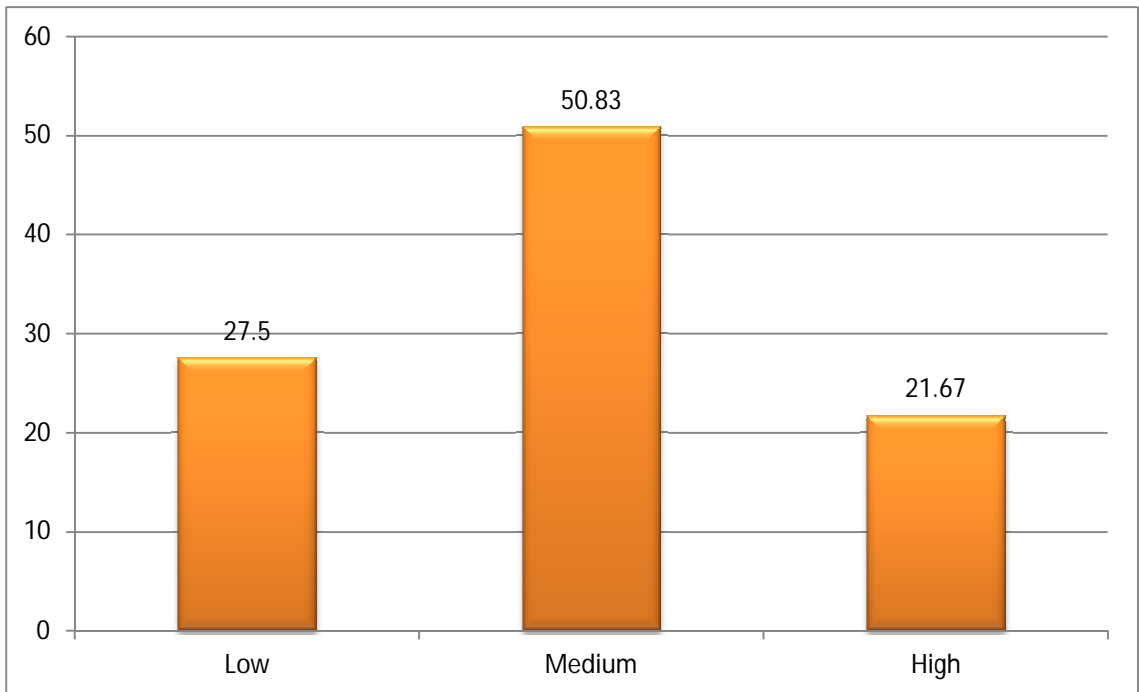


Fig. 4.10 Distribution of banana growers according to mass media exposure

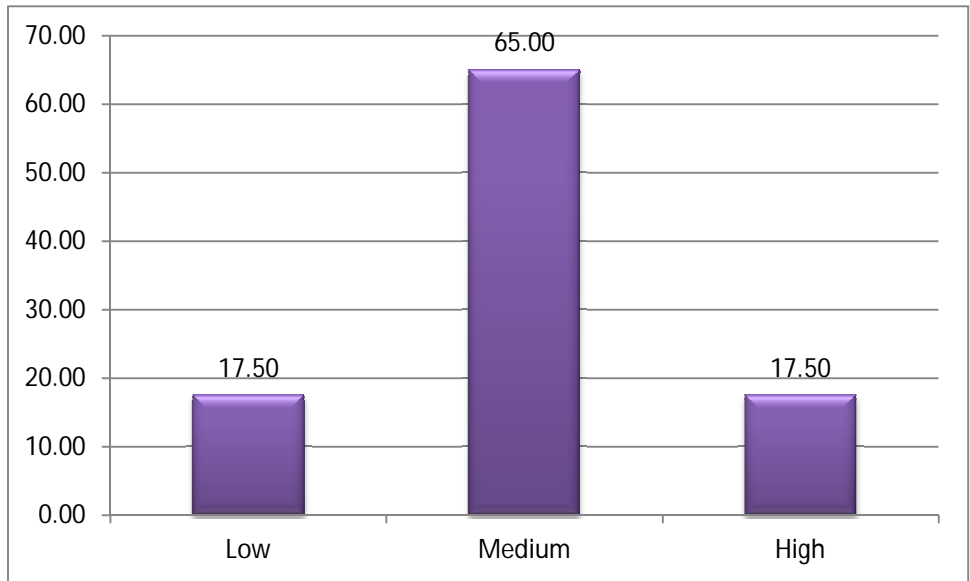


Fig. 4.11 Distribution of banana growers according to scientific orientation

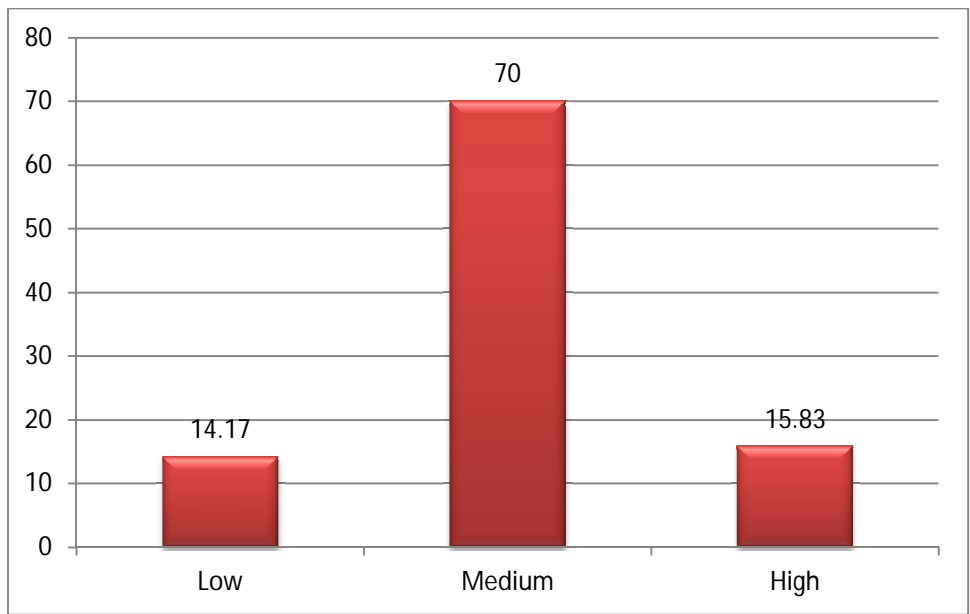


Fig. 4.12 Distribution of banana growers according to risk orientation

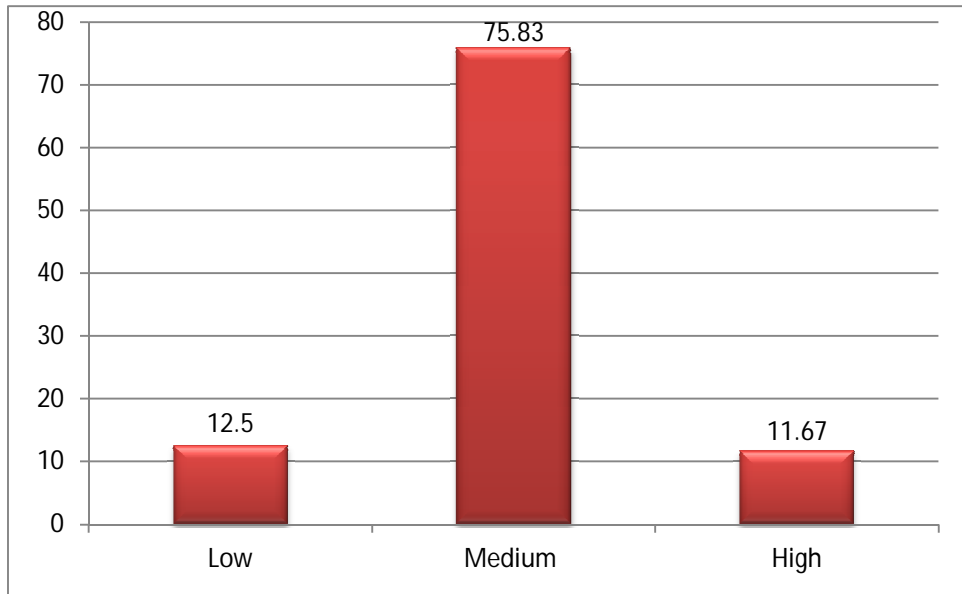


Fig. 4.13 Distribution of banana growers according to market orientation

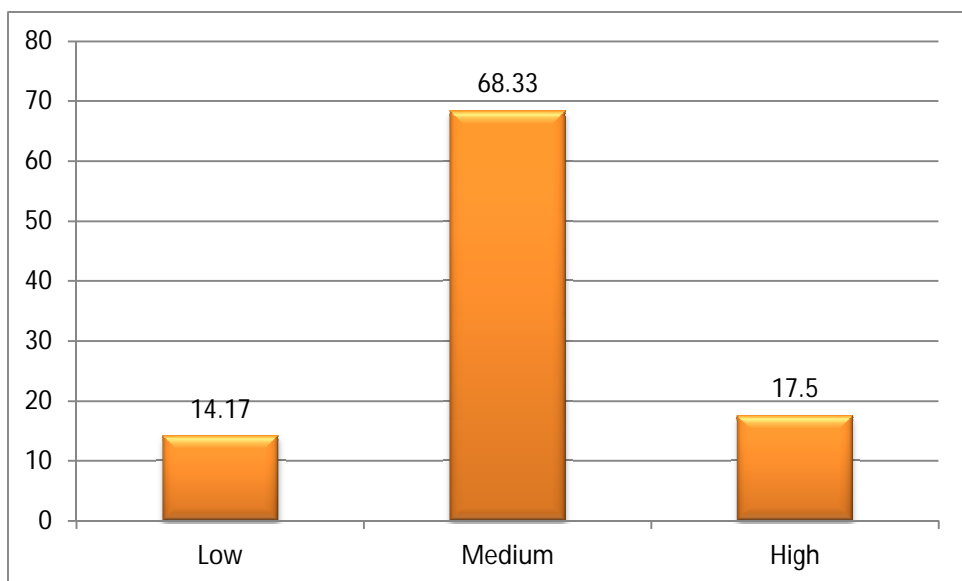


Fig. 4.14 Distribution of banana growers according to innovativeness

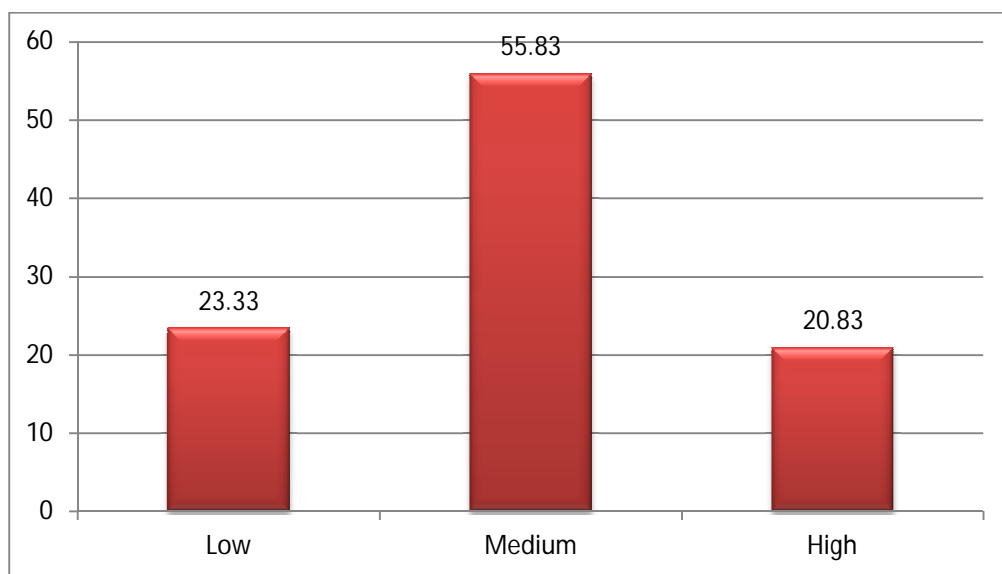


Fig. 4.15 Distribution of banana growers according to achievement motivation

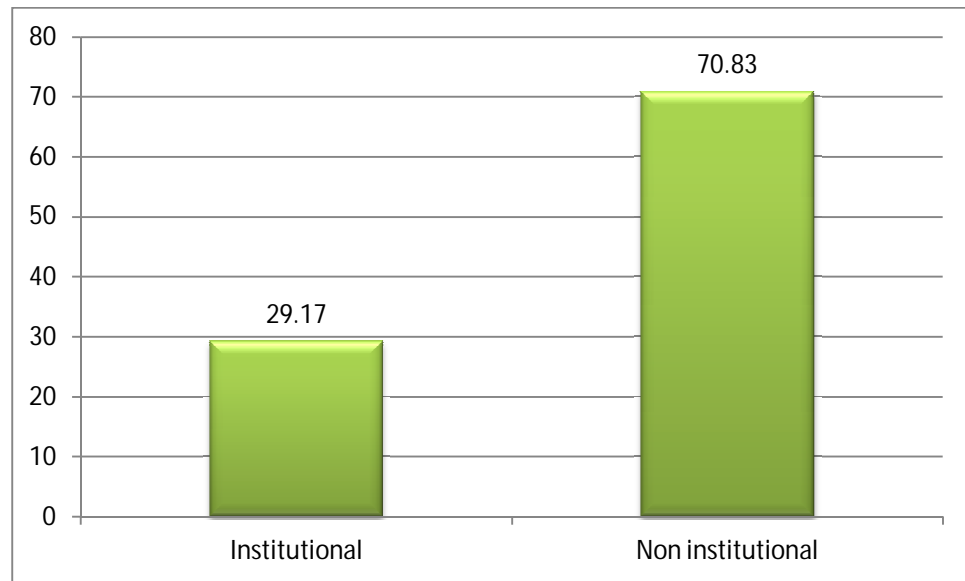


Fig. 4.16 Distribution of banana growers according to their preference to the type of training

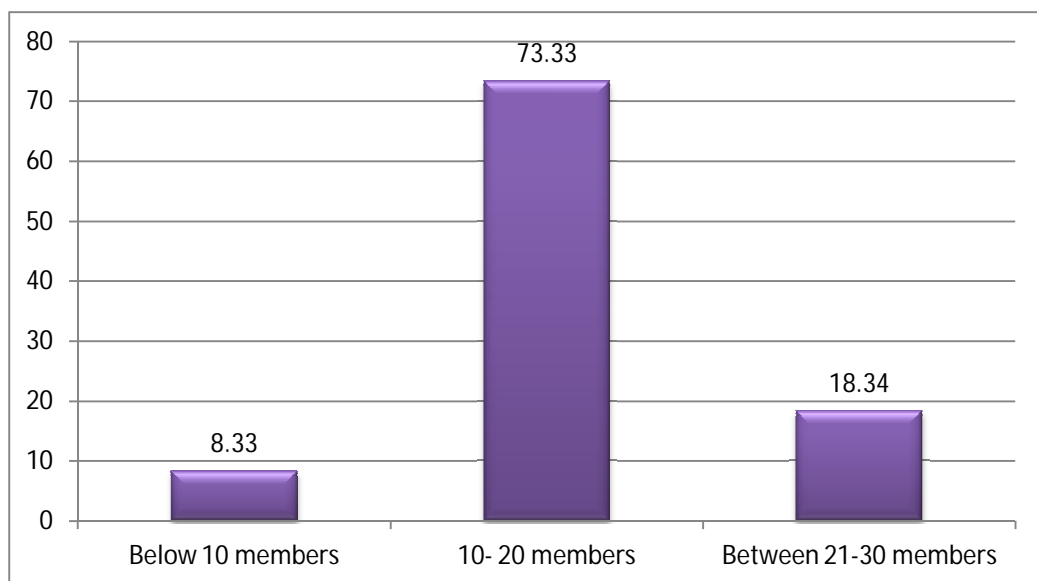


Fig. 4.17 Distribution of banana growers according to their preference to the size of training group

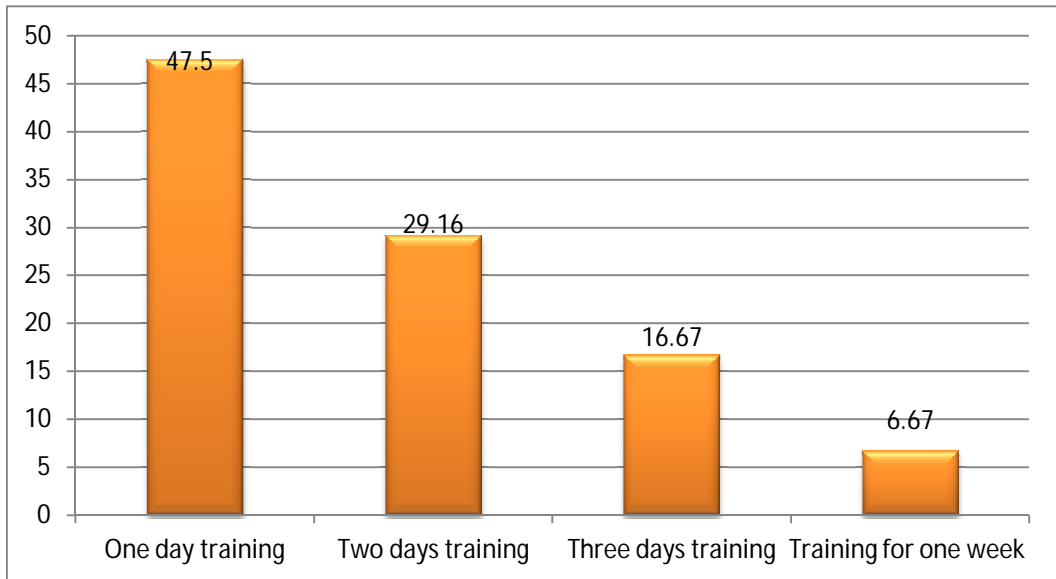


Fig. 4.18 Distribution of banana growers according to their preference to the duration of training

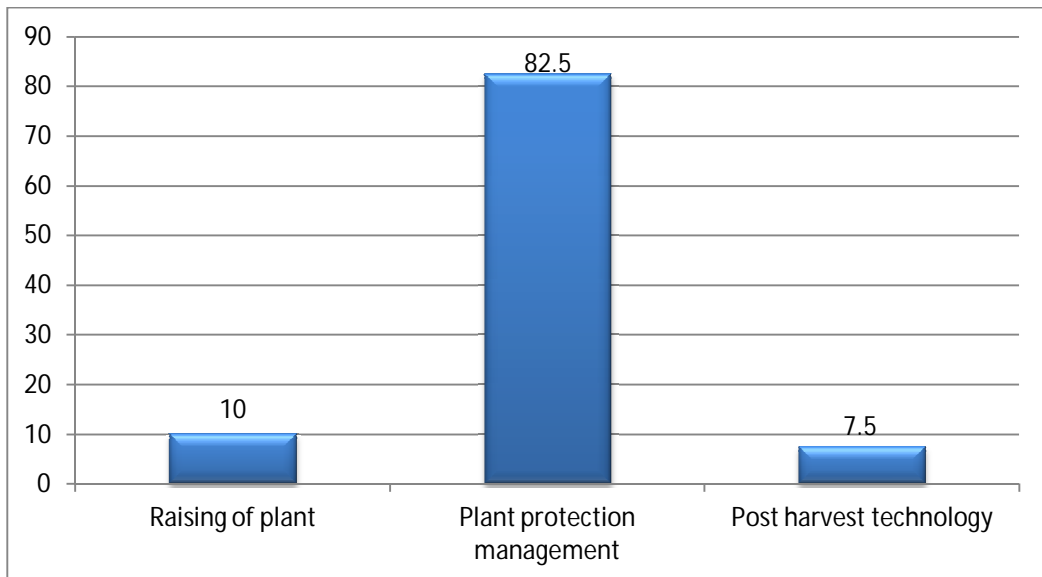


Fig. 4.19 Distribution of banana growers according to their preference to the time of training

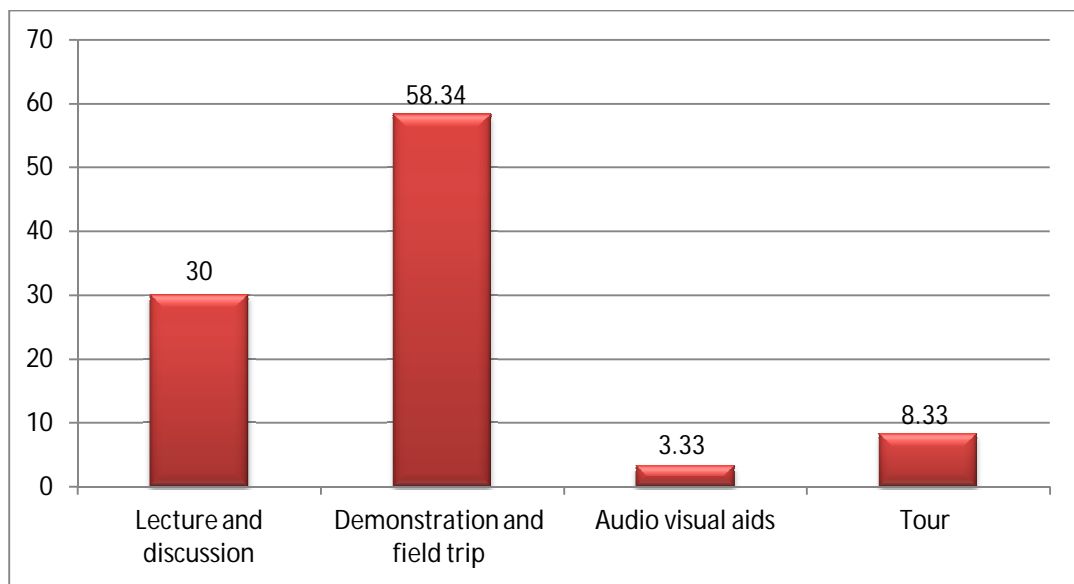


Fig. 4.20 Distribution of banana growers according to their preference to the method of training

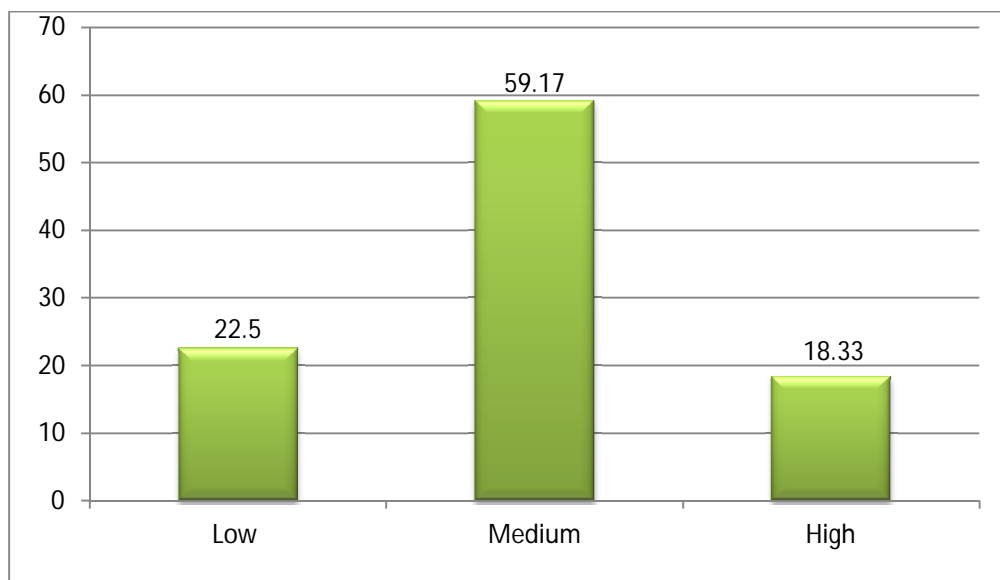


Fig. 4.21 Distribution of banana growers according to their overall adoption levels



Palakkad District



Fig. 3.3 Map showing selected blocks in Palakkad district



Fig. 3.1. Map of India showing Kerala state

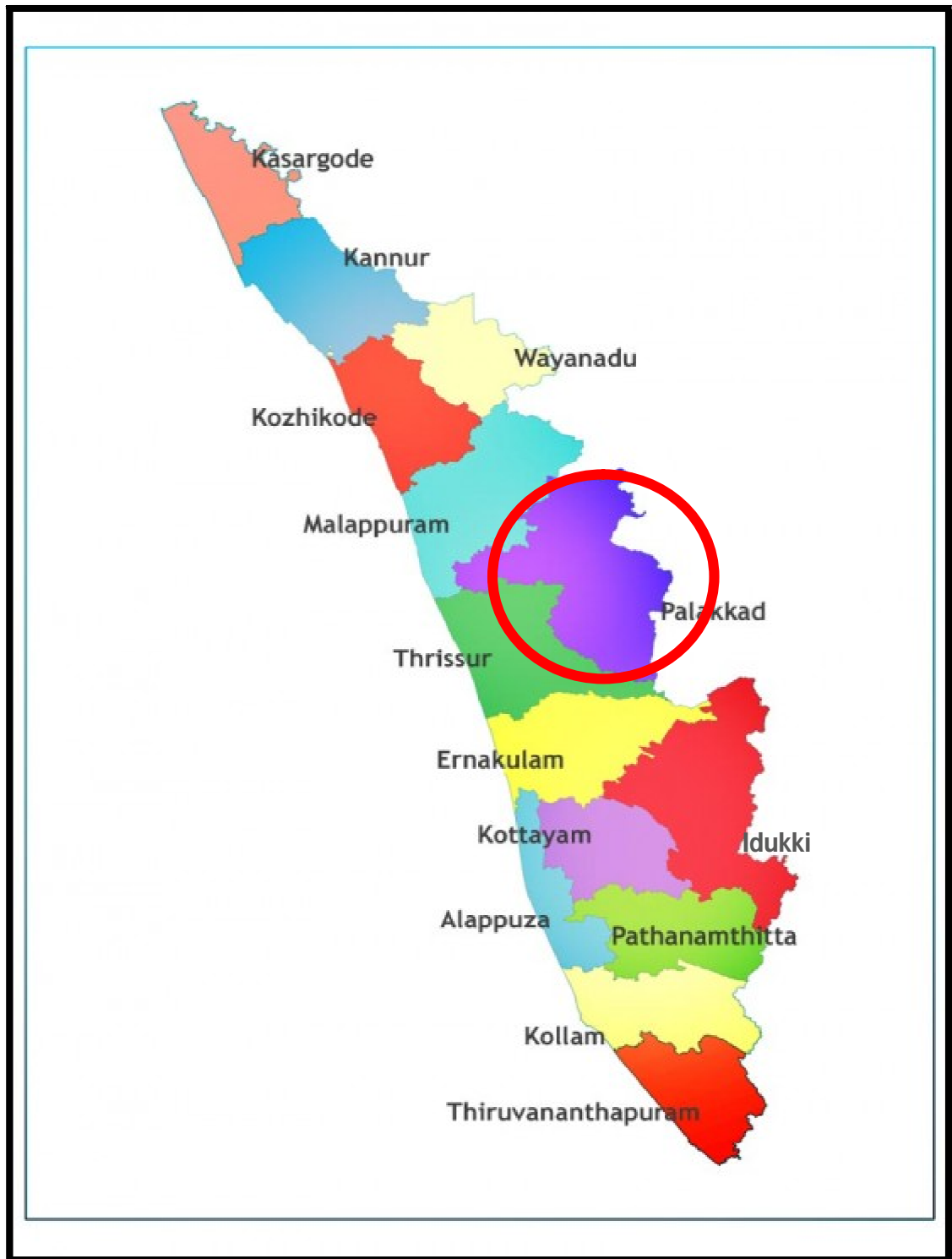


Fig. 3.2. Map of Kerala showing Palakkad district

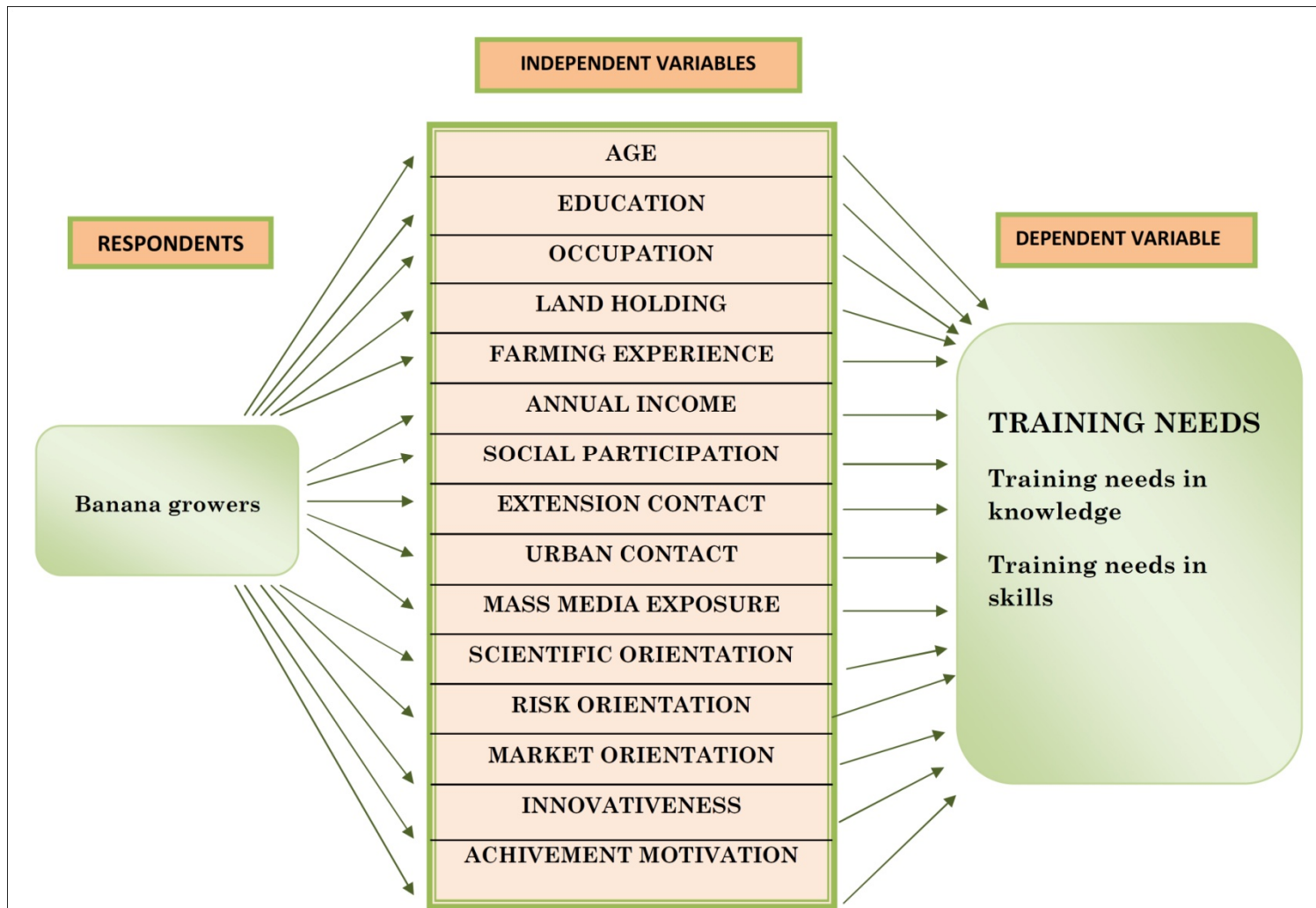


Fig. 2.1. Conceptual model of the study

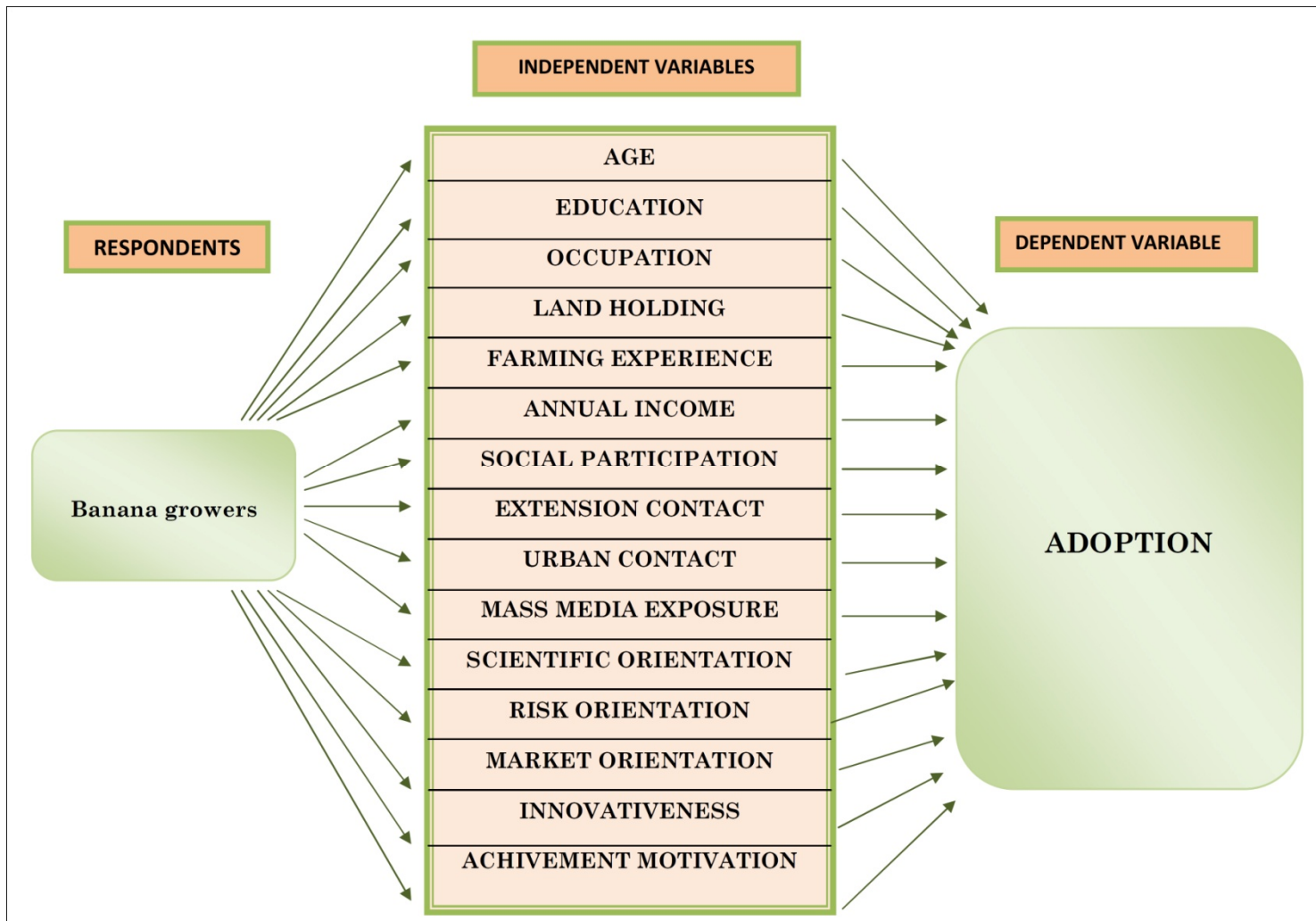


Fig. 2.2. Conceptual model of the study

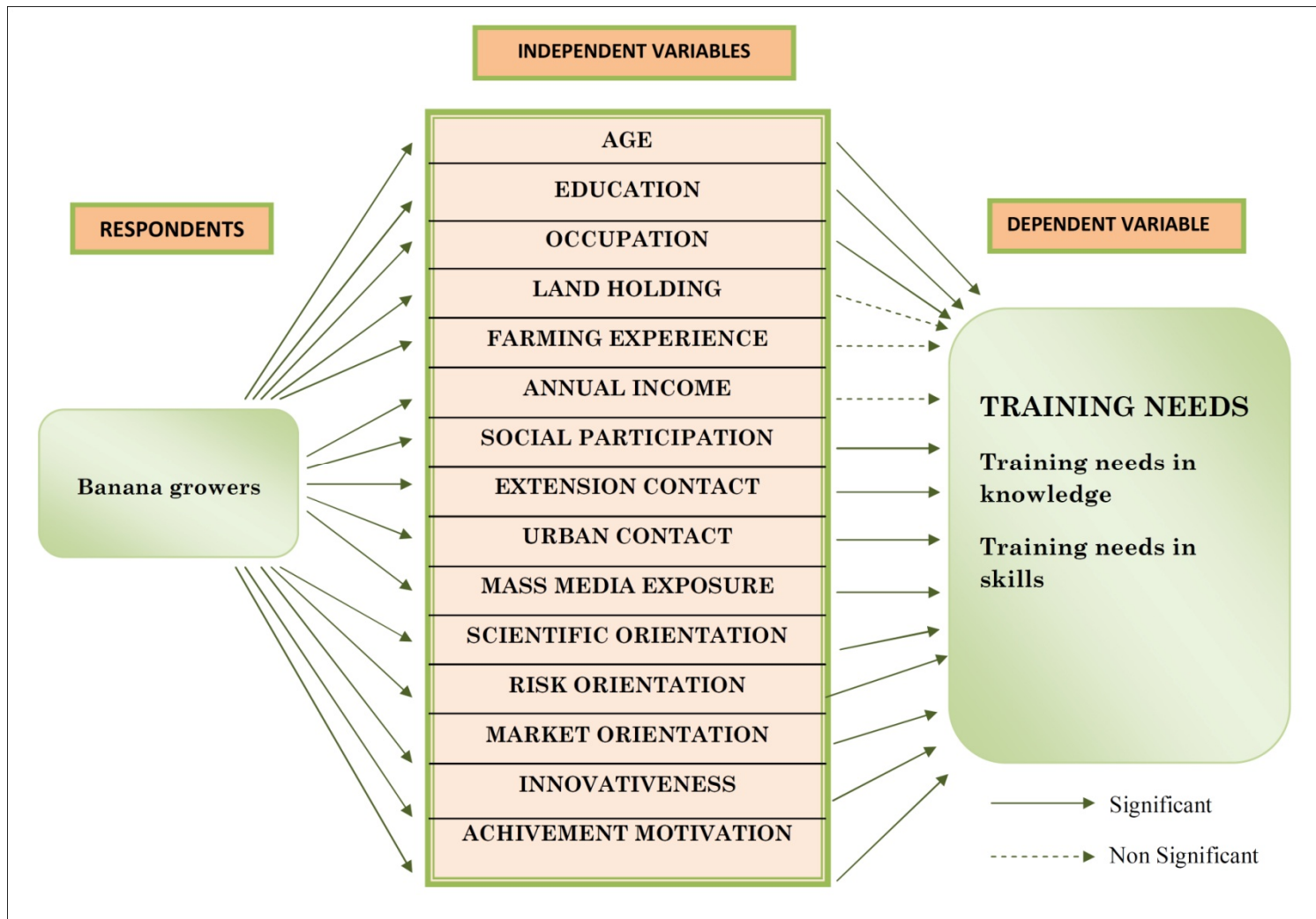


Fig. 4.22. Empirical model of the study

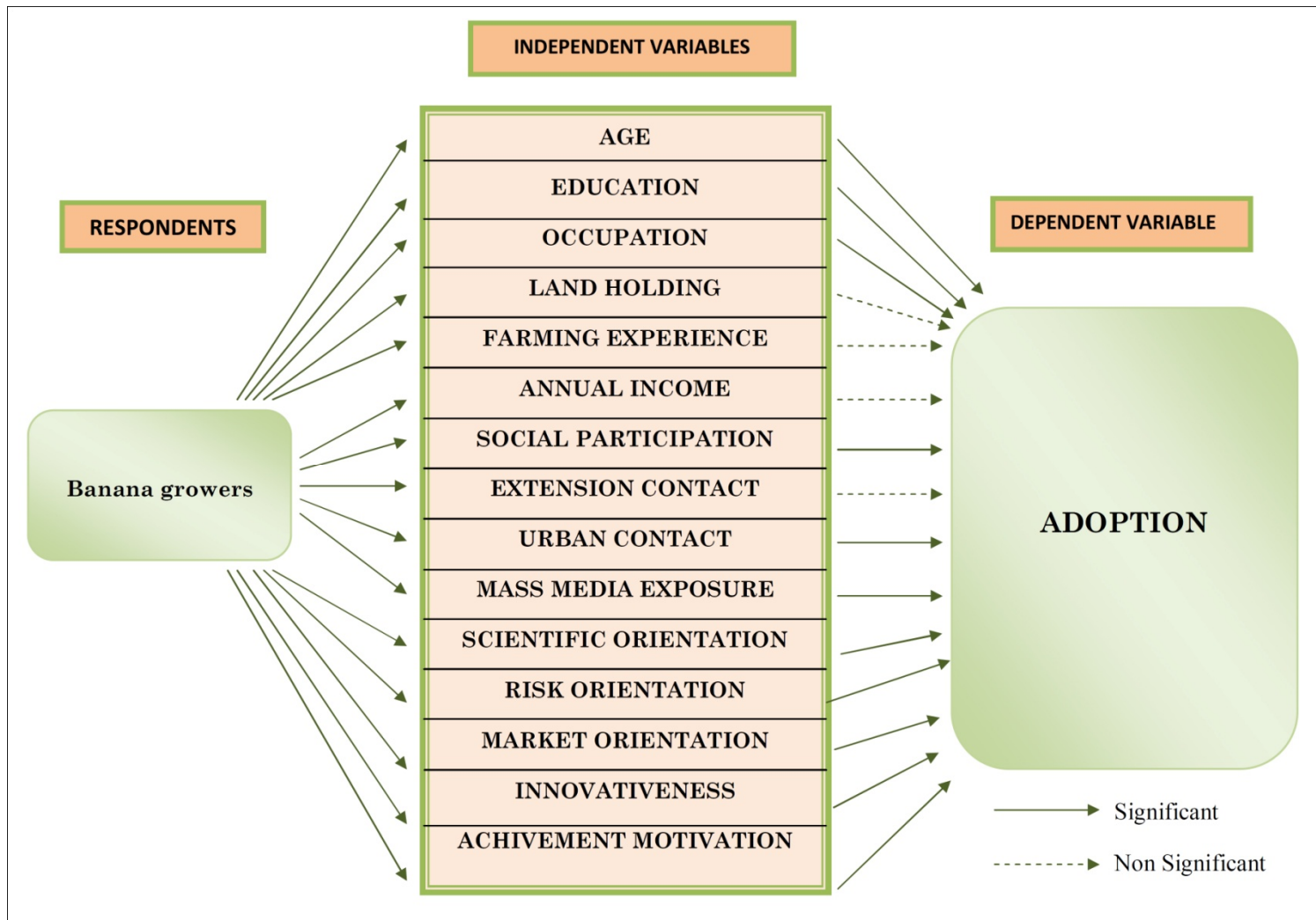


Fig. 4.23. Empirical model of the study

Investigator collecting information from the respondents







Table 4.22. Training needs in knowledge of banana growers with regard to cultivation practices

S. No.	Main areas of training in knowledge	Training needs			Level of Training need
		Mean score	Rank (Mean score)	Rank (Average Mean score)	
I.	Agro climatic requirements for growing of banana				
	1. Required soils for banana cultivation	1.62	12		Medium
	2. Required temperature for banana cultivation	1.08	41		Low
	3. Required relative humidity for banana cultivation	1.04	46		Low
	4. Required mean Sea level for banana cultivation	1.02	47		Low
	5. Sowing time	1.19	35		Medium
	Average Mean Score	1.19		X	
II.	Land preparation				
	6. Digging pits for planting	1.28	33		Medium
	7. Size of pits	1.29	32		Medium
	8. Use of rotovator to break clods	1.45	28		Medium
	Average Mean Score	1.34		VII	
III.	Suckers and planting				
	9. Selection of variety	1.53	25		Medium
	10. Type of suckers	1.73	16		Medium
	11. Selection of suckers	1.55	24		Medium
	12. Sucker treatment	1.06	43		Low
	13. Method of planting	1.15	37		Medium
	14. High density planting	2.43	3		High
	Average Mean Score	1.58		IV	
IV.	Nutrient management				
	15. Organic manures	2.22	7		High
	16. Dosage of fertilizers (NPK 100 - 200 - 400 g / plant /year)	2.04	10		Medium
	17. Method of application of fertilizer	1.9	14		Medium
	18. Time of application of fertilizers	1.77	15		Medium
	19. Application of liquid fertilizers through drip irrigation	2.05	9		Medium
	20. Insitu green manuring	1.14	38		Medium

	21. Application of micronutrients	2.34	5		High
	22. Application of biofertilizers	1.7	17		Medium
	23. Pre harvest bunch spray	1.56	23		Medium
	24. Application of growth regulators	1.47	26		Medium
	Average Mean Score	1.82		III	
V.	Water management				
	25. No: of irrigations to be given for banana crop	1.67	18		Medium
	26. Irrigation interval	1.46	27		Medium
	27. Method of irrigation (drip, furrow, basin)	1.37	30		Medium
	28. Methods of drip irrigation	1.95	12		Medium
	Average Mean Score	1.49		VI	
VI.	Intercultural practices				
	29. Mulching	1.07	42		Low
	30. Desuckering	1.05	44		Low
	31. Propping	1.41	29		Medium
	32. Bunch cover	1.18	36		Medium
	33. Application of herbicides	1.63	20		Medium
	34. Intercropping with cucumber, amaranthus or elephant foot yam	1.33	31		Medium
	35. Harrowing and earthing up	1.13	39		Medium
	Average Mean Score	1.26		VIII	
VII.	Plant protection				
	36. Diagnosis of important insect pests	2.71	2		High
	37. Diagnosis of important diseases	2.35	4		High
	38. Management measures for insects and diseases	2.93	1		High
	Average Mean Score	2.66		I	
VIII.	Organic practices				
	39. Application of recommended nutrients	2.22	6	6	High
	40. Application of recommended management practices for pests and diseases	2.16	8	8	High
	41. Organic certification of products	1.66	19		Medium
	Average Mean Score	2.01		II	

IX.	Harvesting				
	42. Time and method	1.24	34		Medium
	Average Mean Score	1.24		IX	
X.	Post harvest management				
	43. Grading	1.93	13		Medium
	44. Storage	1.59	22		Medium
	45. Packing	1.04	45		Low
	46. Transportation	1.12	40		Low
	47. Marketing	1.97	11		Medium
	Average Mean Score	1.53		V	

Table 4.24. Training needs in skills of banana growers with regard to cultivation practices

S. No.	Main areas of training in skill	Mean score	Rank (Mean score)	Rank (Average Mean score)	Level of Training need
I.	Land preparation				
	1.Digging pits for planting	1.58	23		Medium
	2.Installation of drip system	2.00	13		Medium
	3.Formation of irrigation channels	1.52	24		Medium
	Average Mean Score	1.56		VIII	
II.	Suckers and planting				
	4.Selection of healthy suckers	1.82	18		Medium
	5.Sucker treatment	2.04	11		Medium
	6.Method of planting	1.17	28		Low
	7.High density planting	2.78	2		High
	Average Mean Score	1.96		V	
III.	Nutrient management				
	8.Soil test based fertilizer application	2.97	1		High
	9.Method of application of fertilizers	2.47	6		High
	10.Fertigation	2.68	3		High
	Average Mean Score	2.71		I	
IV.	Water management				
	11.Mechanization in drip irrigation system	1.93	16		Medium
	12.Irrigation at critical stages	2.11	9		Medium
	Average Mean Score	2.02		III	
V.	Intercultural practices				
	13.Desuckering	1.27	26		Low
	14.Propping	1.80	19		Medium
	15.Preparation and use of hericides	2.00	14		Medium
	16.Harrowing and earthing up	1.27	27		Low
	Average Mean Score	1.59		VII	

VI.	Plant protection				
	17.Preparation and use of pesticides	2.40	7		Medium
	18.Handling of insecticides and fungicides	1.83	17		Medium
	19.Maintenance of plant protection equipments	1.43	25		Medium
	Average Mean Score	1.96		IV	
VII.	Organic practices				
	20.Sucker treatment with biofertilizers	2.47	5		High
	21.Use of biocontrol agents	1.74	21		Medium
	a. Beauveria	1.73			
	b. Trichoderma	1.49			
	c. Pseudomonas	1.99			
	22. Use of botanical pesticides	2.58	4		High
	23. Method of application of nutrients	1.73	22		Medium
	24. Application of recommended management practices for pest and disease	2.37	8		Medium
	25. Techniques in getting organic certification	2.02	12		Medium
	Average Mean Score	2.15		II	
VIII.	Post harvest management				
	26. Grading	1.95	15		Medium
	27. Storage	1.77	20		Medium
	28. Packing	1.16	29		Low
	29. Transportation	1.13	30		Low
	30. Marketing	2.07	10		Medium
	Average Mean Score	1.62		VI	

Table 4.36. Constraints in the adoption of banana production technology

Constraints	Frequency	Percentage	Rank
I. Bio physical constraints			
1. Problematic soils	85	70.83	I
2. Poor water retention capacity of soil	50	41.67	VI
3. Poor quality of irrigation water	63	52.5	V
4. Inadequate drainage facilities	68	56.67	IV
5. Natural calamities	76	63.33	III
6. Wild boars	80	66.67	II
II. Technological constraints			
1. Susceptibility of plant to disease like panama wilt	95	79.17	II
2. Incidence of insect / pest attack like banana weevil	98	81.67	I
3. Non availability of suitable high yielding variety	78	65.00	III
4. Unfavourable weather conditions during fruit formation	66	55.00	V
III. Socio personal			
1. Lack of proper knowledge about banana production technology	86	71.67	I
2. Inadequate contact with extension workers	80	66.67	II
3. Poor economic conditions of the farmer	77	64.17	III
IV. Economic			
1. Lack of premium price for organic produce	78	65.00	III
2. Low profit due to high cost of cultivation	110	91.67	I
3. High labour cost	80	66.67	II
4. High cost of plant protection chemicals	75	62.50	IV
5. High cost of manure and fertilizers	72	60.00	V
V. Administrative constraints			
1. Inadequate supply of agricultural inputs from co-operative societies	79	65.83	III

2. Inadequate training facilities	95	79.17	I
3. Insufficient technical staff	88	73.33	II
4. Non- availability of adequate credit	68	56.67	V
5. Non- availability of fertilizers and plant protection chemicals in time	61	50.83	VI
6. Improper crop insurance schemes	76	63.33	IV
VI. Marketing constraints			
1. Insufficient collection centres at local levels	73.33	88	II
2. Lack of remunerative price	81.67	98	I
3. Inadequate knowledge about market intelligence	62.5	75	III
4. Inadequate transport facilities	50.00	60	IV

Table 4.37. Suggestions of the banana growers to overcome the constraints in banana cultivation

S. No.	Suggestions	Frequency	Percentage	Rank
1.	Provide appropriate control measures	110	91.67	I
2.	Timely technical guidance	95	79.17	II
3.	Frequent monitoring of technical staff	92	76.67	III
4.	Maintaining demonstration plots	60	50.00	XI
5.	Conduct training programmes	73	60.83	VIII
6.	Establishing soil testing labs in nearby locality	84	70.00	IV
7.	Supply of planting materials at a subsidised rate by the Department of agriculture	65	54.17	X
8.	Provision of fertilizers on subsidy rates	82	68.33	V
9.	Providing crop insurance	75	62.5	VII
10.	Establishment of collection centers at the nearest point	79	65.83	VI
11.	Market outlets for organic produce	70	58.33	IX

Table 4.31. Content analysis of extent of adoption of banana production technology by banana growers

S. No .	Recommended practices	Adoption					
		FA	%	PA	%	NA	%
I	Suckers and planting						
	1. Use of suitable varieties of banana (Nendran, Poovan, Palayamkodan, Chenkadali, Njalipoovan, Monthan)	54	45.00	66	55.00	-	-
	2. Sucker treatment with bavistin @ 0.1%.	55	45.83	57	47.50	8	6.67
	3. High density planting (5000 plants / ha.)	3	2.50	37	30.83	80	66.67
II	Nutrient management						
	4. Soil test based fertilizer application	8	6.67	40	33.33	72	60.00
	5. Application of NPK in the ratio of 100 - 200 - 400 g / plant /year	20	16.67	100	83.33	-	-
	6. Method of application of fertilizers (60- 70 cm around the plant in two equal split doses.)	20	16.67	100	83.33	-	-
	7. Time of application of fertilizers (Two months after planting and four months after planting).	15	12.5	95	79.17	10	8.33
	8. Application of liquid fertilizers through drip irrigation (fertigation)	3	2.5	6	5	111	92.5
	9. In situ green manuring with cowpea and daincha	34	28.33	56	46.67	30	25
	10. Application of micronutrients like ZnSO (0.5%) and CuSO (0.2%).	10	8.33	40	33.33	70	58.33
	11. Application of biofertilizers like rhizobacteria, azotobacter etc.	14	11.67	75	62.50	31	25.83
	12. Pre harvest bunch spray with 3% K ₂ SO ₄	3	2.50	55	45.83	62	51.67
	13. Application of growth regulators like ethylene, NAA etc.	5	4.17	30	25.00	85	70.83
III	Intercultural practices						
	1. Mulching with paddy straw or dry leaves etc.	51	42.50	65	54.17	4	3.33
	2. Desuckering (removal of side suckers) till the emergence of bunch.	85	70.83	35	29.17	-	-

	3. Propping with bamboo sticks or ropes.	18	15.00	76	63.33	25	20.83
	4. Bunch cover with dry leaves or plastic covers.	12	10.00	79	65.67	29	24.17
	5. Application of herbicide like glyphosate @ 0.4 kg/ha.	10	8.33	80	66.67	30	25.00
	6. Intercropping with cucumber, amaranthus or elephant foot yam	50	41.67	63	52.50	7	5.83
IV	Plant protection						
	1. Management measures for insects and diseases	20	16.67	100	83.33	-	-
V	Organic practices						
	1. FYM @ 10 kg / plant	48	40.00	68	56.67	4	3.33
	2. Vermicompost @ 2 kg / pit	12	10.00	34	28.33	74	61.67
	3. Neem cake @ 1 kg / pit	50	41.67	35	29.17	35	29.17
	4. N, P and K biofertilizers – PGPR mix 1 @ 50 -100 g / pit	-	-	8	6.67	112	93.33
	5. Panchagavya 3% as foliar spray three times at third, sixth and ninth month after planting	4	3.33	12	10.00	104	86.67
	6. Sucker treatment with cowdung	36	30.00	80	66.67	4	3.33
	7. Swabbing mud slurry around pseudostem	5	4.17	86	71.67	29	24.17
	8. Application of tapioca leaf extract (nanma, menma)	-	-	5	4.17	115	95.83
	9. Spraying of 1 % Bordeaux mixture for sigatoka disease control	4	3.33	28	23.33	88	73.33
	10. Spraying of Beauveria bassiana @ 1 x 10 ⁷ spores/ml against pseudostem weevil.	4	3.33	16	13.33	100	83.33
	11. Application of organic manures and Trichoderma harzianum (100:1) in the pit before planting to control rhizome weevil.	4	3.33	28	23.33	88	73.33
	12. Soaking the suckers in Pseudomonas fluorescens solution (2%) for 30 minutes before planting to control rhizome weevil.	12	10.00	56	46.67	52	43.33
	13. Neem oil emulsion @ 3 % in mud slurry for swabbing	9	7.50	63	52.5	48	40.00

	14. Spraying neemazal (1% EC) on the Pseudostem	-	-	10	8.33	110	91.67
VI	Post harvest management						
	1. Grading	8	6.67	74	61.67	38	31.67
	2. Storage	4	3.33	10	8.33	106	88.33
	3. Packing	-	-	11	9.17	109	90.83

Note: FA = Full Adoption, **PA**= Partial Adoption, **NA** = Non Adoption

**പാർട്ടി
പരിമിതികൾ**

I. ജൈവഭൗതികമായ പരിമിതികൾ	അതെ / അല്ല	നിർദ്ദേശങ്ങൾ
1. പ്രശ്നമുള്ള മണ്ണ്		
2. വെള്ളം പിടിച്ചുനിർത്താനുള്ള കഴിവില്ലായ്മ മണ്ണിനുകുറവാണ്		
3. ഗുണനിലവാരം കുറഞ്ഞ ജലം		
4. നീരാഴുക്കിനുള്ള സൗകര്യത്തിന്റെ അഭാവം		
5. പ്രകൃതിക്ഷോഭം		
6. വന്യജീവികൾ		
II. സാങ്കേതിക പരിമിതികൾ		
1. വാഴയെ പിടികൂടുന്ന കരിച്ചിൽ രോഗം		
2. മാണവബലത്തിന്റെയും മറ്റുകീടങ്ങളുടെയും ആക്രമണം		
3. അനുയോജ്യമായ ഇനങ്ങളുടെ ലഭ്യത കുറവ്		
4. പ്രതികൂലമായ കാലാവസ്ഥകൊണ്ടുള്ള കായ്ഫല കുറവ്		
III. സാമൂഹിക സ്വകാര്യ പരിമിതികൾ		
1. സാങ്കേതിക വാഴക്കൃഷിയിലെ അറിവില്ലായ്മ		
2. എക്സ്പെൻഷൻ ജോലിക്കാരായുള്ള ബന്ധപ്പെടലിന്റെ അഭാവം		
3. കർഷകന്റെ ദാരിദ്ര്യം		

IV. സാമ്പത്തിക പരിമിതികൾ		
1.ജൈവ ഉത്പന്നങ്ങൾക്കുടിയ വില ലഭിക്കുന്നില്ല		
2.കൃഷിയിലെ ചിലവുവെട്ടുന്നതു കാരണം ലാഭം കുറയുന്നു		
3. ഉയർന്ന വേതനം		
4.സസ്യ സംരക്ഷണത്തിനുള്ള രാസവളത്തിന്റെയും രാസപദാർത്ഥങ്ങളുടെ മറ്റും ഉയർന്ന വില		
5.രാസവളത്തിന്റെയും മറ്റും ഉയർന്ന വില		
V. ഭരണാധികാര പരിമിതികൾ		
1.കാർഷിക സാധനങ്ങളുടെ അപര്യാപ്തമായ വിതരണം		
2.പരിശീലന സൗകര്യക്കുറവ്		
3.മതിയായ സാങ്കേതിക ജീവനക്കാരുടെ അഭാവം		
4.ആവശ്യമായ വായ്പയുടെ അഭാവം		
5.സസ്യസംരക്ഷണത്തിനുള്ള രാസപദാർത്ഥങ്ങളും വളങ്ങളും സമയത്തിനു ലഭ്യമല്ല		
6.കൃത്യമല്ലാത്ത ഇൻഷുറൻസ് പദ്ധതികൾ		
VI. വിപണന പരിമിതികൾ		
1.ശേഖരണ കേന്ദ്രങ്ങളുടെ അഭാവം		
2.വിളകൾക്ക് ലഭിക്കുന്ന കുറഞ്ഞ വില		
3.വിപണി വിവരങ്ങളുടെ അഭാവം		
4.ഗതാഗത സൗകര്യങ്ങളുടെ അഭാവം		

b. Training needs in skills related to banana cultivation

S. No.	Main areas of training in skill	Most needed (3)	Needed (2)	Least needed (1)
I.	Land preparation			
	1. Digging pits for planting			
	2. Installation of drip system			
	3. Formation of irrigation channels			
II.	Suckers and planting			
	4. Selection of healthy suckers			
	5. Sucker treatment			
	6. Method of planting			
	7. High density planting			
III.	Nutrient management			
	8. Soil test based fertilizer application			
	9. Method of application of fertilizers			
	10. Fertigation			
IV.	Water management			
	11. Mechanization in drip irrigation system			
	12. Irrigation at critical stages			
V.	Intercultural practices			
	13. Desuckering			
	14. Propping			
	15. Preparation and use of herbicides			
	16. Harrowing and earthing up			
VI.	Plant protection			
	17. Preparation and use of pesticides			
	18. Handling of insecticides and fungicides			
	19. Maintenance of plant protection equipments			

VII.	Organic practices			
	20. Sucker treatment with biofertilizers			
	21. Use of biocontrol agents a. Beauveria b. Trichoderma c. Pseudomonas			
	22. Use of botanical pesticides			
	23. Method of application of nutrients			
	24. Application of recommended management practices for pest and disease			
	25. Techniques in getting organic certification			
VIII	Post harvest management			
	26. Grading			
	27. Storage			
	28. Packing			
	29. Transportation			
	30. Marketing			

PART C

Adoption of recommended practices of banana cultivation

S. No .	Recommended practices	Adoption			
		FA	PA	NA	Reasons
I.	<p>Suckers and planting</p> <ol style="list-style-type: none"> 1. Use of suitable varieties of banana (Nendran, Poovan, Palayamkodan, Chenkadali, Njalipoovan, Monthan) 2. Sucker treatment with bavistin @ 0.1%. 3. High density planting (5000 plants / ha.) 				
II.	<p>Nutrient management</p> <ol style="list-style-type: none"> 1. Soil test based fertilizer application 2. Application of NPK in the ratio of 100 - 200 - 400 g / plant /year 3. Method of application of fertilizers (60- 70 cm around the plant in two equal split doses.) 4. Time of application of fertilizers (Two months after planting and four months after planting). 5. Application of liquid fertilizers through drip irrigation (fertigation) 6. <i>In situ</i> green manuring with cowpea and daincha. 7. Application of micronutrients like ZnSO (0.5%) and CuSO (0.2%). 8. Application of biofertilizers like rhizobacteria, azotobacter etc. 9. Pre harvest bunch spray with 3% K₂SO₄. 10. Application of growth regulators like ethylene, NAA etc. 				
III.	<p>Intercultural practices</p> <ol style="list-style-type: none"> 1. Mulching with paddy straw or dry leaves etc. 2. Desuckering (removal of side suckers) till the emergence of bunch. 3. Propping with bamboo sticks or ropes. 4. Bunch cover with dry leaves or plastic covers. 5. Application of herbicide like glyphosate @ 0.4 kg/ha. 6. Intercropping with cucumber, amaranthus or elephant foot yam 				
IV.	<p>Plant protection</p> <ol style="list-style-type: none"> 1. Management measures for insects and diseases 				

V.	<p>Organic practices</p> <ol style="list-style-type: none"> 1. FYM @ 10 kg / plant 2. Vermicompost @ 2 kg / pit 3. Neem cake @ 1 kg / pit 4. N, P and K biofertilizers – PGPR mix 1 @ 50 -100 g / pit 5. Panchagavya 3% as foliar spray three times at third, sixth and ninth month after planting 6. Sucker treatment with cowdung 7. Swabbing mud slurry around pseudostem 8. Application of tapioca leaf extract (nanma, menma) 9. Spraying of 1 % Bordeaux mixture for sigatoka disease control 10. Spraying of <i>Beauveria bassiana</i> @ 1×10^7 spores/ml against pseudostem weevil. 11. Application of organic manures and <i>Trichoderma harzianum</i> (100:1) in the pit before planting to control rhizome weevil. 12. Soaking the suckers in <i>Pseudomonas fluorescens</i> solution (2%) for 30 minutes before planting to control rhizome weevil. 13. Neem oil emulsion @ 3 % in mud slurry for swabbing 14. Spraying neemazal (1% EC) on the pseudostem 				
VI	<p>Post harvest management</p> <ol style="list-style-type: none"> 1. Grading 2. Storage 3. Packing 				

PART D

Please give your suggestions on various aspects of training such as type of training, appropriate size of training group, duration, time of training and method of training.

- | | Reasons |
|--|---------|
| 1. Which type of training do you prefer ? | |
| i. Institutional | () |
| ii. Non – institutional | () |
| 2. What do you think of appropriate size of training group for both institutional and non institutional training ? | |
| i. Below 10 members | () |
| ii. 10 - 20 members | () |
| iii. Between 21- 30 members | () |
| 3. What should be the duration of the training programme ? | |
| i. One day training | () |
| ii. Two days training | () |
| iii. Three days training | () |
| iv. Training for one week | () |
| 4. What is your preference for time of training for above said duration for training programmes ? | |
| i. At the time of planting | () |
| ii. Raising of plant | () |
| iii. Plant protection management | () |
| v. Post harvest technology | () |
| 5. Which of the following methods do you prefer ? | |
| i. Lecture and discussion | () |
| ii. Demonstration and field trip | () |
| iii. Audio visual aids | () |
| iv. Tour | () |

PART E

CONSTRAINTS : Please mention the constraints faced by you and give suggestions to over come them.

I. Bio physical constraints	YES / NO	SUGGESTIONS
1. Problematic soils		
2. Poor Water retention capacity of soil		
3. Poor quality of irrigation water		
4. Inadequate drainage facilities		
5. Natural calamities		
6. Wild boars		
II. Technological constraints		
1. Susceptibility of plant to disease like panama wilt		
2. Incidence of insect / pest attack like banana weevil		
3. Non availability of suitable high yielding variety		
4. Unfavourable weather conditions during fruit formation		
III. Socio personal		
1. Lack of proper knowledge about banana production technology		
2. Inadequate contact with extension workers		
3. Poor economic conditions of farmer		

IV. Economic		
1. Lack of premium price for organic produce		
2. Low profit due to high cost of cultivation		
3. High labour cost		
4. High cost of plant protection chemicals		
5. High cost of manure and fertilizers		
V. Administrative constraints		
1. Inadequate supply of agricultural inputs from cooperatives		
2. Inadequate training facilities		
3. Insufficient technical staff		
4. Non- availability of adequate credit		
5. Non- availability of fertilizers and plant protection chemicals in time		
6. Improper crop insurance schemes		
VI. Marketing constraints		
1. Insufficient collection centres at local levels		
2. Lack of remunerative price		
3. Inadequate knowledge about market intelligence		
4. Inadequate transport facilities		

**ACHARYA N.G.RANGA AGRICULTURAL UNIVERSITY
DEPARTMENT OF EXTENSION EDUCATION
AGRICULTURAL COLLEGE, BAPATLA**



INTERVIEW SCHEDULE

**TRAINING NEEDS OF BANANA GROWERS IN PALAKKAD DISTRICT OF
KERALA**

NAME OF THE FARMER:

RESPONDENT NO:

BLOCK:

VILLAGE:

PHONE NO:

ADDRESS:

PART A

PERSONAL, SOCIO- ECONOMIC & PSYCHOLOGICAL CHARACTERISTICS

1. AGE:

2. EDUCATION:

- I. Illiterate :
- II. Functionally literate :
- III. Lower Primary school :
- IV. Upper Primary school:
- V. High school :
- VI. Higher secondary :
- VII. Graduation:
- VIII. Post graduation:

3.OCCUPATION:

Categorisation	Response
Agriculture	
Agriculture + Labour work	
Agriculture + Animal husbandry	
Agriculture + Labour work+Animal husbandry	
Agriculture + Service	
Agriculture + Business	
Agriculture + others	

4. LAND HOLDING:

S. No.	Category	Owned land (acres)	Leased land (acres)		Total land (acres)
			Leased out	Leased in	
1.	Marginal (up to 2.5 acres)				
2.	Small (2.51 – 5 acres)				
3.	Semi medium (5.01 – 10 acres)				
4.	Medium (10.01 – 25 acres)				
5.	Large (>25 acres)				

5. Experience in agriculture :

Experience in banana cultivation :

6.ANNUAL INCOME:

S. No.	Source of income	Income in Rs
1	Gross income from agriculture	
2	GrossIncome from labour	
3	GrossIncome from dairy	
4	GrossIncome from poultry	
5	GrossIncome from services	
6	GrossIncome from business	
	Total income of the family	

7. SOCIAL PARTICIPATION:

S. No.	Type of organization	Form of membership			Extent of participation		
		Non – member (1)	Membe r (2)	Office bearer (3)	Regularly (3)	Occasiona lly (2)	Never (1)
1.	Gram Panchayaths						
2.	Cooperative societies						
3.	Cooperative Banks						
4.	School management						
5.	Religious organization						
6.	If any, specify						

8.EXTENSION CONTACT:**Frequency of Contact**

S. No.	Source	Regularly (3)	Ocassionally (2)	Never (1)
1	Agricultural Assistant			
2	Agricultural Officer			
3	Assistant Directorof Agriculture			
4	Scientists			
5	Friends & relatives			
6	Input dealers			
7	Agri – clinics			
8	NGOs			
9	Any other (please specify)			

9. URBAN CONTACT:

a. How often do you visit the nearest town ?

1. Never :
2. Twice in a week :
3. Once in a week:
4. Once in a fortnight :
5. Once in a month :
6. More than two times in a week :

b. Please indicate purpose of your visit to the nearest town ?

1. On farm work :
2. Personal work:
3. Social call:
4. Entertainment and others :

10. MASS MEDIA EXPOSURE:

S. No.	SOURCES	Extent of exposure		
		Regularly (3)	Occasionally (2)	Never (1)
	<ol style="list-style-type: none">1. Radio programmes2. Television programmes3. Newspaper4. Information materials5. KissanMelas6. Mobile text message or calling7. Internet			

11. SCIENTIFIC ORIENTATION:

S. No.	Statements	Response		
		Agree (3)	Un Decided (2)	Disagree (1)
1.	Improved methods of banana cultivation give better results to a farmer than old methods.			
2.	A farmer with lot of experience should use new methods in banana cultivation as recommended.			
3.	Though it takes time for a farmer to learn new methods in farming it is worth the effort.			
4.	A good farmer experiments with new ideas in farming.			
5.	Traditional methods of farming have to be changed in order to raise the level of living of a farmer.			
6.*	The way the farmers forefathers followed is still the best way to follow today.			

12. RISK ORIENTATION:

S. No.	Statements	Response		
		Agree (3)	Un Decided (2)	Disagree (1)
1.*	A farmer should grow large number of crops to avoid greater risks involved in growing one or two crops.			
2.	A farmer should rather take more of a 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 higher risks than the average, usually does better financially			
4.	It is good for a farmer to take risks when he knows his chance of success is fairly high.			
5.*	It is better for a farmer not to try new farming methods unless most other farmers have used them with success.			
6.	Trying an entirely new method in cultivation of banana involves risk, but it is worth trying.			

13. MARKET ORIENTATION:

S. No.	Statements	Response		
		Agree (3)	Un decided (2)	Disagree (1)
1.*	Market information is not so much useful to a farmer.			
2.	A farmer can get good price by grading his produce.			
3.*	One should sell his produce to the nearest market irrespective of prices			
4.*	One should purchase his inputs from nearest shop where other farmers purchase.			
5.	One should grow those varieties which have more market demand.			
6.	Storage of the produce can help to get better price for his/her produce.			

14. INNOVATIVENESS:

S.No.	Statements	Response				
		SA	A	UD	D	SDA
1.	Do you want to learn new ways of bananacultivation?					
2.	If the extension worker gives a talk on banana cultivation aspects, would you like to attend?					
3.*	Do you think man's future is in the hands of God.					
4.	Do you want change in your life?					
5.	Do you want to earn money by venturing into new economic activity?					
6.*	Do you think of living happily today without worrying about tomorrow?					
7.*	Do you want your son to be a farmer?					
8.	A farmer should try to follow new technologies in banana production.					

15. ACHIEVEMENT MOTIVATION:

Sl. No.	Statement	Agree (3)	Un Decided (2)	Disagree (1)
1.	One should always ahead of others in group.			
2.*	What we know is enough and there is no need of learning new skills for betterment.			
3.	Even though the task is difficult one should have determination and drive ambition to achieve it.			
4.*	Hard work for better life is useless.			
5.	A basic human tragedy is that man proposes but God disposes.			
6.	One should set difficult goals for one self and try to reach them.			
7.*	Every event in human life has already been settled and determined his fate.			
8.	Work should come first even if one cannot get rest.			

PART B

Training NeedsOf Banana Growers

a. Training needs in knowledge related to banana cultivation

S. No.	Main areas of training in knowledge	Most needed (3)	Needed (2)	Least needed (1)
I.	Agro climatic requirements for growing of banana			
	1. Required soils for banana cultivation			
	2. Required temperature for banana cultivation			
	3. Required relative humidity for banana cultivation			
	4. Required mean Sea level for banana cultivation			
	5. Sowing time			
II.	Land preparation			
	6. Digging pits for planting			
	7. Size of pits			
	8. Use of rotovator to break clods			
III.	Suckers and planting			
	9. Selection of variety			
	10. Type of suckers			
	11. Selection of suckers			
	12. Sucker treatment			
	13. Method of planting			
	14. High density planting			
IV.	Nutrient management			
	15. Organic manures			
	16. Dosage of fertilizers (NPK 100 - 200 - 400 g / plant /year)			
	17. Method of application of fertilizer			
	18. Time of application of fertilizers			
	19. Application of liquid fertilizers through drip irrigation			
	20. Insitu green manuring			
	21. Application of micronutrient			
	22. Application of biofertilizers			
	23. Pre harvest bunch spray			

	24. Application of growth regulators			
V.	Water management			
	25. No: of irrigations to be given to banana crop			
	26. Irrigation interval			
	27. Method of irrigation (drip, furrow, basin)			
	28. Methods of drip irrigation			
VI.	Intercultural practices			
	29. Mulching			
	30. Desuckering			
	31. Propping			
	32. Bunch cover			
	33. Application of herbicides			
	34. Intercropping with cucumber, amaranthus or elephant foot yam			
	35. Harrowing and earthing up			
VII.	Plant protection			
	36. Diagnosis of important insect pests			
	37. Diagnosis of important diseases			
	38. Management measures for insects and diseases			
VIII.	Organic practices			
	39. Application of recommended nutrients			
	40. Application of recommended management practices for pest and disease			
	41. Organic certification of products			
IX.	Harvesting			
	42. Time and method			
X.	Post harvest management			
	43. Grading			
	44. Storage			
	45. Packing			
	46. Transportation			
	47. Marketing			

ആചാര്യ എൻ ജി രംഗ അഗ്രിക്കൾച്ചറൽ യൂണിവേഴ്സിറ്റി
ഡിപ്പാർട്ട്മെന്റ് ഓഫ് എക്സ്റ്റൻഷൻ എഡ്യൂക്കേഷൻ
അഗ്രിക്കൾച്ചറൽ കോളേജ് ബാപട്ട



ഫോറം

കർഷകനെ പേര് :

നമ്പർ :

ബ്ലോക്ക് :

ഗ്രാമം :

വിലാസം :

ഫോൺ നമ്പർ :

പാർട്ടി

സാമൂഹിക സാമ്പത്തിക മാനസിക സവിശേഷതകൾ

1. വയസ്സ് :
2. വിദ്യാഭ്യാസം :
 - 1.നിരക്ഷരൻ
 - 2.എഴുത്തും വായനയും അറിയാം
 - 3.ലോവർ പ്രൈമറി
 - 4.അപ്പർ പ്രൈമറി
 - 5.ഹൈ സ്കൂൾ
 - 6.ഹയർ സെക്കന്ററി
 - 7.ബിരുദം
 8. ബിരുദാനന്തര ബിരുദം
3. തൊഴിൽ :

നമ്പർ :	തരം	പ്രതികരണം
1.	കൃഷി	
2.	കൃഷി + കുലിപ്പണി	
3.	കൃഷി + കന്നുകാലികൾ	
4.	കൃഷി + കുലിപ്പണി + കന്നുകാലികൾ	
5.	കൃഷി + സേവനങ്ങൾ	
6.	കൃഷി + ബിസിനസ്	
7.	കൃഷി + മറ്റുള്ളവയും	

4. കൈവശമുള്ള സ്ഥലം :

നമ്പർ :	തരം	സ്വന്തം (ഏക്കർ)	പാട്ടം (ഏക്കർ) കൊടുത്തത് വാങ്ങിയത്		മൊത്തം (ഏക്കർ)
1.	മാർജിനൽ (2.5 ഏക്കർ വരെ)				
2.	സ്റ്റാൾ (2.51 - 5 ഏക്കർ)				
3.	സെമി മീഡിയം (5.01- 10 ഏക്കർ)				
4.	മീഡിയം (10.01 - 25 ഏക്കർ)				
5.	ലാർജ്ജ് (25 ഏക്കർ)				

5. കൃഷിയിൽ എത്ര വർഷത്തെ പരിചയമുണ്ട് :

വാഴകൃഷിയിൽ എത്ര വർഷത്തെ പരിചയമുണ്ട് :

6. വാർഷിക വരുമാനം :

നമ്പർ :	വരുമാന മാർഗ്ഗങ്ങൾ	വരുമാനം (രൂപ)
1.	കൃഷി	
2.	കുലിപ്പണി	
3.	കന്നുകാലികൾ	
4.	കോഴിവളർത്തൽ	
5.	സേവനങ്ങൾ	
6.	ബിസിനസ്	
	കുടുംബത്തിന്റെ മൊത്ത വരുമാനം	

7. സാമൂഹിക പങ്കാളിത്തം :

ന :	സംഘടനയുടെ തരം	അംഗത്വം			പങ്കാളിത്തം		
		അംഗം (1)	അംഗ മല്ല (2)	ഭരണാധികാരി(3)	പതിവായി (1)	വല്ലപ്പോഴും (2)	ഒരിക്കലുമില്ല (3)
1.	പഞ്ചായത്തുകൾ						
2.	കോപ്പറേറ്റീവ് ട്രേഡിംഗ് സൊസൈറ്റികൾ						
3.	കോപ്പറേറ്റീവ് ബാങ്കുകൾ						
4.	സ്കൂൾഭരണ സമിതി						
5.	മതപരമായ സംഘടന						

8. എക്സ്റ്റൻഷൻ കോൺടാക്ട് :
ബന്ധപ്പെടുന്ന ആവൃത്തി

ന:	ഇനങ്ങൾ	പതിവായി (1)	വല്ലപ്പോഴും (2)	ഒരിക്കലും മില്ല (3)
1.	അഗ്രിക്കൾച്ചറൽ അസിസ്റ്റന്റ്			
2.	അഗ്രിക്കൾച്ചറൽ ഓഫീസർ			
3.	അസിസ്റ്റന്റ് അഗ്രിക്കൾച്ചറൽ ഡയറക്ടർ			
4.	ശാസ്ത്രജ്ഞൻ (കെ എ യു)			
5.	കൂട്ടുകാരും ബന്ധുക്കളും			
6.	ഡീലർമാർ			
7.	അഗ്രി ക്ലിനിക്കുകൾ			
8.	എൻ ജി ഒ			

9. നഗരവുമായുള്ള ബന്ധം :

- a. എത്ര പ്രാവശ്യം അടുത്തുള്ള നഗരം സന്ദർശിക്കാറുണ്ട് ?
 - i.ഒരിക്കലുമില്ല
 - ii.മാസത്തിൽ ഒരിക്കൽ
 - iii രണ്ട്ആഴ്ചയിൽ ഒരിക്കൽ
 - iv. ആഴ്ചയിൽ ഒരുവട്ടം
 - v. ആഴ്ചയിൽ രണ്ടുവട്ടം
 - vi. ആഴ്ചയിൽ രണ്ടിൽ കൂടുതൽ പ്രാവശ്യം

- b. സന്ദർശന ഉദ്ദേശം
 - i.കൃഷി ആവശ്യങ്ങൾ
 - ii. വ്യക്തിപരമായ ആവശ്യങ്ങൾ
 - iii. സാമൂഹിക ആവശ്യങ്ങൾ
 - iv. വിനോദവും മറ്റു ആവശ്യങ്ങളും

10. ബഹുജനമീഡിയ എക്സ്പോഷർ :

ന:	ഇനങ്ങൾ	എക്സ്പോഷർ		
		പതിവായി	വല്ലപ്പോഴും	ഒരിക്കലുമില്ല
1.	റേഡിയോ പരിപാടികൾ			
2.	ടെലിവിഷൻ പരിപാടികൾ			
3.	പത്രം			
4.	വിവരണ വസ്തുക്കൾ			
5.	കിസ്റ്റാൻ മേള			
6.	മൊബൈൽ ഉപയോഗം			
7.	ഇന്റർനെറ്റ്			

11. സയന്റിഫിക് ഓറിയന്റേഷൻ :

ന:	സ്റ്റേമെന്റ്	പ്രതികരണം		
		യോജിക്കുന്നു	യോജിക്കുന്നില്ല	തീരുമാനിച്ചിട്ടില്ല
1.	ഒന്നോരണ്ടോതരംവിളകൾക്യാഷിചെയ്യുമ്പോൾ, പരാജയസാധ്യതകൾകുറയ്ക്കാൻഅനവധിഎണ്ണക്യഷിചെയ്യണം			
2.	ചെറിയഎന്നാൽപരാജയസാധ്യതകുറഞ്ഞലാഭത്തേക്കാൾവലിയലാഭത്തിനുവേണ്ടി കർഷകർ ധൈര്യപെട്ടുമുന്നോട്ടുവരണം			
3.	ശരാശരിയിൽകൂടുതൽവെല്ലുവിളികൾഏറ്റെടുക്കാൻമനസ്സുകാണിക്കുന്നകർഷകർസാമ്പത്തികമായിമുൻപന്തിയിൽനിൽക്കും			
4.	വിജയസാധ്യതഉറപ്പാണെങ്കിൽകർഷകർവെല്ലുവിളികൾസ്വീകരിക്കുന്നതല്ലതാണ്			

5.	നൂതനകൃഷിരീതികൾ പരീക്ഷിക്കാൻ തയാറാക്കുന്നതിനുള്ള മറ്റുകർഷകർ പരീക്ഷിച്ചു തെളിയിത്വ സ്വീകരിക്കുന്നതാണ്			
6.	വാഴകൃഷിയിൽ തികച്ചും നൂതനമായ ഒരു സമ്പ്രദായം അപകട സാധ്യതയുള്ളതാണെങ്കിലും ശ്രമിച്ചാൽ ഫലം കിട്ടുന്നവയാണ്			

12. റിസ്ക് ഓറിയന്റേഷൻ :

ന:	സ്റ്റേറ്റ്മെന്റ്	പ്രതികരണം		
		യോജിക്കുന്നു	യോജിക്കുന്നില്ല	തീരുമാനിച്ചിട്ടില്ല
1.	വാഴകൃഷിയുടെ പഴയരീതികളെക്കാളും പുതിയരീതികൾ മെച്ചപ്പെട്ട ഫലം നൽകുന്നു			
2.	വാഴകൃഷിയിൽ ഏറെ പരിചയസമ്പത്തുള്ള കർഷകർക്ക് ശുപാർശയ്ക്കനുസരിച്ചു തുറന്നു തീരുന്ന പ്രയോഗിക്കണം			
3.	നൂതന കൃഷി സമ്പ്രദായങ്ങൾ പഠിക്കാൻ സമയമെടുക്കുമെങ്കിലും അതിനു അതിന്റെതായ ഗുണമുണ്ട്.			
4.	ഒരു നല്ല കർഷകൻ കൃഷിയിൽ പുതിയ ആശയങ്ങൾ പരീക്ഷിക്കും.			
5.	മെച്ചപ്പെട്ട ജീവിതസാഹചര്യങ്ങൾക്കു വേണ്ടി കർഷകർ തങ്ങളുടെ സാമ്പ്രദായിക രീതികളിൽ നിന്നു വിട്ടുപോകണം.			

6.	കർഷകരുടെ മുൻതലമുറകൾ സ്വകരിച്ച കൃഷിരീതികൾതന്നെയാണ് ഇന്നത്തെ കാലത്തും അഭികാമ്യം.			
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13. മാർക്കറ്റ് ഓറിയന്റേഷൻ :

ന:	സ്റ്റേറ്റ്മെന്റ്	പ്രതികരണം		
		യോജിക്കുന്നു	യോജിക്കുന്നില്ല	തീരുമാനിച്ചിട്ടില്ല
1.	വിപണി വിവരത്തെ കുറിച്ചുള്ള ധാരണ ഒരു കർഷകനെ സമ്പന്നിച്ചു വലിയ പ്രയോജനമുള്ള കാര്യമല്ല.			
2.	വിള തരംതിരിച്ചു വില്പനതിലൂടെ കർഷകന്മെച്ചപ്പെട്ടവില ലഭിക്കുന്നു.			
3.	വിലയിലുള്ള ഏറ്റകുറച്ചിൽ കണക്കിലെടുക്കാതെ കർഷകൻ തങ്ങളുടെ സമീപത്തുള്ള വിപണിയിൽ വിളകൾ വിറ്റഴിക്കണം.			
4.	മറ്റു കർഷകർ വാങ്ങുന്ന ഏറ്റവും സമീപത്തുള്ള കടകളിൽ നിന്നുഷിക്കാവശ്യമായ സാധനങ്ങൾ വാങ്ങണം			
5.	കൂടുതൽ വിപണിസാധ്യതയുള്ള ഇനങ്ങൾ കൃഷിചെയ്യണം.			

6.	വിളയുടെ സംഭരണം അവയ്ക്ക് ഭേദപ്പെട്ടവില ലഭിക്കാൻ കാരണമാകുന്നു.			
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14. ഇന്നോവേറ്റീവ്സ്:

ന:	സ്റ്റേമെന്റ്	പ്രതികരണം				
		ശക്തമായ യോജിക്കുന്നു	യോജിക്കുന്നു	തീരുമാനിച്ചിട്ടില്ല	യോജിക്കുന്നില്ല	ശക്തമായ യോജിക്കുന്നില്ല
1.	വാഴക്കൃഷിയിലെ നൂതന കൃഷിരീതികൾ പഠിക്കാൻ നിങ്ങൾക്കൊപ്പമുണ്ടോ.					
2.	വിജ്ഞാനവ്യാപന പ്രവർത്തകൻ വാഴക്കൃഷിയുടെ വിവിധതലങ്ങളെപ്പറ്റി സംസാരിക്കുകയാണെങ്കിൽ താങ്കൾ പങ്കുചേരാൻ താല്പര്യപ്പെടുമോ.					
3.	ഒരു മനുഷ്യന്റെ ഭാവി ദൈവത്തിന്റെ കരങ്ങളിലാണെന്നു താങ്കൾ വിശ്വസിക്കുന്നുണ്ടോ					
4.	താങ്കളുടെ ജീവിതത്തിൽ മാറ്റങ്ങൾ ഉണ്ടാകാൻ താങ്കൾ ആഗ്രഹിക്കുന്നുവോ					
5.	പുതിയ സാമ്പത്തിക പ്രവർത്തനങ്ങളിലേക്കുടന്നു ചെന്നുചേരാനോ നിങ്ങൾക്ക് ആഗ്രഹമുണ്ടോ					
6.	നാളെയെക്കുറിച്ച് വ്യാകുലപ്പെടാതെ ഇന്നുതോഴിയായി ജീവിക്കാനാണോ തങ്ങൾക്ക് ആഗ്രഹം					

7.	താങ്കളുടെ മകൻ ഒരു കൃഷിക്കാരൻ ആകണം എന്നാണോ താങ്കൾ താൽപര്യപ്പെടുന്ന					
8.	താൽപര്യപ്പെടുന്ന ത്യാഗയുടെ വിളവുർദ്ധിപ്പിക്കാൻ ഒരു കൃഷിക്കാരൻ നൂതന സാങ്കേതിക വിദ്യകൾ ഉപയോഗപ്പെടുത്താൻ ശ്രമിക്കണം.					

15. അചീവമെന്റ് മോട്ടിവേഷൻ :

ന:	സ്റ്റേമെന്റ്	പ്രതികരണം		
		യോജിക്കുന്നു	യോജിക്കുന്നില്ല	തീരുമാനിച്ചിട്ടില്ല
1.	ഒരു കുട്ടത്തിൽ എല്ലായ്പ്പോഴും മറ്റുള്ളവരെക്കാൾ മുന്നിട്ടുനിൽക്കാനാണ് ഒരാൾ ശ്രമിക്കേണ്ടത്			
2.	അഭിവൃദ്ധി കൈവരിക്കാൻ പുതിയ പാടവങ്ങൾ കരസ്ഥമാക്കേണ്ടതില്ല, മുമ്പേയുള്ള അറിവുതന്നെ ധാരാളമാണ്.			
3.	കർത്തവ്യം ആയാസമുള്ളതാണെങ്കിലും അതുനിറവേറ്റാനുള്ള ദൃഢനിശ്ചയവും തീവ്രമായ അഭിലാഷവുമാണ് ഒരാൾക്കേണ്ടത്.			
4.	മെച്ചപ്പെട്ട ജീവിതത്തിനായുള്ള കഠിനപ്രയത്നമെല്ലാം വ്യർത്ഥമായ കാര്യങ്ങളാണ്.			
5.	അടിസ്ഥാനപരമായ മാനുഷികവിപത്ത് എന്തെന്നാൽ മനുഷ്യൻ തീരുമാനിക്കുന്നു പക്ഷെ ദൈവം നിർണ്ണയിക്കുന്നു			

6.	അവനവനുവേണ്ടി കഠിനമായ ലക്ഷ്യങ്ങൾ ചിട്ടപ്പെടുത്തി അവകൈയെത്തി പിടിക്കാൻ ശ്രമിക്കണം			
7.	മനുഷ്യ ജീവിതത്തിൽ നടക്കുന്ന ഓരോ അനുഭവങ്ങളും കാലേക്കുട്ടി നിശ്ചയിക്കപ്പെട്ടതും അവൻ്റെ വിധിയായി നിർണ്ണയിക്കപ്പെട്ടതുമാണ്			
8.	വിശ്രമം ലഭിച്ചില്ലെങ്കിലും ജോലി ചെയ്യുന്നതിനായിരിക്കണം നമ്മൾ മുൻഗണന നൽകേണ്ടത്			

പാർട്ട് ബി

a. വാഴ കൃഷിയുടെ പരിശീലന മേഖലകൾ (അറിവ്)

ന:	വാഴ കൃഷിയുടെ പരിശീലന മേഖലകൾ (അറിവ്)	ഏറെ ആവശ്യം	ആവശ്യം	കുറച്ചു ആവശ്യം
I.	വാഴകൃഷിയ്ക്ക് അനുയോചിതമായ കാലാവസ്ഥ 1. മണ്ണ് ഇനം 2. താപനില 3. ആപേക്ഷിക ആർദ്രത 4. സമുദ്രനിരപ്പ് 5. കാലം			
II.	നിലമൊരിക്കൽ 6. നടാനുള്ള കുഴിയെടുക്കൽ 7. കുഴിയുടെ വലുപ്പം 8. റോട്ടോവേറ്ററിനെ ഉപയോഗം			
III.	കന്നുനടിയൽ 9. അനുയോജ്യമായ വാഴ ഇനങ്ങൾ (നേന്ദ്രൻ, പൂവൻ, പാളയങ്കോടൻ, ചെങ്കുളി, ഞാലിപ്പൂവൻ, മൊന്തൻ) 10. കന്നിനെ ഇനം 11. കന്നു തിരഞ്ഞെടുക്കൽ 12. കന്നു തയ്യാറാക്കൽ 13. നടയിൽ രീതി 14. ഹൈഡ്രോസിറ്റി നടിയൽ			

IV	<p>പോഷണം</p> <p>15. ജൈവവളം</p> <p>16.നിർദ്ദേശിക എൻ . പി .കെ (100 -200 - 400 ഗ്രാം /വാഴ /വർഷം)</p> <p>17. വളം ഇടുന്ന രീതി</p> <p>18.വളം ഇടുന്ന സമയം</p> <p>19.തുളളി നനയിലൂടെയുള്ള (ദ്രാവകവളത്തിന്റെ ഉപയോഗം</p> <p>20. തത്സമയപച്ചവളം</p> <p>21. സൂക്ഷ്മമൂലകങ്ങളുടെ ഉപയോഗം</p> <p>22. ജീവാണുവളത്തിന്റെ ഉപയോഗം</p> <p>23. വിളവെടുപ്പിനു മുമ്പുള്ള വഴക്കുലയിലെ വിവിധ തളികൾ</p> <p>24.വഴക്കുലയിലെ ഹോർമോൺ പ്രയോഗം</p>			
V.	<p>ജലനിയന്ത്രണ രീതി</p> <p>25. വാഴകൃഷിയിലെ ജലസേചനത്തിന്റെ എണ്ണം</p> <p>26. ജലസേചനത്തിന്റെ ഇടവേള</p> <p>27. ജലസേചനരീതി</p> <p>28. തുളളിനനയുടെ രീതികൾ</p>			
VI.	<p>കൃഷി പരിപാലന പ്രക്രിയകൾ</p> <p>29. പുതയിടൽ</p> <p>30. വശങ്ങളിലെ പുതുതായി മുളച്ച കന്നുകൾ മുറിച്ചുമാറ്റൽ</p> <p>31.താങ്ങുകൊടുക്കൽ</p> <p>32. കുല പൊതിയൽ</p> <p>33.കളനാശിനിയുടെ ഉപയോഗം</p> <p>34.ഇടവിളകൾ (ചീര ,ചേന , വെള്ളരിക്ക)</p> <p>35.നിലം നിരത്തലും, മണ്ണിട്ടുമൂടലും</p>			
VII.	<p>വിളസംരക്ഷണം</p> <p>36. പ്രധാന രോഗങ്ങളുടെ നിർണ്ണയം</p> <p>37. പ്രധാന കീടങ്ങളുടെ നിർണ്ണയം</p> <p>38.രോഗകീടനിയന്ത്രണം</p>			

VIII.	<p>ജൈവവകുപ്പിരീതികൾ</p> <p>39. നിർദ്ദേശിക മൂലകങ്ങളുടെ ഉപയോഗം</p> <p>40. നിർദ്ദേശിക രോഗകീടനിയന്ത്രണ രീതികളുടെ ഉപയോഗം</p> <p>41. ജൈവ ഉല്പന്നങ്ങളുടെ സാക്ഷ്യപ്പെടുത്തൽ</p>			
IX.	<p>വിളവെടുപ്പ്</p> <p>42. സമയം, രീതി</p>			
X.	<p>വിളവെടുപ്പിനുശേഷം</p> <p>43. തരംതിരിക്കൽ</p> <p>44. സംഭരണം</p> <p>45. പൊതിയല്</p> <p>46. ഗതാഗതം</p> <p>47. വിപണനം</p>			

b. വാഴ കൃഷിയുടെ പരിശീലന മേഖലകൾ (പാടവം)

ന:	വാഴ കൃഷിയുടെ പരിശീലന മേഖലകൾ (പാടവം)	ഏറെ ആവശ്യം	ആവശ്യം	കുറച്ചു ആവശ്യം
I.	<p>നിലമൊരിക്കൽ</p> <p>1. നടാനുള്ള കുഴിയെടുക്കൽ</p> <p>2. ഡ്രിപ്പ് സിസ്റ്റം (തുളളിനന) സ്ഥാപിക്കല്</p> <p>3. ചാലുകളുടെ നിർമ്മാണം</p>			
II.	<p>കന്നുനടിയൽ</p> <p>4. ആരോഗ്യമുള്ള കന്നു തിരഞ്ഞെടുക്കൽ</p> <p>5. കന്നുതയ്യാറാക്കൽ</p> <p>6. നടയിൽ രീതി</p> <p>7. ഹൈഡ്രോസിറ്റി നടിയൽ</p>			
III.	<p>പോഷണം</p> <p>8. മണ്ണു പരിശോധനക്ക് അധിഷ്ഠിതമായ വള പ്രയോഗം</p>			

	<p>9. വളം ഇടുന്ന രീതി</p> <p>10. തുള്ളി നനയിലൂടെയുള്ള വള പ്രയോഗം</p>			
IV.	<p>ജലനിയന്ത്രണ രീതി</p> <p>11. തുള്ളിനനയിലെ യന്ത്രവൽക്കരണം</p> <p>12. നിർണ്ണായക ഘട്ടങ്ങളിലെ ജലസേചനം</p>			
V.	<p>കൃഷി പരിപാലന പ്രക്രിയകൾ</p> <p>13. വശങ്ങളിലെ പുതുതായി മുളച്ച കന്നുകൾ മുറിച്ചുമാറ്റൽ</p> <p>14. ഊന്നു കൊടുക്കൽ</p> <p>15. കളനാശിനികളുടെ തയ്യാറാക്കലും ഉപയോഗവും</p> <p>16. നിലം നിരത്തലും, മണ്ണിട്ടുമൂടലും</p>			
VI	<p>വിളസംരക്ഷണം</p> <p>17. കീടനാശിനികളുടെ തയ്യാറാക്കലും ഉപയോഗവും</p> <p>18. കീടനാശിനികളുടെയും കുമിളനാശിനികളുടെയും കൈകാര്യം ചെയ്യൽ</p> <p>19. സസ്യ സംരക്ഷണ ഉപകരണങ്ങളുടെ പരിപാലനം</p>			
VII.	<p>ജൈവ കൃഷി രീതികൾ</p> <p>20. ജൈവ വളങ്ങളോടുകൂടിയ കന്നുതയ്യാറാക്കൽ</p> <p>21. ബയോ കണ്ട്രോൾ ഏജൻ്റിന്റെ ഉപയോഗം</p> <p>a. ബ്യൂവേറിയ</p> <p>b. ട്രൈക്കോഡർമ</p> <p>c. സ്യൂഡോമോണാസ്</p> <p>22. സസ്യ സംബന്ധമായ കീടനാശിനികൾ</p> <p>23. പോഷകങ്ങൾ നൽകുന്നതിന്റെ രീതി</p> <p>24. നിർദ്ദേശിത രോഗകീട നിയന്ത്രണ മാർഗങ്ങളുടെ ഉപയോഗം</p> <p>25. ജൈവ സാക്ഷ്യപ്പെടുത്തലിന്റെ സമ്പ്രദായങ്ങൾ</p>			

VIII.	വിളവെടുപ്പിനുശേഷം 26. തരംതിരിക്കൽ 27. സംഭരണം 28. പൊതിയല് 29. ഗതാഗതം 30. വിപണനം			
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പാർട്ട് സി

വാഴക്കൃഷിയിലെ നിർദ്ദേശിക പ്രവൃത്തികളുടെ അനുവർത്തനം

ന:	നിർദ്ദേശിക പ്രയോഗം	അനുവർത്തനം		
		മുഴുവനായ	ഭാഗികമായ	ഇല്ല
I.	കന്നുനടിയൽ 1. അനുയോജ്യമായ വാഴ ഇനങ്ങൾ (നേന്ദ്രൻ, പൂവൻ, പാളയങ്കോടൻ, ചെങ്കുളി, ഞാലിപ്പൂവൻ, മൊന്തൻ) 2. കന്നുതച്ചാരാക്കൽ (ബ്രാവിസ്റ്റിൻ 0.1%) 3. ഹൈഡ്രെൻസിറ്റി നടിയൽ (5000 വാഴകൾ/ഹെക്ടർ)			
II.	പോഷണം 1. മണ്ണു പരിശോധനക്ക് അധിഷ്ഠിതമായ വളപ്രയോഗം 2. നിർദ്ദേശിക എൻ . പി . കെ (100 -200 -400 ഗ്രാം /വാഴ /വർഷം) 3. വളം ഇടുന്ന രീതി(രണ്ടു തവണകളായി) 4. വളം ഇടുന്ന സമയം (രണ്ടു മാസത്തിനു ശേഷവും നാലു മാസത്തിനു ശേഷവും) 5. തുള്ളി നനയിലൂടെയുള്ള ദ്രാവകവളത്തിന്റെ ഉപയോഗം 6. തത്സമയപച്ചവളം (പയർ) 7. സൂക്ഷ്മമൂലകങ്ങളുടെ ഉപയോഗം (സിങ്ക് സൾഫേറ്റ്, 0.5 %, കോപ്പർ സൾഫേറ്റ്, 0.2%) 8. ജീവാണുവളത്തിന്റെ ഉപയോഗം(റൈസോ ബാക്ടീരിയ, അസെറ്റോബാക്ടർ) 9. വിളവെടുപ്പിനു മുമ്പുള്ള വഴക്കുലയിലെ വിവിധ തളികൾ (പൊട്ടാസിയം സൾഫേറ്റ്, 3%) 10. വഴക്കുലയിലെ ഹോർമോൺ പ്രയോഗം (എത്തിലെൻ, എൻ എ എ)			

III.	കൃഷി പരിപാലന പ്രക്രിയകൾ 1.പുതയിടൽ (വൈക്കോലി) 2.വശങ്ങളിലെ പുതുതായി മുളച്ച കന്നുകൾ മുറിച്ചുമാറ്റൽ 3.താങ്ങുകൊടുക്കൽ (മുള കമ്പ്) 4.കുല പൊതിയൽ (പ്ലാസ്റ്റിക് കവർ) 5.കളനാശിനിയുടെ ഉപയോഗം (ഗ്ലൈഫോസേറ്റ് 0.4 കിലോ / ഹെക്ടർ) 6.ഇടവിളകൾ (ചീര ,ചേന , വെള്ളരിക്ക)			
IV.	വിളസംരക്ഷണം 1.രോഗങ്ങളും കീടങ്ങളും നിയന്ത്രിക്കാനുള്ള നടപടികൾ			
V.	ജൈവ കൃഷി രീതികൾ 1.ചാണകം (10 കിലോഗ്രാം ഒരു കുഴിയിൽ) 2.മണ്ണിരകമ്പോസ്റ്റ് (2 കിലോഗ്രാം ഒരു കുഴിയിൽ) 3.വേപ്പിൻപിണ്ണാക്ക് (1 കിലോഗ്രാം ഒരു കുഴിയിൽ) 4.പിജിപിത്തർ മിക്സ് (50 -100 ഗ്രാംഒരുകുഴിയിൽ) 5.പഞ്ചഗവ്യം 3 % ഇലകളിൽ മൂന്നും , ആറും, ഒന്നുതും മാസം പ്രായത്തിൽ തളിക്കുക 6.കന്നു നടുന്നതിനുമുമ്പ് ചാണകത്തിൽ മുക്കുക 7.വാഴത്തടയ്ക്ക് ചുറ്റും ചെളി തുടച്ചുണക്കുക 8.നന്മ, മേന്മ എന്നിവയുടെ ഉപയോഗം 9.ഇല കരിച്ചിൽ രോഗം തടയാനായ് 1% ബോർഡോ മിസ്റ്ററിന്റെ തളി 10.തടതുരപ്പൻ പുഴുവിനെതിരെയുള്ള ബ്യൂവേറിയ ബസ്സിനയുടെ ഉപയോഗം (സ്പോർസ് / മില്ലി ലിറ്റർ) 11.മാണവണ്ടിനെതിരെയുള്ള ട്രൈക്കോഡെർമയുടെ ഉപയോഗം(1:100, ജൈവ വളവുമായി) 12.മാണവണ്ടിനെ നിയന്ത്രിക്കാനായി സൂഡോമോണസിൽ(3%) കന്നുകൾ നടുന്നതിനുമുമ്പു 30 മിനിറ്റു മുക്കിവയ്ക്കുക 13.വേപ്പെണ്ണ മിശ്രിതം (3%) ചെളിയിൽ ചേർത്ത് വാഴത്തടയ്ക്ക് ചുറ്റും തുടച്ചുണക്കുക 14. വാഴത്തടയ്ക്ക് ചുറ്റും നീം അസൽ (1%) തളിക്കുക			
VI.	വിളവെടുപ്പിനുശേഷം 1.തരം തിരിക്കൽ 2. സംഭരണം 3.പൊതിയല്			

പാർട്ടി ഡി

പരിശീലനവുമായി ബന്ധപ്പെട്ടു നിങ്ങളുടെ നിർദ്ദേശങ്ങൾ രേഖപ്പെടുത്തുക.

1. ഏതുതരം പരിശീലനമാണ് താല്പര്യപ്പെടുന്നത്?

- i. സ്ഥാപനസംബന്ധിയായ ()
- ii. സ്ഥാപനസംബന്ധിയല്ലാത്ത ()

2. പരിശീലന സംഘത്തിലെ അംഗങ്ങളുടെ എണ്ണം എത്ര ആകണമെന്നാണ് അഭിപ്രായം ?

- i. പത്തിനുംതാഴെ അംഗങ്ങൾ ()
- ii. 10 - 20 അംഗങ്ങൾ ()
- iii. 21 -30 അംഗങ്ങൾ ()

3. എത്രയാകണം പരിശീലനത്തിന്റെ കാലയളവ് ?

- i. ഒരു ദിവസത്തെ പരിശീലനം ()
- ii. രണ്ടു ദിവസങ്ങളുടെ പരിശീലനം ()
- iii. മൂന്നു ദിവസങ്ങളുടെ പരിശീലനം ()
- iv. ഒരു ആഴ്ചത്തെ പരിശീലനം ()

4. ഏതു സമയത്താണ് പരിശീലനം ആവശ്യമായെന്നുണ്ട് ?

- i. നടന്ന സമയത്ത് ()
- ii. വാഴ വളരുന്ന സമയത്ത് ()
- iii. രോഗകീടനിയന്ത്രണം ()
- iv. വിളവെടുപ്പിനുശേഷം ()

5. ഏതു പരിശീലന രീതിയാണ് താല്പര്യപ്പെടുന്നത് ?

- i. പ്രദർശനവും സംവാദവും ()
- ii. പ്രകടനവും പഠനയാത്മ ()
- iii. ദൃശ്യ-ശ്രവ്യസഹായികളി ()
- iv. പര്യടനം ()