PERCEIVED USEFULNESS AND CONTENT ANALYSIS OF POST GRADUATE THESES IN AGRICULTURE: THE CASE OF COLLEGE OF AGRICULTURE, VELLAYANI

by

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(2017-11-116)

THESIS

Submitted in partial fulfilment of the

requirement for the degree of

MASTER OF SCIENCE IN AGRICULTURE

Faculty of Agriculture

Kerala Agricultural University, Thrissur

DEPARTMENT OF AGRICULTURAL EXTENSION

COLLEGE OF AGRICULTURE

VELLAYANI, THIRUVANANTHAPURAM-695 522

KERALA, INDIA

2019

DECLARATION

I, hereby declare that this thesis entitled **"PERCEIVED USEFULNESS AND CONTENT ANALYSIS OF POST GRADUATE THESES IN AGRICULTURE: THE CASE OF COLLEGE OF AGRICULTURE, VELLAYANI"** is a bonafied record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

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CERTIFICATE

Certified that this thesis entitled **"PERCEIVED USEFULNESS AND CONTENT ANALYSIS OF POST GRADUATE THESES IN AGRICULTURE: THE CASE OF COLLEGE OF AGRICULTURE, VELLAYANI"** is a record of research work done independently by Ms. Deinichwa Dkhar (2017-11-116), under my guidance and supervision and it has not previously formed the basis for the award of any degree, fellowship or associate ship to her.

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ACKNOWLEDGEMENTS

I humbly bow my head before the most merciful "Lord Almighty" who through his uncountable blessings and support made this venture a success.

I take this opportunity to expressed my deep sense of gratitude to my Major Advisor, ***Dr. Allan Thomas, Assistant Professor (Sel. Gr),*** *Department of Agricultural Extension for his meticulous planning, sustaining encouragement, worthy suggestions, whole hearted support, incessant bearance and above all his humanitarian affection and parental care that touched me the most and memories of which I'll treasure throughout my life. I'll always be extremely thankful to him for the trust and confidence he has shown in me and my capabilities.*

I would like to express my sincere gratitude to ***Dr. B. Seema, Professor and Head,*** *Department of Agricultural Extension and member of my advisory committee, for her willing help and judicious guidance throughout the entire period of my research.*

I thank ***Dr. Anil Kumar, Professor,*** *Department of Agricultural Extension and Dean, Faculty of Agriculture Vellayani and member of my advisory committee for his help throughout the completion of this thesis.*

I thank ***Dr. Brigit Joseph,*** *Professor and Head, Department of Agricultural Statistics and member of my advisory committee for her guidance and suggestions during statistical analysis that contributed to the final shape of this work.*

I wholeheartedly acknowledge of ***Dr. Vijayaraghava Kumar,*** *retired Professor and Head, Department of Agricultural Statistics and Research Co-ordination for his valuable suggestions and remarks during the course of thesis preparation.*

I am extremely thankful to all the member of teaching staff of Department of Agricultural Extension, namely, ***Late Dr. N. Kishore Kumar, Dr. A. K. Sherief,***

and Dr. G. S. Sreedaya *for their suggestions and remarks provided at every stage of my work and research.*

My wholehearted thanks to the library staff and all the non-teaching staff of Department of Agricultural Extension for their unfailing support rendered during my years of study and research.

I deeply extent my gratitude to the authorities of Kerala Agricultural University for the financial help provided during their research.

I gratefully acknowledge my senior Surajya, Nithish, Mithra, Lakshmi, Shilpa, Elizabeth and Reshma for all their help and guidance and advices rendered to me.

My wholehearted thanks to my classmates Greeshma, Geethu, Pooja, Safna, Chhanda Charan, Vinod, Santhosh, Alan and Sreenath for their help and support during the years of my study.

I am deeply indebted to all the respondents who whole-heartedly participated in my study.

Mere words alone cannot express my gratitude to the wonderful beings who created me, my parents ***Shri. Ram Samati and Smt. Paiadakawan Dkhar****, my brother, my sister, my cousins, my uncles, my aunts, my grandparents and all my closest friends for being besides me in all my ups and downs. Their unconditional love, prayers, care and encouragement were the prime factors that kept me in good spirits during the course of my study.*

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Date: 27/08/2019

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LIST OF ABBREVIATIONS

%	:	Per cent
A	:	Aided Private
AAU	:	Anand Agricultural University
AEDS	:	Agricultural Extension and Development Studies
AES	:	Agro- Economic Studies
AESBM	:	Agricultural Economics, Agricultural Statistics and Agribusiness Management
AICRPs	:	All India Coordinated Research Projects
AIS	:	Agriculture Information System
AMP	:	Aromatic and Medicinal Plants
ANCOVA	:	Analysis of Co Variance
ANOVA	:	Analysis of Variance
APA	:	American Psychological Association
ATMA	:	Agricultural Technology and Management Agency
BBPP	:	Biotechnology, Biochemistry and Plant Physiology
BO	:	Beneficial Organisms
BT	:	Bio-Technology
BZU	:	Bahauddin Zakariya University
CLC	:	College Level Council
COP	:	Coconut and Other Palms
CPB	:	Crop Physiology and Biochemistry
CPBI	:	Crop Pest and Beneficial Insects
CRD	:	Completely Randomized Design
DMRT	:	Duncan's Multiple Range Test
DP	:	Diploma Programme

Ed. S	:	Education Specialist Degree
et al.	:	and co -workers/ co –authors
etc.	:	Et-cetera
f	:	Frequency
FC	:	Field Crops
FGM	:	Forage and Green Manure Crops
Fig.	:	Figure
FL	:	Floriculture
FR	:	Fruits
FRC	:	Faculty Research Council
FSN	:	Food Science and Nutrition
FSRCS	:	Farming System Research and Climate Studies
G	:	Government
GAO	:	General Accounting Office
Gen	:	General
GIS	:	Geographic Information System
GS	:	Gender Studies
i.e.	:	That-is
IARI	:	Indian Agricultural Research Institute
ICAR	:	Indian Council of Agricultural Research
ICT	:	Information and Communication Technologies
IFS	:	Integrated Farming System
IIMC	:	Indian Institute of Mass Communication
IJEE	:	Indian Journal of Extension Education
ITK	:	Indigenous Technical Knowledge
JAC	:	Journal of Applied Communications

JOE	:	Journal of Extension
KAU	:	Kerala Agricultural University
KVK	:	Krishi Vigyan Kendras
M. Ed.	:	Master of Education
M. Sc.	:	Master of Science
Max	:	Maximum
Min	:	Minimum
NARS	:	National Agricultural Research System
NDRI	:	National Diary Research Institute
NGOs	:	Non-Governmental Organizations
NRM	:	Natural Resource Management
OBC	:	Other Backward Classes
OF	:	Organic Farming
PBG	:	Plant Breeding and Genetics
PBT	:	Plant Biotechnology
PC	:	Project Coordination
PCS	:	Plantation Crops and Spices
PF	:	Pomology and Floriculture
PG	:	Post Graduate
PhD	:	Doctor of Philosophy
PHT	:	Post-Harvest Technology
PHTAV	:	Post-Harvest Technology and Value Addition
PI	:	Principal Investigator
POS	:	Pulses and Oilseeds
PP	:	Plant Protection
PPBM	:	Plant Pathogens and Beneficial Microbes

R	:	Rice
RBC	:	Rice and Rice Based Cropping System
RBD	:	Randomized Block Design
RC	:	Research Co-ordination
SA	:	Soils and Agronomy
SAUs	:	State Agricultural Universities
SC	:	Schedule Caste
SD	:	Standard Deviation
SE	:	Standard Error
SHG	:	Self Help Group
SHOF	:	Soil Health and Organic Farming
SPC	:	Spices and Plantation Crops
SSAC	:	Soil Science and Agricultural Chemistry
ST	:	Schedule Tribes
STC	:	Sugar and Tuber Crops
UP	:	Unaided Private
URL	:	Uniform Resource Locator
Veg	:	Vegetables
viz.	:	Namely

INTRODUCTION

CHAPTER I

INTRODUCTION

"Put your heart, psyche and soul into even your diminutive acts. This is the clandestine of success"

-Swami Sivananda

"Striving for achievement while not toil is like making an attempt to reap wherever you haven't planted"

-David Bly

Agriculture as the cornerstone of Indian economy plays a pivotal role in uplifting the socioeconomic realm of the country. Indian agriculture is miscellaneous and extensive sector involving a large number of actors. The main pioneer for agricultural research in India was the establishment of Indian (originally known as Imperial) Agricultural Research Institute (IARI) in 1905 at Pusa, Bihar. Due to massive earthquake, the institute was later shifted to Pusa, New Delhi in 1936.Since independence, IARI was considered as the premier national institutes for agricultural research, education and extension and it was a contributory in 1960-70 green revolutions. The Indian (formerly known as Imperial) Council of Agricultural Research (ICAR) was established on 16 July 1929 as a registered society under the Societies Registration Act, 1860 upon fulfillment of the recommendation of the Royal Commission on Agriculture. Thenceforth, it was one of the largest networks of agricultural research and education institutes in the world and also an autonomous body responsible for aiding, promoting and coordinating agricultural education and research in India.

The agrarian research framework in India incorporates around 27,500 scientists and more than one lakh supporting staff effectively engaged with farming examination, which makes it the biggest and institutionally, the most multifaceted research system in the world (Borthakur and Singh, 2012). Newcomb (1993) identified the need to transform university agricultural education programs and also encouraged implementation of a different approach to research in

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agricultural education to include a defined program of inquiry. The research and education accountabilities at the state level rest with the State Agricultural Universities (SAUs) that were established in India as an integral part of the National Agricultural Research System (NARS) mainly to give the much needed impetus to Agriculture Education and Research in the country. Thus, Kerala Agricultural University (KAU) was established on 24th February 1971. In consistence with the arrangement of KAU Act of 1971, the Agricultural College and Research Institute at Vellayani which was started in 1955 by the erstwhile Government of Travancore-Cochin were brought under the Kerala Agricultural University.

Kerala Agricultural University focuses its strategy on synergizing multi-disciplinary education and strengthening problem specific research, relevant to the state and aims at overall development of all agriculture related institutions. Such is the importance of research and one of its major components is post-graduation research. Therefore, a study was essential to comprehend the pattern of agricultural research that will enable to identify, scientifically document and publish the contribution of KAU made to the agrarian society through PG research. Hence, this study on content analysis is of great importance.

According to Edgar (2007) the research examines dimensions of agricultural education and suggests strategies to focus on the discipline. The implications of this study on qualitative content analysis will be reckoning as it will draw attention to past, present, and future research in agricultural education *via* a holistic approach. The study will definitely throw light to the overall contribution made through PG research as well as it will enable to identify the constraints faced by the PG scholars and scientists during the conduct of their PG research.

The detailed study on "Perceived usefulness and content analysis of Post Graduate theses in Agriculture: The case of College of Agriculture, Vellayani" was undertaken to identify the trends of post graduate (PG) research, gaps in

research themes, pattern of post graduate studies in terms of different attributes like number of words in title, research design, statistical tools used, crops or area focused and other content of the theses, personal and social characteristics of teachers and students with the following objectives.

- To find out the perceived usefulness
- To analyze the pattern of Post Graduate research (PG) studies on its contents, related parameters and trend of the identified thrust area for PG research.
- To explore and analyze the constraints and opinions for future refinement as perceived by the teachers and students in the conduct of post-graduate research.

1.1 PURPOSE OF THE STUDY

The main purpose of the study was to conduct a comprehensive review of the research published in all departments from 2012 to 2017 to critically examine the status of the departments. Findings of the study may have wider implications on types of researches being carried out and the methodologies used and provide basis from which to direct future research.

The primary purpose of the study was to determine the research themes frame by the University for Post Graduates Research in agriculture from 2008 to 2017 and to identify the touched and untouched thrust areas as well as the gaps in research themes. The secondary purpose of the study was to find out the perceived usefulness and attitude of students towards research as well as the constraints faced during research.

1.2 LIMITATIONS OF THE STUDY

The study was limited only for a particular period of time focusing on 287 post graduate (PG) theses published from 2012 to 2017. Hence, the results cannot be generalized on the basis of the limited standard of research study. The analysis

could have achieved more depth if the results are compared with other colleges within the university or with other similar universities. However, due to paucity of time the study has been restricted to only one college. In spite of all the limitations, the researchers took every effort to conduct the study in a systematic manner to make the research objectives reliable.

1.3 ORGANISATION OF THE THESIS

The detailed report of the study is presented in five chapters:

The first chapter is 'introduction' and it explains about the importance of the topic, objectives, purpose and limitation of the study. Second chapter, 'review of literature' deals with the investigation that includes the previous works and findings in accordance with the objective of study. Third chapter 'methodology' designates the sampling design, the study area, measurement of content pattern, main variables, personal and social characteristics, method of data collection and statistical tools used. Fourth chapter 'results and discussion' explains the results of the study with inferences and the 'summary' chapter which is the final one, summarises the salient findings of the work that is done and explains the implications based on the results of the study. At the end, the references, abstract and appendices of the thesis are given.

REVIEW OF LITERATURE

CHAPTER-II

REVIEW OF LITERATURE

Theoretical orientation is a perquisite for any research. In any precise analysis, an extensive review of literature is necessary as it gives knowledge of work that has already been done in the field and also provides insight into method and procedure. It is also a basis for operational definition of major concepts and interpretation of findings. Literature that has been reviewed may have direct or indirect impact on the study. It is also worth indicating that this study encompasses the review that is unique and there is only very few literature addressing this research on content analysis of postgraduate dissertation of State Agricultural Universities (SAUs). Hence, reviews were built on related works mainly focussing on general related theme, published research journal articles and research work on specific topics or disciplines, which too were limited.

The review has been divided under the following heads for better clarity and understanding.

2.1 Content analysis- meaning and concept
2.2 Genesis of PG research
2.3 Purpose and use of content analysis
2.4 Methods and analysis in content analysis
2.5 Areas and trends in PG research
2.6 Operationalization and measurement of content patterns of post graduate research studies in terms of different attributes
2.7 Operationalization and measurement of main variables
2.8 Operationalization of personal and social characteristics of students and teachers
2.9 Operationalization of other variables as perceived by both students and teachers
2.10 Challenges encountered by student researchers

2.1 CONTENT ANALYSIS-MEANING AND CONCEPT

The meaning and concept of content analysis varies with different authors. As indicated by Berelson (1952) content analysis is a research procedure for the objective, organized, and quantifiable description of the manifest content of communication. According to Holsti (1968) it is any technique for making inferences by systematically and objectively identifying specified characteristics of messages.

Content signifies what is contained and content analysis is the examination of what is contained in a message. Comprehensively content analysis might be viewed as a strategy where the content of the message forms the basis for drawing inferences and conclusions about the content (Nachmias and Nachmias, 1976). Further, content examination falls in the interface of observation and document analysis. Kerlinger (1986) portrayed content analysis as a technique of studying and examining communication in a precise, objective, and quantitative way to quantify factors. Subsequently, it is moreover considered as an unnoticeable or non-responsive method for social research.

Content analysis is a research technique for making replicable and valid inferences from textual data to their context. Researchers often use this technique to examine texts in a way that provides knowledge, new insights, representation of facts, and practical guide to action (Krippendorff, 1980). According to General Accounting Office (GAO) (1989), content analysis is a set of measures for collecting and organizing information in a consistent format that allows analysts to make implications about the characteristics and connotation of written and other recorded material.

Content analysis as a research method existed for decades and the best content-analytic studies use both qualitative and quantitative operations (Weber, 1990). It also allowed an inconspicuous appraisal of texts that is also susceptible

to the effects of research biased, which can affect decisions made in the collection, analysis, and interpretation of data (Kolbe and Burnett, 1991).

As per Duriau *et al.* (2007) content analysis is an overarching apparatus for examining patterns and other related parameters. Content analysis is all about making valid, replicable and objective inferences about the message on the basis of explicit rules conforming to the three basic principles of scientific method *viz.* objectivity, systematic and generalizability (Prasad, 2008 and O'Leary, 2014).

Much of the time, content analysis constantly includes coding of the objective word-based information which is vital to qualitative data analysis (Drisko and Maschi, 2016), and subsequent synopsis and examination of the coded content. The qualities and intentions of the authors can be derived from the data which may uncover underlying themes and associations. For many neophyte researchers, examining qualitative data is found to be unpredictably puzzling and time-consuming (Erlingsson and Brysiewicz, 2017).

Giving due consideration to the aforesaid reviews content is operationalized as text matter with information of a document or publication in any form and content analysis gives an account to the sum total of the newness, readability, relevancy, perceived usefulness of the information and the way in which it is presented.

2.2 GENESIS OF PG RESEARCH

Agricultural research in India

Historically as expressed by Borthakur and Singh (2012), Indian agricultural research system is the peak of a process which begins in the 19th century and which brought about the foundation of Imperial (presently Indian) Council of Agricultural Research (ICAR) on the suggestions of a Royal Commission on Agriculture in 1929. From that point onward there was a marvelous advancement of agricultural research in India. The council was

hypothetical to guide the research deeds of central and regional department of agriculture as per the proposal of the royal commission on agriculture, the Government of India set up imperial council of agriculture research on 16th July, 1929. The name of the council was changed from Imperial Council of Agriculture Research to ICAR in March 1947.

As demonstrated by Singh (2001) the headliners in the historical backdrop of agricultural research in India is the establishment of agriculture departments and agriculture colleges; establishment of the imperial council of agricultural research; initiation of commodity committees; project for intensification of regional research on cotton, oilseeds and millets; initiation of all India coordinated crop improvement projects; reorganization of ICAR and the development of agricultural universities. Among these, first three could be listed under the development of agriculture in the colonial era, whereas the next four were prominent in the post-colonial era.

The more prominent accentuation given to the agrarian research could be set up by the way that the framework guided by the ICAR now has 64 ICAR institutes, 60 All India Coordinated Research Projects (AICRPs) and 19 National Projects, 15 National Research Centers, 6 National Bureaux, 13 Project Directorates, 706 Krishi Vigyan Kendras (KVK), 4 Deemed Universities, 3 Central Agricultural University and 64 State Agricultural Universities (SAUs).

Agricultural research in Kerala

The antiquity of agricultural education in Kerala can be traced back to the year 1896 when a plan was advanced in the former Travancore state to train a few young men in scientific agriculture at the Demonstration Farm in Karamana, Thiruvananthapuram. In 1922, agriculture was introduced as a discretionary subject in the Middle School classes in the State when an Agricultural Middle School was started at Aluva in Ernakulam District. The reputation and expediency of this School direct to the beginning of similar institutions at Kottarakkara and

Konni in 1928 and 1931 respectively. When the University of Travancore was formed, a plan was proposed for organizing a Diploma course (1939). Agriculture was later presented as an elective subject for Intermediate course in 1953. No momentous head way made until 1955. In 1955, the earlier Government of Travancore, Cochin started an Agricultural College at Vellayani, which was later, brought under the Government Department of Agriculture. The Randhawa Commission constituted by the ICAR, recommended the establishment of Agricultural Universities. The need for establishing at least one Agricultural University in each state was stressed by the second National Education Commission (1964-66) headed by Dr. D. S. Kothari. As a result, the Kerala Agricultural University (KAU) was established and started functioning from 1st February 1972. Among the Agricultural Universities, KAU is the only one of its kind in Kerala. With its establishment the agricultural education and research in the state entered a new phase.

The Kerala Agricultural University (KAU) came into existence on 24th February 1971, under the Kerala Agricultural University Act 1971. Later, on February 1st 1972 the existing two educational and 21 research institutions were brought under one umbrella for encouraging the sustainable and quickened advancement of agriculture in the State and were managed by the Departments of Agriculture and Animal Husbandry of the Government of Kerala (Randhawa, 1963).

A well-established agricultural research institutional framework with balance region distribution is the strength of the Kerala's agriculture.

2.3 PURPOSE AND USE OF CONTENT ANALYSIS

The several purpose of content analysis as described by Berelson (1952) in his book "Content analysis in communication research" was to designate the characteristics of content, to make implications about the causes of content and to make interpretations about the effect of content.

Mitchell (1967) focuses mainly on the use of content analysis of articles, newspapers, or other types of communication data for explanatory rather than descriptive purposes.

According to Holsti (1969) the purpose of content analysis is to make inferences about the antecedents of communications, to describe and make inferences about the characteristics of communications and to make inferences about the consequences of communications.

In order to understand the changing cultural symbols, Taviss (1969) content analyzed popular fiction in the 1900s and the 1950s to test the hypothesis that social alienation has been decreasing in middle class American society, while self-alienation has been increasing. Chai (1978) studied the political conflict in Red China following the death of Mao Tse-tung in 1976, by analyzing the content of 40 obituary notices received by the central committee of the Communist Party of China, as it was impossible for American scholars to survey or to observe first-hand the Chinese reaction to Mao's death.

Another uses of content analysis is to study the changing trends in the theoretical content and methodological approaches by content analyzing the journal articles of the discipline (Loy, 1979). Using the same approach, Vijayalakshmi *et al.* (1996) examined a stratified random sample of 194 research articles published in the Indian Journal of Social Work from 1971 to 1990 to identify characteristics of authors, and document the trends in empirical content, subject areas, and methodological characteristics such as source of data, research design, sampling, and statistical techniques used in the articles.

Murty (2001) analyzed the news items, letters to the editor, and editorials of four selected dailies in India published during the calendar year of 1995, to make a comparative study of the coverage of development news.

Krippendorff (2004) in his book "Content analysis: an introduction to its methodology" he stated that six questions must be addressed in every content

analysis *viz.* (1) which data are analyzed? (2) How are the data defined? (3) From what population are data drawn? (4) What is the relevant context? (5) What are the boundaries of the analysis? and (6) what is to be measured?.

As indicated by Prasad (2008) content analysis is utilized by researchers from various disciplines like social sciences, communications, psychology, political science, history, and language studies but it is most widely used in social science and mass communication research. It has been used generally to comprehend a wide range of themes such as social change, cultural symbols, changing trends in the theoretical content of different disciplines etc.

Zavyalova *et al.* (2012) in their study used the advanced content analysis techniques chiefly to code effective content of articles and blog entries.

Hence, the above reviews establishes the purpose and use of content analysis which mainly focuses on data drawn, relevant context of content facets *viz.*, empirical content, subject areas, and methodological characteristics such as source of data, research design, sampling, and statistical techniques used in the postgraduate thesis that is to be measured.

2.4 METHODS AND ANALYSIS IN CONTENT ANALYSIS

Krippendorf (1980) stated that classical quantitative content analysis has few answers to the question from where the categories come, how the system of categories is developed: "How categories are defined ... is an art. Little is written about it".

Stempel (1989) stated that the researcher who wishes to undertake a study using content analysis must deal with four methodological issues: selection of units of analysis, developing categories, sampling appropriate content, and checking reliability of coding.

Kondracki *et al.* (2002) stated that selection of methods depends on the types and length of material to be analyzed, results desired, and researchers' preferences and technological capabilities.

Prasad (2008) specified that content exploration involves six stages specifically preparation of the research problem or goals; determination of communication content and sample; developing content classes; finalizing units of analysis; preparing a coding schedule, pilot testing and checking inter coder reliabilities; analyzing the collected data.

Biswas (2009) use statistical techniques like frequency and percentage for comprehensive and meaningful interpretation of data.

Khodadoost *et al.* (2011) content analyzed 37 theses via the checklist that was prepared by investigator which was used for explanation of descriptive information such as frequency, mean, percentile, tables and diagrams. Content analysis of these thesis showed that some of the parameters such as number of pages, number of sources and men or woman investigators have optimal situation. The study also revealed that mean of duration for doing research had diminished every year.

Schreier (2012) stated that qualitative content analysis is one of the several qualitative methods currently available for analyzing data and interpreting its meaning.

According to Datt (2016), there are eight steps of doing content analysis: preparation of data, defining the unit or theme of analysis, developing categories and coding scheme, pre-testing the coding scheme on sample, coding all the text, assessing the consistency of coding employed, drawing inferences on the basis of coding or themes, presentation of results.

Considering the above reviews, methods like using a checklist, formulation of objectives, selection of content pattern and sample, categorization

of the content, analysis of data and so on were followed. Statistical analysis like percentage, frequency, mean etc. is mainly used.

2.5 AREAS AND TRENDS IN PG RESEARCH

Areas of research in this study refer to the different fields of study in post-graduate researches conducted by 16 departments from 2008 to 2017 at College of Agriculture Vellayani. Trends in research are operationalized as the tendency or a general direction in which something tends to move. Here, a research trend is decided by analyzing the pattern of changes in the research areas and the number of research work published over time.

Singh *et al.* (1972) reported that out of the 239 extension theses till 1972, 15.6 per cent were on Agricultural Communication. Feliciano (1974) stated that on the basis of communication research conducted from 1964-1974, the Asian region has focused on three main areas: media infrastructural studies dealing with history and development of media; studies of communicators and receivers of message, and developmental type studies *i.e.* dealing with communication aspects of the various components of development such as agriculture, health, education, science, industry, national integration and alike.

Jhamtani and Singh (1980) reported that 16.4 per cent theses were directed towards Agricultural Communication in degree researches in extension during the period of 1972-78. Rogers and Stiff (1983) specified that the area of research in communication during the first World War were related to propaganda, advertising, public relations and media oriented audience exposure, whereas at the time of World War II, the emphasis was on the development of electronics and information theories, laboratory oriented research, survey research and field experiments. Later on mass media became popular.

Siddaramaiah and Raghavendra (1983) reported on content analysis of IJEE that out of 497 articles published during the year 1965-1981, the major area of research considered were 14 containing adoption and diffusion, agricultural

education, communication, extension administration, extension methods, leadership and group dynamics, programme planning, research method and techniques, rural institutions, social change, special groups, training of extension personnel, training of farmers, and youth development. The trend in coverage of the different areas of research over a period of time was not consistent in all the areas. There was an increasing trend in the number of articles published from 1965-1981 in respect of the three areas having communication, rural institutions and special groups. In contrast to this, a decreasing trend was noticed in certain areas like programme planning, training of extension personnel, youth development etc.

Jain and Babu (1987) reported that of 160 papers published in Indian Journal of Extension Education (IJEE), maximum number (75) were in the period of 1975-1984 and the areas of research covered were Multimedia-23, Mass communication (Radio)-22, Farm journalism-19, Sources of information-16, Television-16, Audio-visual aids-14, Interpersonal communication-10, Group contacts-9, Source credibility-8, Communication skills-8, Communication behaviour of extension personnel-8 and Communication behaviour of farmers-7.

Mehra and Trikha (1993) reported ten areas of research in the content analysis of post graduate theses of agricultural communication conducted from 1983-1989 at the G.B. Pant University of Agriculture and Technology, Pantnagar having adult education, audience profile, audio visual, media mix, print, radio, television, and sources of communication, traditional folk culture, and training programme as the content of research. Of the ten areas of research, audience profile has the largest share (20.83%) followed by radio (16.67%) and the audio visual (12.50%). The least focused area was traditional folk culture (2.08%). Further, the areas of research have been categorized based on the Berlo's model of communication *i.e.* Source, Message, Channel, and Receiver.

Tripathy *et al.* (2000) reported that out of 89 research study on Agricultural communication, the highest contribution (41.58%) was from the field

of communication media; followed by (17.89%) studies on television; (8.9%) on change agents, contact farmers and opinion leaders; (5.62%) on radio; (4.49%) on newspaper; (2.25%) on another print media, and (2.25%) on traditional media whereas 7.87 per cent of the research studies on the communication pattern followed by credibility (6.74%), communication behaviour (4.49%) and (2.25%) on information need respectively.

Thakur and Trikha (2004) reported 14 areas of research in the Content Analysis of Post-Graduate theses from 1996-2001 of Agricultural Communication conducted at the G.B. Pant University of Agriculture and Technology, Pantnagar. Of the 14 areas of research, maximum number of theses (15.38%) was submitted on educational technology followed by communication pattern, development journalism and evaluation studies (11.54% each). Management studies, speech communication and training have the coverage of 7.69 per cent each. The least covered areas were development studies, information source, instructional technology, mass media, motivation, technology transfer and video for development which accounted for 3.84 per cent each.

Edgar (2007) reported that there were 30 secondary research theme areas identified in the Journal of Applied Communications (JAC) between 1997 and 2006. The top most frequently identified secondary research theme was food, agriculture, natural resources, health, and family (14.3%). The second most frequent secondary research theme was information sources and technology, identified in eleven per cent of the research JAC articles. Communication management was the third most frequently identified secondary research theme (6.6%).

Singh (2008) in his study "Pioneer Research in Extension Education", stated about the trend of extension education researches that out of 240 M.Sc. (Ag.) researches conducted during a period of five decades (1957- 2006) in the Bihar Agricultural College, Sabour, the maximum number of theses (28.75%) were carried out in 'behavioural and socio-psychological domain' followed by the

area of 'diffusion and adoption of agricultural innovations' (26.67%), and next was 'agricultural administration and management' (17.92%). The area related with the 'training of farmers and extension personnel' received the next place (16.25%) followed by 'agricultural communication and extension teaching methods' (14.17%). Quite a good number of theses (14.17%) were carried out taking the miscellaneous problems pertaining to 'agricultural and rural development processes. Regarding the trend of submission of number of theses, he revealed that the maximum number (28.75%) of the theses were submitted during the decade from 1967-1976 followed by the last decade (1977-2006) of the discipline (24.58%). During the other three decades, the numbers of theses were more or less the same.

Biswas (2009) reported that Department of Extension Education in Banaras Hindu University recorded 182 M. Sc. theses so far till 2008 out of which 173 theses that is available in departments is used for collection of information. The study shows that there were 18 major areas of research in the field of Extension Education *viz.,* adoption and diffusion, agricultural journalism, content analysis, human resource management, entrepreneurship development, environmental studies, health studies, ICT, developmental projects/programmes, social and psychological dimensions, ITK, studies of gender, youth and children, training programmes of farmers, research and educational institutions/organizations, private extension, extension administration and organizational management, extension methods and communication studies and miscellaneous studies which again been divided into different sub- areas. The study shows that maximum number of researchers *i.e.* 31.79 per cent conducted a study in extension methods and communication studies and minimum in entrepreneurship development with 1.16 per cent.

According to Biswas (2009) the number of theses submitted in every five years of duration in the Department of Extension Education is selected for study. It shows an increasing trend of the research works conducted since 1977 in the

department till 1982-86 whereas a decreasing trend is observed till 1992-96. However, again an increasing trend is observed from 1997-2001 to 2002-06.

A Study conducted by Verma (2017) showed an increasing trend of research works conducted since 1980-94 in the department whereas a decreasing trend in 1995-99. However, again an increasing trend is observed from 2000-2004 to 2010-2014. It is found that the highest number of thesis were submitted during 2010-2014 (22.34%) because of more number of thesis submission during that period and minimum research were conducted in the year 1995-99 (5.32%) because of less number of researches conducted during that period. The average number of thesis was submitted in the year 1985-94 and 2005-2009.

2.5 OPERATIONALIZATION AND MEASUREMENT OF CONTENT PATTERN OF POST GRADUATE RESEARCH STUDIES IN TERMS OF DIFFERENT ATTRIBUTES

Content pattern in this study is operationalized as the principle substance such as written matter, illustrations or like that gives information on a work. It includes parameters like number of words in title of theses, number of words in abstract, number of objectives, number of references, number of pages, number of tables, figures, plates, appendices and abbreviations, types of research design, statistical methods used, locale of study, sample size, nature or types of respondents, sampling methods, data collection techniques, dependent variables, independent variables and alike. A very few review of literature is available from secondary sources directly related to content pattern. Hence the review of literature has been generalized in terms of parameter selected for the study under the head of content pattern.

Regarding the number of words in title and abstracts, Sargeant (2012) stated that the dissertation should contain an abstract of up to 350 words. Cherry (2019) specified that the number of words in the title according to APA (American Psychological Association) style (6^{th} edition) should not be more that

12 words and for an abstracts the number of words should be between 150 and 250 words.

Regarding number of objectives, Liebano *et al.* (2005) indicated in their study that from 723 master dissertations analyzed, 196 (27.11%) presented only one objective and 527 (72.89%) had more than one objective.

Regarding the number of references, Malone and Videon (1997) analyzed a total of 291 student bibliographies submitted for courses in ten undergraduate institutions in the Greater Philadelphia Area for use of electronic resources and it was found that the typology of resources was print books, print periodicals, full text electronic sources and others. The breakdown for the citations was 58 per cent serials, 34 per cent monographs, 7 per cent electronic full text and one per cent for others. Strangely, 34 per cent of the bibliographies did not include electronic resources even though all the students were taught how to use these electronic resources and there was confusion in the citation format itself.

Oppenheim and Smith (2001) analyzed bibliographies of 60 final year undergraduate dissertations produced from 1997 to 1999 for type of materials cited. It was reported that the total number of citations was 2095 and the number of citations per project was between 2 to 97 with a mean of 34.9. Books accounted for 40.2 per cent of the citations and this is followed by journal articles (29.5%). Throughout the three years, the number of internet and book citations increased but there is a decrease of citation to journal articles and other formats. Most citations were five years old or less. Edzan (2008) stated that citation analysis of student's bibliographies is one of abundant assessment methods which can be used to determine success of any information literacy or information skills programme in meeting its learning outcomes.

Number of Pages in this study refers to the number of pages from introduction chapter to the appendixes. Randolph *et al.* (2012) reported that the number of pages for M.Ed. theses, the minimum and maximum number of pages

was 23 and 183, respectively. The mean was 64.15 with a standard deviation of 23.37. For Ed.S theses, the minimum and maximum number of pages was 29 and 165, respectively. The mean was 67.18 with a standard deviation of 25.94. For doctoral theses, the minimum and maximum number of pages was 77 and 273, respectively. The mean was 142.40 with a standard deviation of 47.21.

Research design in this study, refers to the set of procedure or methods used in collecting and analyzing measures of variables in the problem research. Sujan (1986) found that in the analysis of 15 research studies conducted during 1983 to 1985 in Uttarakhand maximum number of studies (46.67%) used exploratory research design followed by experimental research design (40%). Only 20 per cent studies used descriptive research design followed by observation and *ex-post-facto* research designs with 6.67 per cent each. Mehra and Trikha (1993) revealed that content analysis of 48 Post- Graduate theses of seven years of research from 1983-89 of Agricultural Communication and Extension conducted at the G.B. Pant University of Agriculture and Technology, Pantnagar that single research technique was used in 75.00 per cent followed by combination of research techniques in 25.00 per cent.

Singh and Gill (1993) stated on "Review of Adoption Research Studies in Indian Journal Of Extension Education (IJEE) from 1980-1987" that of the 70 studies published under adoption area that three-fourth of the studies have used 'survey' design and most of these studies were '*ex-post-facto*' for the study of existing situation. The next order of research design used was the paired match (20%) in which urban-rural; progressive-non-progressive; innovative households, non-innovative households were used as sample of studies. The designs like case study, action research, etc. were conspicuous by their absence in these studies.

Rone (1998) found an increase in qualitative designs over time. Singh *et al.* (2001) reported in their study that 81.10 per cent used *ex-post facto* followed by experimental and both (9.09%). Thakur and Trikha (2004) stated that on content analysis of 26 Post-Graduate theses for six years of research from 1996-

2001 of Agricultural Communication and Extension conducted at the G.B. Pant University of Agriculture and Technology, Pantnagar that maximum number of theses (50%) used descriptive research design followed by exploratory research design (46.15%). Only 3.85 per cent theses used experimental research design. None of the theses used diagnostic research design. Regarding the pattern of research design, maximum number of theses (96.15%) used single research design while only one thesis used a combination of research designs.

According to Biswas (2009) the study indicates that 6.94 per cent of the theses used exploratory research design followed by 5.78 per cent that used ex-post-facto research design whereas 3.47 per cent of the theses used evaluator research design. Only 1.73 per cent and 1.15 per cent of the theses used descriptive and experimental research designs respectively. About 80.93 per cent did not mention the research designs used by the researchers for their studies.

Regarding the statistical methods used, Sujan (1986) reported that maximum number (93.33%) of the studies used percentage followed by t-test (66.67%). 53.33 per cent studies used mean followed by coefficient of correlation (33.33%). Analysis of variance was used by 13.33 per cent of the studies. Mehra and Trikha (1993) reported that the most commonly used techniques of analysis were percentage (93.75%), followed by mean (52.08%), frequency and coefficient of correlation (33.33% each).

Singh and Gill (1993) revealed from the data that the most commonly used analysis techniques from the "method of estimation" group were percentage, multiple regressions (R2), coefficient of correlation (r), mean and standard deviation. Among the "method of testing" group, t-test was applied in 12 studies. F-test and Z-test were used in 5 and 3 studies, respectively. In "non-parametric" statistical group, path analysis and X_2 were used in about one-tenth of the research studies. However, it is concluded that in most of the studies, method of estimation, statistical tools of data analysis were used, and followed by non-parametric techniques.

Prolima and Kaushik (2000) observed that in maximum research articles (53.5%), percentages were used for analysis of data followed by Mean (27.9%), Frequency (22.9%), Coefficient of correlation (22.3%), t-test (19.8%), and Chi-square (16.2%). The Home Science articles by and large did not make use of path analysis, cluster analysis and other complex statistics. Coefficient of dispersion and b value were the least used statistics.

Regarding the locale of study, Singh and Gill (1993) revealed that the regarding the locale of the studies majority of the studies (17.14%) were conducted in Haryana state followed by Andhra Pradesh (12.85%). It is noted that the maximum districts (5) have been covered in Uttar Pradesh. There is no such state where all the districts are covered under these studies. It is interesting to note that no study was undertaken in Assam, Gujarat, Madhya Pradesh and Rajasthan states. Besides India, one study each in Nigeria and Pakistan were conducted. Thakur and Trikha (2004) revealed that maximum number of theses (42.31%) covered institution/organization followed by village (23.07%) and block (19.23%). Few researches were conducted at regional level (7.69%) and at district level (3.85%).

Biswas (2009) revealed that most of the researches were carried out in Uttar Pradesh (71.68%) followed by Bihar (8.67%). There were 6.36 per cent of the researches which did not give any information about the states where the research works were conducted. In Andhra Pradesh 5.78 per cent of the research works were conducted while in Rajasthan only 2.89 per cent of the researches were conducted followed by 1.16 per cent each for West Bengal, Jharkhand, and Jammu & Kashmir whereas only 0.57 per cent each for Orissa and Karnataka.

Sample size in this study refers to the total number of respondents used in the theses from the whole population for investigation. Sujan (1986) revealed that maximum number (86.67%) of the studies had 51 to 100 numbers of respondents followed by 101 to 150 and 151 to 200 (6.67% each). No study had number of respondents in between 1 to 50. Singh and Gill (1993) revealed that 30 per cent

research studies had taken sample size in the range of 75 to 150 and 43.43 per cent of research studies were conducted with sample size ranging from 150 to 225. Thus, majority of research studies were undertaken with sample size ranging from 75 to 225.

Thakur and Trikha (2004) concluded that majority of the theses (38.46%) had 101 to 150 respondents. The maximum number of respondents in a thesis was found to be 256 whereas 32 was the minimum number of respondents in a thesis. Biswas (2009) reported that majority of the theses (61.27%) had respondents ranging from 51 to 100, whereas 12.14 per cent of the theses were without respondents. 10.41 per cent of the theses had 101-150 respondents followed by 7.52 per cent of theses having below 51 respondents. The maximum number of respondents among the studies was 500 while the minimum number of respondents was 25.

Nature of respondents in this study means the kind of respondents considered for any kind of research. Sujan (1986) found that in the analysis of 15 research studies conducted during 1983-1985 in Uttarakhand that maximum numbers (93.3%) of the respondents were farmers followed by subscribers, instructors and extension workers (6.67% each). Singh and Gill (1993) stated regarding the nature of the respondents on "Review of Adoption Research Studies in Indian Journal Of Extension Education (IJEE) from 1980-1987" that 61.43 per cent studies had taken crop farmers as their respondents and rest of studies were conducted on dairy/poultry/fish farmers, farming couples, far leaders and gobar gas adopters. Thakur and Trikha (2004) revealed that most of the respondents were students and rural women (23.07% each) followed by farmers (7.69%), members of self-help groups and other organizations (7.69%) and teachers (7.69%). In some theses (11.54%), more than one type of respondents was used. Verma (2017) revealed that most of the thesis (37.23%) took farmers of the village, university students (23.40%), youth (10.64%), children (8.15%), farm women (5.32%), teachers (4.26%) and only 3 theses took rural adults (3.19%) as the respondents.

Regarding the sampling methods, Sujan (1986) observed that 53.33 per cent villages were selected through Purposive sampling whereas 26.67 per cent through Random sampling method. Majority of the respondents were selected through Random method (66.67%) followed by Census method and combination of random and purposive methods (13.33% each). The least number (6.67%) of respondents were selected through Purposive method of sampling. Singh and Gill (1993) reported that multistage sampling procedure was used in almost all the research studies. Under this procedure, 60.00 per cent studies had adopted random sample technique followed by purposive sampling in 14.67 per cent cases. In about one-tenth of studies reviewed, the researchers did not mention any sampling technique. In some studies, researchers had used more than one technique of sampling. Prolima and Kaushik (2000) observed that maximum number of articles used random sampling techniques (61.8%) followed by Random and purposive (19.8%), Stratified (10.4%) and multistage random (4.4%), Cluster sampling and Census method had minimum contribution (only 3.2%).

Thakur and Trikha (2004) reported that most of the researchers used random sampling method (64.16%) for the selection of respondents whereas in 12.14 per cent of the theses no respondents were taken followed by 6.94 per cent of theses having no information about the sampling methods for selecting the respondents. Only 5.78 per cent of theses were conducted each with census method and combination of sampling procedures for selecting the respondents. There was only one (0.58%) thesis having probability sampling method for selecting the respondents.

Regarding the data collection techniques, Pausewang (1973) specified that questionnaire is a research tool to study a rather limited subject within a given social content with qualitative exactness. Wick and Dirkes (1973) analyzed the dissertation characteristics of a random sample of 199 dissertation abstracts. The results that are relevant to this study are that 69 per cent of those theses were experimental and that only 7 per cent of dissertations used non-numerical data gathering methods, such as interviews. Mehra and Trikha (1993) reported that the

structured interview schedule was used in majority (58.33%) followed by combination of tools to collect the data in 35.42 per cent. Singh and Gill (1993) reported that about two-third studies used interview schedule as data collection technique. Questionnaire was used in 13.69 per cent research studies. In one-fifth of the studies the technique of data collection had not been mentioned. An observation technique has been used in a single study. In some studies, more than one technique of data collection was used. Prolima and Kaushik (2000) stated regarding the tools of data collection on content analysis of Home Science Extension Research articles 67.6 per cent used interview schedules for data collection followed by Questionnaire method (16.2%), case method and documentation were least used.

Regarding the dependent and independent variables, Sujan (1986) observed that maximum number (66.67%) of the studies used the variable Socioeconomic- status followed by Knowledge (53.33%). 26.67 per cent each of the studies used the variables Communication exposure and Mass media exposure followed by Perceived attributes (20%). Thakur and Trikha (2004) reported that 50.00 per cent of the theses were based on the study of dependent and independent variables. Maximum number of theses (30.77%) used variables ranging from 16-20 whereas 26.92 per cent used 5-10 variables followed by 11-15 variables (19.23%), 21-25 variables (11.54%), and 26-30 variables (3.85%). In 7.69 per cent of the theses, more than thirty variables were used. The maximum and minimum numbers of variables used were thirty-six and eight respectively.

Biswas (2009) revealed that majority of the theses (24.67%) used adoption as one of the dependent variables followed by knowledge (23.33%) and attitude (11.56%). 31.21 per cent of the theses did not clearly distinguish between the dependent and independent variables whereas 12.14 per cent of the theses did not used any of the dependent or independent variables.

Verma (2017) reported that majority of the thesis was done on socio-economic status (13.83%) of the village people followed by the impact assessment

of farm and television (10.64%) on villager and third variable are Tele-viewing behavior (9.57%) of farmer and non-farmer. whereas a major portion of research was also conducted in radio listening behaviour and awareness (8.51%).

2.7 OPERATIONALIZATION AND MEASUREMENT OF MAIN VARIABLES

Perceived usefulness in this study can be operationalized as the degree to which students or teachers believes that the research work done influence them personally, the farming community and the institutions as a whole. Kale and Khuspe (1982) in their study entitle "The perception behavior of rural televiewers about the usefulness of telecast programme" concluded that the agricultural programmes were quite useful but could be improved by making appropriate use of traditional methods of communication such as Kirtan, Loknatya, Bhajan and Folk songs. Lower caste people perceived the programmes as more useful than did higher caste people.

A study on 120 colleges conducted by Irani (2002) revealed that those who had relevant erstwhile experience with internet communication technologies had the most favorable perceptions of the usefulness of these technologies and were most appropriate to use them. Experience and perceived usefulness were the strongest predictors of intent to use them.

Rasmussen *et al.* (2008) reported in their study of "Student Perceptions toward Agriculture in a General Education Life Science Course" that significant changes were found in understanding the role of agriculture in their personal lives and in society, and in the ability to relate life science to other disciplines (e.g. chemistry, medicine, environment, and agriculture).

Nazari and Hassan (2011) reported that 68.00 per cent of the respondents believe that television produced agriculture programs provided good benefit to farmers. It designated that the programs should produce in their provincial dialects.

Attitude towards research refers to the mental predisposition of the students towards research. Jalihal (1970) conducted a study on the concept and role of agricultural universities in India and revealed that the students had slightly favourable attitude towards the new system of education. Shaukat *et al.* (2014) conducted a study by using an attitude towards research scale consisted of 32 items having 5 constructs *i.e.,* usefulness of research, research apprehension, optimistic attitudes toward research, research importance to life, and research struggle. The study revealed that males had significantly positive attitudes towards research than the females.

Siamian *et al.* (2015) in their study reported that the student's attitudes toward the usefulness of search for jobs and careers, anxiety, relationship with everyday life and research problem was positive. The findings showed that the difference between age, gender and level of education and the attitude of students towards research was insignificant.

Hussain *et al.* (2016) concluded that the students represented highest level of attitude in 'research is usefulness' in their profession. On the other hand students disagreed that research is relevance to their life. The general attitudes of scholars towards research stayed positive and regarding 'positive research attitude' a significant difference was observed. It is also found that the students enrolled in session 2014-2016 have more progressive attitude towards research than those students enrolled in session 2013-2015. Moreover there is no significant mean difference between male and female students regarding sub scales research attitude.

Muthuswamy *et al.* (2017) study consists of 159 students who have completed one year of course work in their doctoral program. The study is based on factor analysis which yielded 6 factors of attitude towards research *viz.*, love for research, research fear, research usefulness, and difficulties in research, importance of research and benefits of research.

2.8 OPERATIONALIZATION OF PERSONAL AND SOCIAL CHARACTERISTICS OF STUDENTS AND TEACHERS

2.8.1 Age of both students and teachers

Age in this study is operationally defined as the number of years completed by the respondent at the time of investigation. Jand (1975) concluded that majority of the teachers were found in the category of above 40 years. Patel (1982) reported that age of the respondents were group into different categories *viz.*, young age, middle age and old age. His studies revealed that majority (71%) of the respondents were in the age group of 31-35 followed by old age group (20%) and young age group (9%).

Samantha (1985) reported that majority (70.27%) of the scientist were of middle age group. Malik (1988) reported that majority (56.55%) of the teachers in Gujarat agricultural University were found to be in the middle age group followed by young age group (26.26%) and old age group (13.79%). The study also indicates that more than 80.00 per cent of the teachers belong to young and middle age group.

Ardeshana (1990) reported that majority (64.62%) of the teachers were found to be in the middle age group (36 to 50 years) followed by young age group (21.54%) and old age group (13.84%). Further it can be said that 86.16 per cent of the teachers belong to young and middle age group.

According to Natekar (2013), 62 per cent of the respondents fall in the age group of 25-30 years. National Center for Education Statistics (2018) categorized the age of master students into two categories *viz.* fresh out of undergrad (younger than 25) and with job (older than 25). The statistics showed that the enrollment of students under age 25 increased by 15 percent from 2005 to 2015, while the enrollment of those ages 25 and over increased by 13 percent. NCES also projected that from 2015 to 2026 the students under age 25 will increase by 17 per cent, compared with students age 25 and over with 8 per cent.

According to Ministry of Human Resource Development (2016), the Gross Enrolment Ratio (GER) in Higher education in India belonging to the age group 18-23 years is 24.5 per cent. For Scheduled Castes, it is 19.9 per cent and for Scheduled Tribes, it is 14.2 per cent as compared to the national GER of 24.5 per cent.

2.8.2 Gender of both students and teachers

Gender in this study is operationalized as the biological distinction of respondents as either male or female. Smith and Naylor (2001) revealed that 53 per cent of women obtained a good degree, whereas 45 per cent was for men. At the same time 15 per cent of men failed to complete their degree programme, and only 11 per cent of women did, which indicated that gender may be a key factor in Higher Education progression and attainment. Cramer (2011) in his study revealed that 34.51 per cent of the respondents were male and 65.49 per cent were female. According to Natekar (2013), 57 per cent of the respondents were male and 43 per cent of the respondents were female.

Van den Besselaar and Sandstorm (2016) in their papers titled "Gender differences in research performance and its impact on careers: a longitudinal case study" revealed that differences between male and female do not occur in the early career anymore but after comparing the performance levels about 10 years later using various performance indicators they found that productivity of male researchers has grown faster than of female researcher, but the field normalized (relative) citation impact indicators of male and female researchers remain about equal.

2.8.3 Caste of students

Caste in this study is operationalized as a social category to which a person belongs involuntarily *viz.* Schedule Caste (ST), Schedule Tribes (ST), Other Backward Classes (OBC), General (Gen) and others. Kirpal *et al.* (1985) in their study of "Scheduled Caste and Tribe Students in Higher Education: a study of an IIT" stated that regarding the academic performance of the students it is reported that out of 48 SC/ST students, three SC/ST students have good

performance, 33 of them have average performance and 12 have performed badly. Likewise, of the 44 non- SC/ST students, 10 non-SC/ST students have very good performance, 13 have good performance and 21 have average performance. On an average it shows that the academic performance of SC/ST students is poorer than that of non-SC/ST students.

Weisskopf (2004) reported that SC and ST students tend to be more under-represented in Masters and Ph.D programmes than at the Bachelor's degree level. According to Ministry of Human Resource Development (2016) Scheduled Casts students constitute 13.9 per cent and Scheduled Tribes students 4.9 per cent of the total enrolment for higher education. 33.75 per cent students belong to Other Backward Classes (OBCs). Also 4.7 per cent students belong to Muslim Minority and 1.97 per cent from other Minority Community.

2.8.4 Marital status of students

Marital status in this study refers to the respondent state of being married or not married at the time of investigation.

Chilman and Meyer (1966) in their paper titled "Single and married undergraduates measured personality needs and self-rated happiness" revealed that married males and females were found to have significantly higher personality scores for needs associated with intellectualism and academic achievement, the single group of activities associated with impulsive self-expression and emotional dependence. The study also reported that few married males or females had withdrawn from college because of marriage.

Price (2005) conducted a study on "Marriage and Graduate Student Outcomes" and found that being married has a positive effect on both male and female students. The result revealed that married male students are 75 per cent, 66 per cent and 39 per cent more likely to complete their degree by years 4, 5 and 6 respectively rather than single male student which indicates that marriage has a biggest impact on students to finish their work early. The study also revealed that

married female students were 25 per cent, 32 per cent, and 17 per cent more likely to graduate by years 4, 5 and 6 than single female students.

Potokri (2011) conducted a study on "The Academic Performance of Married Women Students in Nigerian Higher Education" and found that the academic performance of women students in higher education in Nigeria differs between married women students and single women students in which some women students in this study were satisfied with their academic performance while others were not. According to Natekar (2013), 64 per cent of the respondents are unmarried and 26 percent of the respondents were married.

Abou-Elhamd *et al.* (2014) in their study reported that 39 per cent of married female medical students got a worse grade than before marriage, while 30.5 per cent got better grade, and the remaining percent (30.5%) got the same grade. They concluded that marriage alone doesn't affect the academic performance but it is largely dependent on the individuals involved and that marriage supports the students emotionally and socially.

2.8.5 Native places of students

Native places refer to the village, town or city that the respondents belong. According to Shukul (1981) urban students performed academically better than rural students in agriculture

Kumar *et al.* (2010) stated that of the 94 students selected for the study, 51 belong to rural areas and remaining 43 belong to urban areas.

2.8.6 Educational Background of students

Education background in this study refers to the education the respondents have undergone. It begins with Kindergarten and usually ends with Post-Graduation College or Doctor of Philosophy Degree. Young (1998) in her study revealed that the location of the school had a significant effect upon student

achievement, with students attending rural schools not performing as well as students from urban schools.

Kumar *et al.* (2010) conducted a study on the final year students (6 year and 4 year programme) of agriculture in Haryana Agricultural University, Hisar titled the "Rural, Urban background and academic performance of agricultural students". A total number of 94 respondents were chosen for the study. The study also uncovered that urban students performed better academically compared to rural students but general reasoning is that rural students ought to perform better in agriculture.

2.8.7 Parental annual income as perceived by students

Parental annual income in this study can be operationalized as the income in rupees per annum earned by student's parents. Ajith (2004) reported that more than half (51.77%) of the agricultural students respondents family had an income above 80, 000 per annum, followed by 26.24 per cent of their families had annual income ranging from 35, 001 to 80,000 while 21.99 per cent of the families had less than 35,000 of annual income.

Shingare (2005) indicated that majority (60.80%) of the undergraduate student respondents of Veterinary Sciences and Animal Husbandry college had high family income, while 20.80 per cent and 18.40 per cent had medium and low level of income, respectively. Rameshrao (2009) concluded that slightly more than half (57.46%) of the post graduate students family and income above 1.51 lakh and 32.14 per cent of the post graduate students who had family income in between 1.1 lakh to 1.5 lakh and the rests 10.40 per cent of them were having family income up to 1.00 lakh.

Bhosale (2011) observed that more than half (52.00%) of the post graduate agricultural students were coming from those families having more than 2.0 lakh annual income, followed by 31.33 per cent and 16.67 per cent of them came from family having income between 1.0 lakh to 2.0 lakh and up to 1.0 lakh

respectively. Gadhvi (2012) disclosed that less than half (46.67%) of the agricultural postgraduate students had medium (1.5 to 3.0 lakh) level of annual income followed by 37.50 and 15.83 per cent of them who had above 3.01 lakh and up to 1.5 lakh level of annual income, respectively.

2.8.8 Research skills of students

Research skills in this study refer to the ability to search for, locate, extract, establish, evaluate and use of present information that is relevant to a particular topic. According to Lyons *et al.* (2005) graduate students reported improvement in their research skills as a result of participation in their graduate teaching fellowship programs.

Gilmore and Feldon (2010) reported that overall, masters-level graduate students rated their teaching and research skills more highly than Ph.D possibly because Master's level students often do not report as many opportunities to interact with other talented graduate students and faculty members regarding their teaching and research.

Meeran *et al.* (2012) indicated that the graduates in general have moderate knowledge and competencies to conduct research. They further suggest that enhancement of the research training is needed in order to produce very knowledgeable and skillful researcher in the student's field of specialization.

2.8.9 Educational qualifications of teachers

Education qualifications in this study refer to the extent of formal education possessed by the respondent at the time of survey. Jand (1975) found that majority (52.5%) of the teachers had Doctorate degree followed by Master Degree (47.5%) only.

Singh (1975) in his study of measurement of teacher's values revealed that level of education had no significant bearing on the values of teachers. Reddy

(1984) indicated that there was relationship between instructors effectiveness and educational qualification. The individuals with higher education were effective in performing various roles of the adult education instructors.

Rani (1985) in her study reported that majority of the teachers were post-graduate. She also reported that education was significantly associated with teaching productivity of agricultural teachers. Samanta (1985) reported that majority of the scientists were highly educated in educational status. She found that 55.41 per cent of the respondents have Master degree and 43.20 per cent have Doctorate degree. Malik (1988) concluded that majority (51.72 per cent) of the teachers has their qualification as Doctorate followed by Post-Graduate (48.28 per cent) qualification. He further reported that there is no relationship between qualification and job satisfaction.

Munshi (1989) observed that all the teachers were qualified up to M.Sc. or Ph.D. level. He also concluded that academic qualification of the teachers was found significantly correlated at one per cent level of significance with teaching effectiveness. He also reported that the total indirect and substantial effect on teaching effectiveness in path analysis was expressed by academic qualification.

Ardeshana (1990) reported that majority (53.85%) of the teachers educated up to M.Sc. level, and 46.15 per cent of the teachers were Ph.D. He also concluded that there was positive and non-significant association between education and attitude of the teachers towards teaching.

2.9 OPERATIONALIZED OF OTHER VARIABLES AS PERCEIVED BY BOTH STUDENTS AND TEACHERS

2.9.1 Resource availability as perceived by both students and teachers

Resource availability refers to the availability of fund, research material, raw materials and literatures for the purpose of conducting a research. Malik (1988) concluded that more than two-third (69.97%) of the teachers expressed that

the facilities available in their departments were average, whereas 15.86 per cent and 15.17 per cent had possessed adequate and inadequate facilities in their department respectively.

Patel (1992) revealed that majority (55%) of the respondents had felt that grant is sufficient for the purchase of research material. Whereas 45 per cent respondents felt that grant is insufficient for the purchased of research material. Regarding the research facilities 68.33 per cent of the respondents felt that research facilities were available moderately to them. However, 18.33 per cent and 13.34 per cent respondents had low and high level of research facility, respectively.

Kalbande *et al.* (2012) reported that PG students and research scholars that were using internet based information resources, online journals, CD-ROM databases; electronic thesis database and e-books were 72.16 per cent, 61.17 per cent, 56.01 per cent, 50.86 per cent and 30.58 per cent respectively. Edem (2016) stated that regarding the respondents opinion of the electronic resources available in the University of Calabar Library the study revealed that respondents were aware of the availability of e-journal (43.65%), followed by Internet resources (29.65%), e-books (19.52%) and lastly databases (7.18%).

Akareem and Hossain (2016) in their study of "Determinants of education quality: what makes students perception different?" stated that students who receive a scholarship usually set a high standard for education quality and they are found to be in the higher expectation groups compared to those students who do not receive a scholarship.

2.9.2 Resource attainment difficulty as perceived by both students and teachers

Resource attainment difficulty refers to the difficulty in attaining the fund, research material, raw materials and literatures for the purpose of conducting a research. Gruszczynska (2016) indicated that very often early career

researchers find themselves disconnected from sources of support (networking, professional development or career advice) at a time when they need those most. Instead, they might find themselves cut off from resources that are only available in permanent roles, precisely the ones that the often early career researchers are ambitious to. Restructuring those networks without any official institutional affiliation can be quite challenging and coaching can help jump-start that process.

2.9.3 Research work environment as perceived by students

Research work environment in this study refers to the surrounding conditions where the researchers work. It can be technical, human and organizational environment. Gilmer (1966) found that the climate not only affects the behavior of individuals but also how organizations themselves interact. According to Evan (1976), organizational environment is a multidimensional perception by members as well as non-members of the essential attributes or character of an organizational system.

Prakasam (1979) observed that work atmosphere in the organization where people live and work is one of the important factors in influencing employee's performance. Kamarulzaman *et al.* (2011) assumed that the personnel who are more satisfied with the physical environment are more likely to produce better outcome.

2.9.4 Acquaintance support as perceived by students

Acquaintance support in this study refers to the extent of help the students is getting from his/her chairman, advisory committee members, peers and non-members, own department and other departments. Soyizwapi and Hoskins (2009) reported that students became aware of the availability of electronic databases from a variety of sources such as friends, library orientation programmes and academic staff. According to Natekar (2013) 70 percent of the respondents took help of their guide in choosing their research topic and 30 percent of them chosen their topic by themselves. Lapidos *et al.* (2018) in their study of 394 respondents

they revealed that more than 75 per cent were satisfied with their workplace supportiveness.

2.9.5 Researchers satisfaction

Researcher's satisfaction refers to a short-term attitude resulting from an evaluation of students' educational experience, services and facilities. Abbasi *et al.* (2011) conducted a study of 401 students at Bahauddin Zakariya University (BZU) and found that overall satisfaction level is alarming low and the results also indicate dissatisfaction of university students on educational services offered by Pakistani universities.

According to Ali and Ahmad (2011) the satisfaction of a student was determined from his/her level of pleasure as well as the effectiveness of the education that the student experiences.

Husemann *et al.* (2017) reported that 25 per cent and 63 per cent of the respondents indicated to feel satisfied or very satisfied after publishing a manuscript.

2.9.6 Publishing difficulty

It refers to the difficulty that the students encountered while publishing their research paper. According to Natekar (2013), only 60 percent of the respondents have published articles in various reputed journals. Zemmouchi-Ghomari (2016) specified that in order to publish manuscripts the researchers have to pay attention to several aspects related to the journal itself, such as, the scope (areas of research that covers), the targeted audience (academics, industrials, students), the indexing repositories (that lead to more or less severe standards), the publication frequency, the acceptance rate, the reviewing duration and so on and so forth.

Rostad and Aksnes (2015) in their study reported that the researchers in social sciences have higher publication rate than researchers in the natural sciences, engineering and technology and in medicine in terms of article equivalents. The study revealed that the researcher in social sciences produces on average 1.5 articles per year, whereas colleagues in the hard sciences produced somewhere between 0.6 and 1.0 articles per year on average and one possible reason for these differences is a different publication pattern in the social sciences compared with the previously studied fields.

Dooley and Sweeny (2017) reported that in 2013 a study of nearly 12,000 manuscripts submitted to peer-reviewed journals published by the American Psychological Association found that 76 percent were rejected, and at top journals, rejection rates soared over 90 percent.

2.9.7 Usefulness of conferences or seminars

It refers to the benefits the researchers get from attending the conferences or seminars. According to Nertney (2017) attending professional conferences, summits, workshops and seminars have positive impacts on business professionals. It offers them opportunity to develop new professionals' relationships, meet new friends, gain knowledge and become more successful in your career.

Picincu (2019) indicated that since a rising amount of understudies and youngsters are going into business; attending seminars will allow them to gain experience, connect with like-minded people and increase their chances of success later in life. Morgan (2019) additionally expressed that attending a seminar has various advantages, including improving relational abilities, gaining expert knowledge, networking with others and renewing motivation and confidence.

2.10 CHALLENGES ENCOUNTER BY STUDENT RESEARCHERS

According to Natekar (2013), 29 percent of the respondents agreed that they are facing strict/stringent rules and regulations by university and 28 percent say that they face guide, 20 percent of the respondents said that they have problems with other Ph.D scholars.

Gruszczynska (2016) specified that the common challenges faced by the early career researches are coping with change, post-Ph.D blues and personal life changes, lack of access to resources, lack of support from supervisors, time management, sustaining writing productivity and uncertainties about academic careers, identity crises and career issues.

Qasem and Zayid (2019) in their examination called attention to the regular difficulties/challenges confronted while writing the research proposals and projects are trouble in choosing the theme for research, absence of good learning of the technique, failure of discovering present day, particular and related references, absence of enthusiasm for research, absence of comprehension of the topic, absence of time, and research managing.

METHODOLOGY

CHAPTER III
METHODOLOGY

This chapter deals with the brief description of methods and procedures that were used for meeting the objectives set forth in this study. The methodology followed in the study is presented under the following sub-headings.

3.1 Research design
3.2 Locale of study
3.3 Selection of thesis
3.4 Selection of respondents
3.5 Selection of research themes
3.6 Trends in PG research
3.7 Operationalization and measurement of content patterns for post graduate research studies in terms of different attributes
3.8 Operationalization and measurement of main variables
3.9 Operationalization of personal and social characteristics of students and teachers
3.10 Operationalization of other variables as perceived by both students and teachers
3.11 Constraints of PG research
3.12 Suggestions for improvement
3.13 Data collection procedure
3.14 Statistical tools used in the study
3.15 Hypothesis set up for the study

3.1 RESEARCH DESIGN

Research design is the plan of the investigation to get answer to the problems of research. Based on the objectives set forth, a qualitative content analysis was followed for studying the content pattern of different attributes of post-graduate (PG) researches in agriculture. According to Hsieh and Shannon

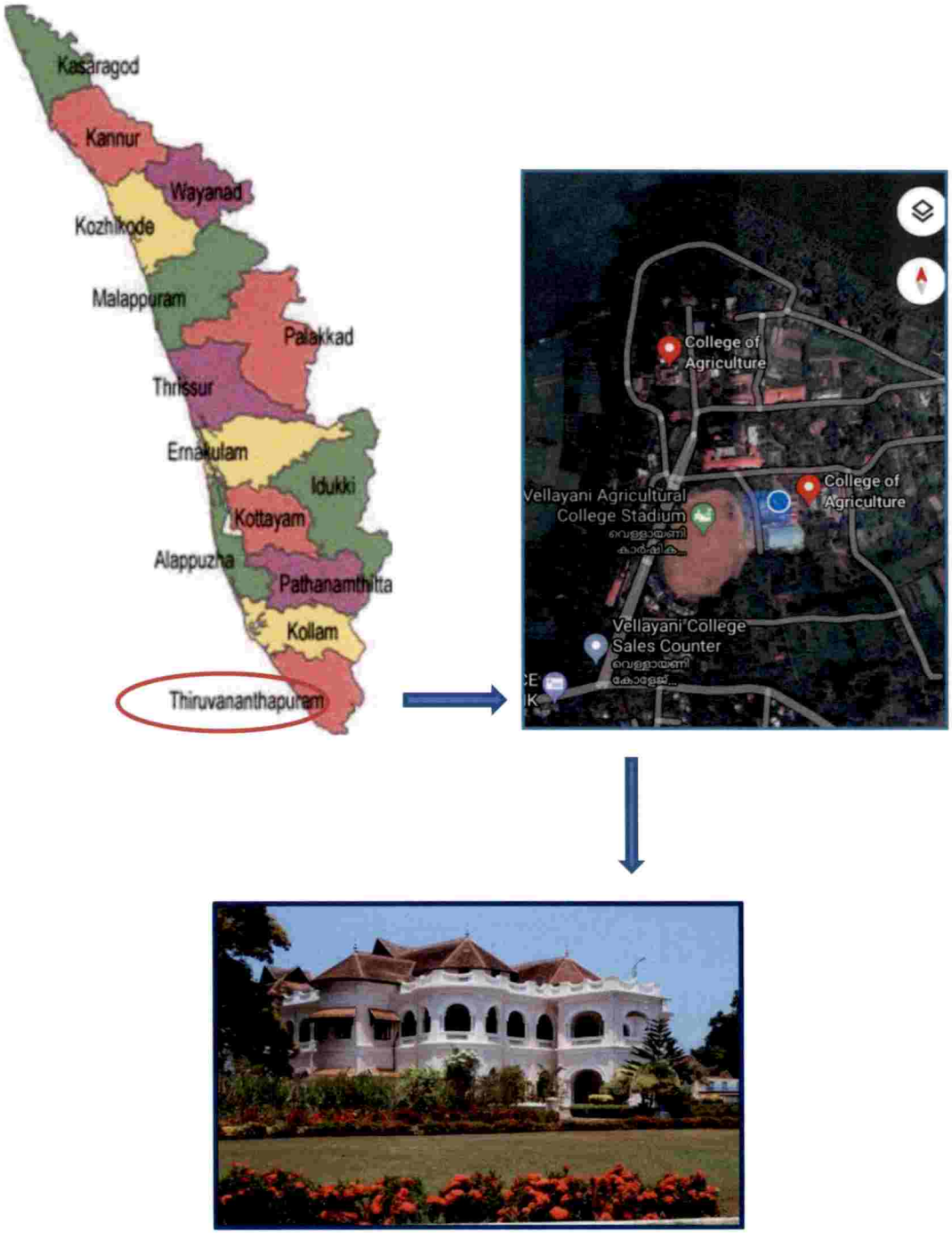


Fig.1: Location map of study area

(2005) qualitative content analysis is a research method for the subjective interpretation of the content of text data through a systematic classification process of coding and identifying themes or patterns. An '*ex post-facto*' design has also been followed for studying the research themes and for obtaining data from the respondents. According to Kerlinger (2004) an *ex post-facto* investigation seeks to reveal possible relationship by observing an existing condition or state of affairs and searching back in time for plausible contributing factors.

3.2 LOCALE OF STUDY

College of Agriculture Vellayani campus of Kerala Agricultural University was selected as locale of study. Map showing the area of study is presented in fig.1.

3.3 SELECTION OF THESIS

The entire thesis submitted under different Project Co-ordination (PC) groups, departments and divisions at College of Agriculture, Vellayani from 2012 to 2017 was enumerated. Division in this study is operationalized as those theses that can be grouped into one. Under each division the thesis were categorised year wise and department wise. The illustration for selection of thesis is presented in fig.2.

3.4 SELECTION OF RESPONDENTS

Random sampling was followed for the selection of respondents. A total of 120 respondents comprising of 60 postgraduate (PG) students and 60 teachers were selected for the study on perceived usefulness of PG research. Since, the study was confined to College of Agriculture, Vellayani and the respondents belonged to the college alone therefore, 60 teachers and 60 students were adequate enough to represent the sample.

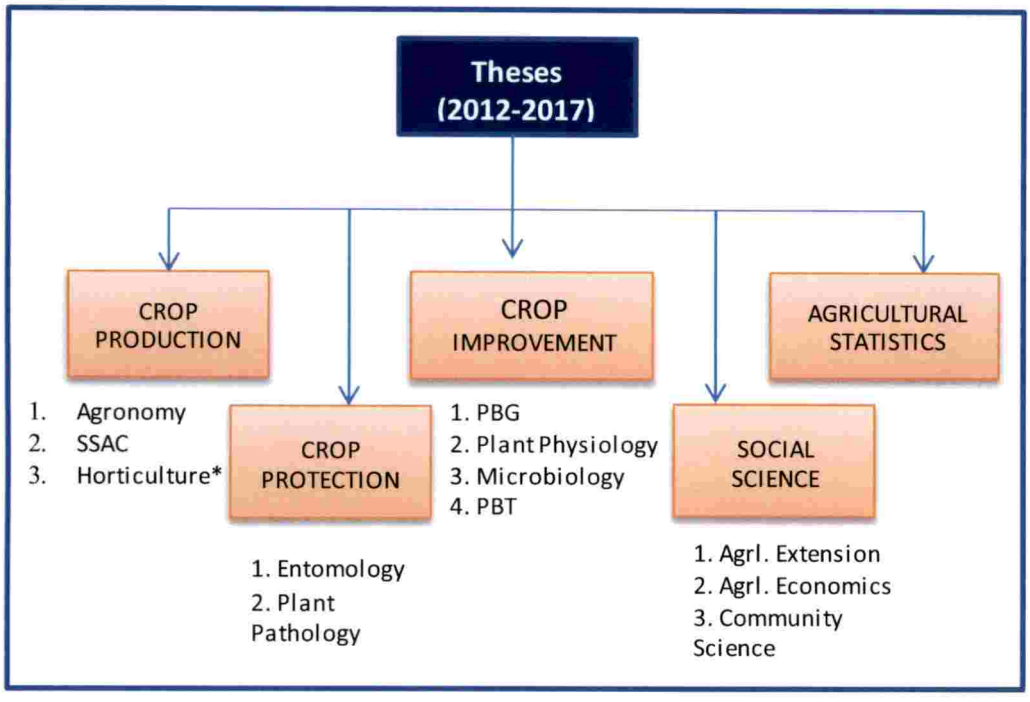


Fig.2: Framework for selection of theses

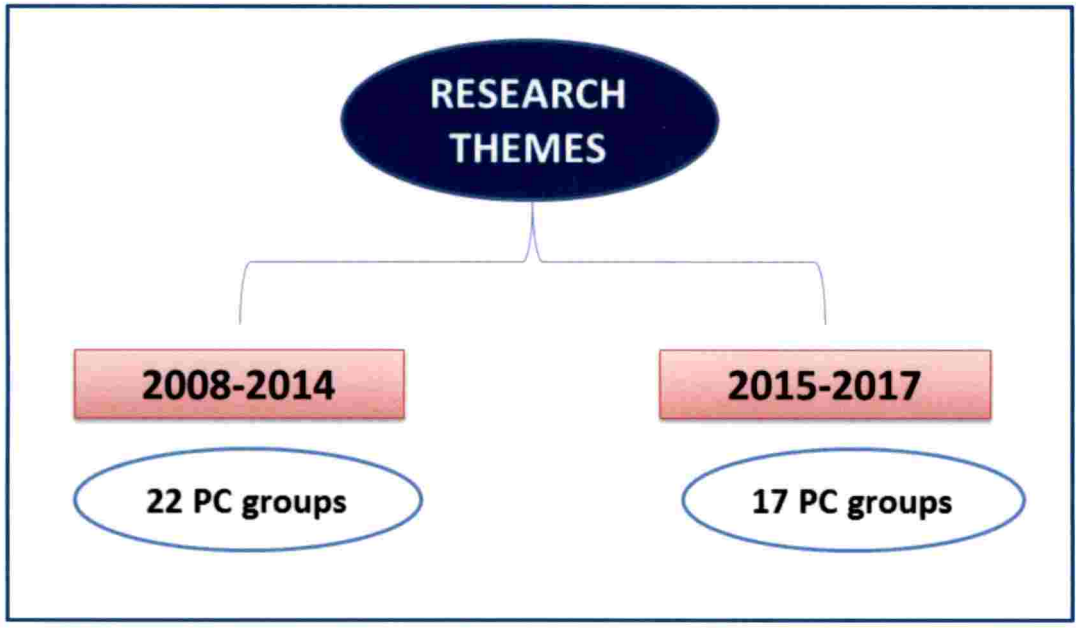


Fig.3: Framework for selection of research themes

3.5 SELECTION OF RESEARCH THEMES

The research themes were reflected from 2008 to 2017 for the *ex-post-facto* study as well as for analyzing the gaps in research. Since there were modifications in research themes through its additions or deletions over years, it was further divided into two period's *viz.* 2008 to 2014 and 2015 to 2017. A clear picture can be understood from fig.3.

3.6 TRENDS IN PG RESEARCH

For achieving the objectives regarding the trends in PG research, the researcher has collected the data personally from the library and Research Co-ordination (RC) office. The theses were categorised and tabulated based on the following subheads:

3.6.1 Number of theses published each year
3.6.2 Year wise categorization of theses under each division
3.6.3 Year wise categorization of theses under each PC groups
3.6.4 Categorization of touched and untouched thrust areas under each PC groups
3.6.5 Comparison between similar PC groups
3.6.6 Gaps in research themes

3.6.1 Number of theses published per year

The trends of the PG researches have been counted and categorised based on the number of theses submitted from 2012 to 2017 in sixteen departments namely, Department of Agronomy, Soil Science and Agricultural Chemistry (SSAC), Vegetables science, Pomology and Floriculture (PF), Plantation Crops and Spices (PCS), Post-Harvest Technology (PHT), Entomology, Plant Pathology, Plant Breeding and Genetics (PBG), Plant physiology, Microbiology, Plant Biotechnology (PBT), Agricultural Extension, Agricultural Economics, Community Science and Agricultural Statistics. Departments of Vegetables Science, Pomology and Floriculture (PF), Plantation Crops and Spices (PCS),

Post-Harvest Technology (PHT) were clubbed together as Horticulture. The number of theses published each year was expressed in terms of frequency and percentages. The list of the theses under each departments and PC groups is presented in appendix I.

3.6.2 Year wise categorization of theses under each division

The trends have been observed based on the number of theses published under each division from 2012 to 2017. The five main divisions were crop production, crop protection, crop improvement, social sciences and agricultural statistics. Year wise categorization of theses under each division was expressed in terms of frequency and percentage.

3.6.3 Year wise categorization of theses under each PC groups

The total number of theses was collected and categorised into year wise and PC groups wise from 2008 to 2017 based on the Faculty Research Council (FRC) report. The theses categorised were expressed in terms of frequency and mean. The list of the PC groups in detailed is specified in appendix II.

3.6.4 Categorization of touched and untouched thrust areas under each PC groups

The thrust areas under each PC groups were illustrated as per the "Project Co-ordination Groups, Thrust Areas and Project Bank" handbook published by Directorate of Research, Kerala Agricultural University for two different periods from 2008 to 2014 and 2015 to 2017 (appendix III). The touched and untouched thrust areas were analyzed through the perusal of technical programmes documented in FRC report for the period from 2008 to 2017. The number of research work assumed under the given thrust areas in respective PC groups were tabulated by careful observation and the categorization of the touched and untouched thrust areas under each PC groups was expressed in frequency and percentage.

3.6.5 Comparison between similar PC groups

The similar PC groups were identified and selected from both categories for the periods *i.e.* 2008 to 2014 and 2015 to 2017 for comparison. The trends in total number of thrust areas framed over the years and the percentage of the untouched thrust areas were calculated, documented and inferred.

3.6.6 Gaps in research themes

A questionnaire was administered to the teachers in different departments asking them to rate the research themes framed with respect to their own departments from 1 to 10 in order to find the gaps in research themes as perceived by teachers. The gaps in research themes were expressed as percentage.

3.7 OPERATIONALIZATION AND MEASUREMENT OF CONTENT PATTERNS OF POST GRADUATE RESEARCH STUDIES IN TERMS OF DIFFERENT ATTRIBUTES

A total of 'fourteen' attributes (3.7.1 to 3.7.14) were selected in general for the study of content pattern of the theses in all departments. However 'seven' more attributes (3.7.15 to 3.7.21) was selected for theses belonging to Department Agricultural Extension. The attributes are mentioned as below:

3.7.1 Number of words in title of theses
3.7.2 Title with scientific names
3.7.3 Number of words in abstract
3.7.4 Number of objectives
3.7.5 Number of references
3.7.6 References based on years
3.7.7 Types of sources in references
3.7.8 Types of errors in reviews
3.7.9 Number of pages
3.7.10 Number of tables, figures, plates, appendices and abbreviations

3.7.11 Types of research design

3.7.12 Statistical methods used

3.7.13 Locale of study

3.7.14 Crops or areas

3.7.15 Sample size

3.7.16 Nature or types of respondents

3.7.17 Sampling Methods

3.7.18 Data collection techniques

3.7.19 Types of data

3.7.20 Number and types of dependent variables

3.7.21 Number of independent variables

3.7.1 Number of words in title of theses

Title refers to the name of the theses and word is a distinct meaningful element of writing, used with others (or sometimes alone) to form a sentence and normally shown with a space on both side when inscribed or printed. The total number of words in the title was counted using MS word. The number of words in the title was categorised as high, medium and low with mean and standard deviation as check and the result was presented in frequency and percentage. Likewise, for understanding the variations on number of words in the title of the entire theses, a histogram was plotted and the skewness was identified.

3.7.2 Theses with scientific names in the title

Scientific name is a name used by scientists, especially the taxonomic name of an organism that consists of the genus and species. The total number of theses with scientific name was identified department wise and the results of theses with scientific name in the title were expressed as frequency and percentages.

3.7.3 Number of words in abstract

An abstract in this study refers to a brief summary of thesis and is often used to help the reader quickly determine the paper's purpose. The total number of words in an abstract was counted using MS word. The numbers of words in an abstract were counted department wise and the theses were categorised into high, medium and low worded abstract using mean and standard deviation as check. The frequency and percentage under each category were calculated.

For a meaningful understanding, the mean number of words in an abstracts of the entire theses from each department under the five divisions was computed. A quartile deviation was used and a box plot was plotted to designate the distribution of the mean number of words in the abstracts diagrammatically.

Category	Criteria
Low	<Q1
Medium	Between Q1 and Q3
High	>Q3

3.7.4 Number of objectives

Objectives in this study refer to the research objectives that were set forth for the study and are mentioned in the theses. They are the results sought by the researcher at the end of the research process *i.e.* what the researchers will be able to achieve at the end of the research study. The number of objectives in the theses was counted by examining the theses. The numbers of objectives in each thesis were counted department wise and they were then categorised into theses with high, medium and low objectives using mean and standard deviation. The frequency and percentage under each category were calculated and for summarization of the number of objectives in the entire theses. A histogram was plotted and the skewness was measured to ascertain variations between theses of different divisions.

3.7.5 Number of references

References here refer to the list of all the sources from which the researchers obtained information for their research work and it is represented in the last page of the thesis. The total number of references in each thesis was counted manually by the researchers. The department wise theses were then categorised into high, medium and low using mean and standard deviation. The frequency and percentage of theses under each category was calculated. The mean number of references of the theses under each division was computed and the results were presented as a box plot using quartile as a measure.

Category	Criteria
Low	<Q1
Medium	Between Q1 and Q3
High	>Q3

3.7.6 References based on years

Reference based on years, in this study is operationalized as the date in which the sources of references were published. The sources of references were counted and categorised based on the year of publication. The frequency and percentage was also calculated under each category of years as listed below:

Sl. No.	Category	Count
1	Up to 1900	
2	1900-1925	
3	1926-1950	
4	1951-1975	
5	1976-2000	
6	After 2001	

3.7.7 Source of references

Source of references refer to the different sources the researchers have consulted while writing his/her thesis. The sources may be in the form of a

printed book, thesis, journals, web documents, reports, proceedings from seminar or conferences, magazines, newspapers and other similar sources. The references were categorised and counted based on the types of sources and the results were expressed in frequency and percentage. The different sources from which the references were enumerated are presented below:

Sl. No.	Types of Sources	Count
1	Books	
2	Journals	
3	Thesis	
4	Reports	
5	Seminar/Conferences	
6	Magazines	
7	Newspapers	
8	Online sources-URL	
9	Others	

3.7.8 Types of errors in references

Error in references or bibliography refers to the inaccuracies in the sources of reference that are deflecting from the format of writing a bibliography. For citing the sources in references of thesis submitted at College of Agriculture, Vellayani and KAU a specific format need to be followed known as the Name-Year (N-Y) System or the Harvard System. While analyzing both in- text citation as well as in-reference citation, if mistakes were observed it was considered to be an error in referencing. In this study five types of error were analyzed *viz.* chronological errors, alphabetical errors, without page numbers, errors in abbreviating and errors in titling journals/books and the numbers of references with those particular errors in theses were counted and results presented in frequency and percentage.

3.7.9 Number of pages in theses

Number of pages refers to the sequence of numbers given to the pages of a thesis. The number of pages from introduction chapter to the references was

counted by analyzing the theses. The mean number of pages in each thesis under each department was counted. The category was designated into low, medium and high based on the mean number of pages using quartile. A box plot was also plotted to designate the distribution diagrammatically.

Category	Criteria
Low	<Q1
Medium	Between Q1 and Q3
High	>Q3

3.7.10 Number of tables, figures, plates, appendices and abbreviations

A list of table is a reference device that helps the readers to quickly and easily navigate to data in the thesis. List of figures allow readers to easily navigate to those pages containing charts and images that are interested to them. Plates here refers to the original photograph presented by the researcher in his/her thesis for a more descriptive and meaningful explanation of results. Appendix serves as a space for materials that help to clarify the research, but do not belong to the main text. List of abbreviations refers to the importance of various abbreviations and acronyms used throughout the thesis. The total number of the tables, figures, plates, appendices and abbreviations were taken from the theses and the average of all was calculated by dividing the sum with the number of theses under each division.

3.7.11 Types of research design

The prime essential of any research is the use of an appropriate research design. Research design in this study, refers to the set of procedure or methods used in collecting and analyzing measures of variables in the problem research. The research design used by each thesis under different divisions was examined, categorised and expressed in terms of frequency and percentage.

3.7.12 Statistical methods used

Statistical methods refer to the various statistical tools or techniques like frequency, percentage, analysis of variance, F-test and alike that were used to analyze the data of various research work. Each of the theses under different divisions of the study was examined for the types of statistical methods used for analysis and the results were presented in frequency and percentage.

3.7.13 Locale of study

Locale of study here refers to the place of study mentioned as district where the researches were conducted. The locale of study was listed from the theses and the results were expressed in frequency and percentage.

3.7.14 Crops or areas

It refers to the different types of crops taken for the study or the different areas of study other than crops that have been focused upon by the researchers. After careful enumeration of the crops or areas under study, the data were expressed in terms of frequency and percentage.

3.7.15 Sample size

Sample size in this study refers to the number of respondents' selected for the study that was presented in the thesis of Department of Agricultural Extension. The sample size was recorded and categorised into high, medium and low using mean and standard deviation and the results expressed in terms of frequency and percentage.

3.7.16 Nature or types of respondents

Nature of respondents refers to the types of respondents such as farmers, students, teachers, labourers and alike considered for any kind of research in department of Agricultural Extension. The types of respondents was recorded, categorised and expressed in terms of frequency and percentage.

3.7.17 Sampling Methods

Sampling methods refers to the procedure of selecting a representative group (sample) from the population under the study that was observed in Agricultural Extension theses. The different sampling methods were recorded and expressed as frequency and percentage.

3.7.18 Data collection techniques

Data collection techniques refer to the techniques such as interviews, questionnaires and alike that was used in the process of gathering and measuring variables of interest. The results on data collection techniques were recorded from the theses under Department of Agricultural Extension. The results were expressed in terms of frequency and percentage.

3.7.19 Types of data

It refers to the two types of data *i.e.* primary and secondary data. Primary data is the data that was collected by the investigator themself for a specific purpose whereas secondary data refers to the data collected by someone else for some other purpose but being exploited by the investigator for another purpose. The types of data used in the theses were recorded and presented in terms of frequency and percentage.

3.7.20 Number and types of dependent variables

Dependent variables are the variables that depend on other factors that are measured. These variables are expected to change as a result of an experimental influence of the independent variables. The number of dependent variables present in the theses were recorded and categorised into high, medium and low using mean and standard deviation. The types of dependent variables were also recorded and expressed in terms of frequency and percentage.

3.7.21 Number of independent variables

Independent variables are the variable that is stable and unaffected by the other variables. The number of independent variables present in theses of extension department was recorded. The theses were then categorised into high, medium and low in terms of the number of independent variables using mean and standard deviation as check.

3.8 OPERATIONALIZATION AND MEASUREMENT OF MAIN VARIABLES

The three main variables selected for the study with its measurement is revealed below:

3.8.1 Perceived usefulness of PG research

Perceived usefulness in this study can be operationalized as the degree to which students or teachers believes that the research work done influence them personally, the farming community and the institutions as a whole. The parameters were rated in a four point continuum with a score range from zero for not useful to three for very useful. Thus, the maximum and minimum score that could be attained by the respondents was 'one hundred and eighty' and 'zero' for students (n=60) and 'one hundred and thirty five' and 'zero' for teachers (n=45) respectively. The perceived usefulness of PG research as perceived by the respondents were then grouped under different parameters and the results under each parameter was expressed in frequency and percentages.

Parameter	Very Useful (3)	Useful (2)	Less Useful (1)	Not Useful (0)
For personal benefits				
For the farming community				
For the research institutions				

3.8.2 Attitude of students towards PG research

Attitude in this study refers to the positive or negative mental predisposition of the students towards research. It was measured based on the student's attitude towards PG research and the teacher's perception about the attitude of students towards research.

For measuring the student's attitudes towards research, a five point likert scale was used with a score set ranging from one to five for the continuum 'strongly disagree to strongly agree'. A set of four statement each (appendix IV) for the five sub components in attitude namely, research usefulness, research anxiety, positive attitude towards research, relevance to life and difficulty of research were rated in the five point continuum as given below:

Response	Score
Strongly Agree (SA)	5
Agree (A)	4
Neither agree nor disagree (N)	3
Disagree (D)	2
Strongly disagree (SD)	1

. The total score was obtained by summing up the values for different statements. Overall the maximum and minimum score that could be attained by a respondent was '300' and '60' respectively.

However, for measuring the teacher's perception in general about the attitude of students towards research, a general question was asked on their attitude towards PG research which was rated in a three point continuum *viz.*, very good, good and poor with a score of three, two and one respectively. The maximum and minimum score that could be attained by a respondent was 135 and 45 respectively.

3.8.3 Ability of students to do research

Ability here refers to the skills, the students attained for doing research. The ability of students to do research as perceived by teachers was measured using the five point Likert scale. The scoring was done as presented below.

Response	Score
Very Poor (VP)	1
Poor (P)	2
Not Very Poor (NVP)	3
Satisfactory (S)	4
Very satisfactory (VS)	5

A total of thirteen statements (appendix IV) were included. The maximum and minimum score that could be attained by the respondent was 'sixty five' and 'thirteen' respectively. Based on the overall range, mean value and standard deviation, the respondents were grouped and categorised into low ability, ability and high ability.

3.9 OPERATIONALIZATION OF PERSONAL AND SOCIAL CHARACTERISTICS OF STUDENTS AND TEACHERS

In order to find out the influence of the profile characteristics of the respondents, the characteristics of students and teachers were identified as detailed below:

A list of eight and seven variables related to the personal and social characteristics of the both students and teachers respectively were collected after detailed review of literature and discussion with subject matter specialists in tune with the objectives of the study. The personal and social characteristics along with their measurement selected for the study are presented in table 1 for both students and teachers.

Table 1: Personal and social characteristics of students and teachers

Sl. No.	Characteristics of students	Sl. No.	Characteristics of teachers
1.	Age	1.	Age
2.	Gender	2.	Gender
3.	Caste	3.	Educational qualifications
4.	Marital status	4.	Guide ship commencement
5.	Native places	5.	Number of students guided
6.	Educational Background	6.	Number of students currently guiding
7.	Parental annual income	7.	Externally aided project
8.	Research skills		

3.9.1 Age of students and teachers

Age in this study is operationally defined as the number of years completed by the respondent at the time of investigation and was classified into three category based on minimum, maximum and range.

Sl. No.	Category in years-students	Category in years-teachers
1.	22-23	42-47
2.	24-25	48-53
3.	26-27	54-59

The respondents were categorised into different category and the results were expressed as frequency and percentage.

3.9.2 Gender of students and teachers

Gender in this study is operationalized as the biological distinction of respondents as either male or female. The respondents were categorised as either male or female with the results expressed in frequency and percentage.

3.9.3 Caste of students

Caste in this study is operationalized as a social category to which a person belongs involuntarily *viz.* Schedule Caste (ST), Schedule Tribes (ST),

Other Backward Classes (OBC), General (G) and others. The frequency and percentage of each category was calculated and reported.

Sl. No	Caste
1.	Schedule Caste (SC)
2.	Schedule Tribe (ST)
3.	Other Backward Classes (OBC)
4.	General (Gen)
5.	Others

3.9.4 Marital Status of students

Marital status in this study refers to the respondent state of being married or not married at the time of investigation. The results were computed and the marital status of the respondents was expressed in frequency and percentage.

3.9.5 Native place of students

Native places refer to the village, town or city that the respondents belong. The frequency and percentage of respondents under each category was calculated and reported.

Sl. No	Native places
1	Village
2	Town
3	City

3.9.6 Educational background of students

Educational background in this study refers to the education the respondents have undergone. It begins with Kindergarten and usually ends with Masters or Ph.D. degree. Likewise, the respondents were categorised into two groups based on the types of schools/universities and based on medium of

instructions during schooling and the results was expressed in frequency and percentage.

The educational background of students based on the types of schools/universities is presented below:

Category	Types of schools/universities
Up to 12th class	Government/Aided private/Unaided private
Undergraduate	Government/Aided private
Post-graduate/Ph. D.	Government

The educational background based on medium of instructions during schooling is presented below:

Medium of instructions	Code
English	1
Vernacular	2

3.9.7 Parental annual income of students

Parental annual income in this study can be operationalized as the income in rupees per annum earned by student's parents. The parental annual income as perceived by the respondent was categorised into two categories above mean and below mean with mean as check and the results were expressed in frequency and percentage.

Parental annual income (in lakhs)	Category
Mean annual income	Above mean
	Below mean

3.9.8 Research skills of students

Research skills in this study refer to the ability to search for, locate, extract, establish, evaluate and use of present information that is relevant to a particular topic. Two types of research skills namely, information seeking skills and methodology skills were taken for the study.

Information seeking skills can be operationalized as the skills that help the students to identify, find, evaluate and manage the information needed for effectively and efficiently find the right material for their research work whereas methodology skills are the skills to evaluate, interpret, explain, identify and analyzed the results of the study.

The research skills were measured using five point Likert scales. A total of twelve statements and thirteen statements (appendix IV) each were specified for information seeking skills and methodology skills respectively. The respondents were asked to rate the statements on a 5-point continuum. The maximum and minimum score that could be attained by a respondent for information seeking skills was 'sixty' and 'twelve' respectively. The maximum and minimum score that could be attained by a respondent for methodology skills was 'sixty five' and 'thirteen' respectively.

The scoring for information seeking skills as well as methodology skills is presented below:

Information seeking skills		**Methodology skills**	
Response	**Score**	**Response**	**Score**
Strongly agree (SA)	5	Very Poor (VP)	1
Agree (A)	4	Poor (P)	2
Neither agree nor disagree (N)	3	Not Very Poor (NVP)	3
Disagree (D)	2	Satisfactory (S)	4
Strongly disagree (SD)	1	Very satisfactory (VS)	5

3.9.9 Educational qualifications of teachers

Education in this study refers to the extent of formal education possessed by the respondent at the time of survey. The respondents were categorised into different category and expressed by frequency and percentage.

Sl. No.	Category	Universities
1	Master of science (M.Sc.)	KAU/ Other
2	Doctor of Philosophy (Ph. D)	KAU/ Other
3	Post- Doctorate	KAU/ Other

3.9.10 Guideship commencement

Guideship refers to the position acquired by the teachers mainly to supervise and direct the students regarding their research work. The number of years of experience completed by the teacher at the time of starting the guideship is term as guideship commencement. The years have been classified into two categories above and below mean with mean as check and the results have been expressed in terms of frequency and percentage.

3.9.11 Number of students guided

Number of students guided refers to the total number of PG and Ph.D. students the teachers have guided. The number of student have been classified into two categories above mean and below mean with mean as check and expressed in terms of frequency and percentage.

3.9.12 Number of students currently guiding

It refers to the total number of PG and PhD students the teachers currently guiding. The number of students was classified above mean and below mean with mean as check and expressed in terms of frequency and percentage.

3.9.13 Externally aided project

Externally aided projects refer to the projects that were financed by the State government or any other agencies in the states for augmenting the States' resources and it plays an important role in the development process. The result based on the number of projects undertaken by the teachers as Principal Investigators (PI) has been calculated and average number of projects per teachers were determine accordingly.

3.10 OPERATIONALIZATION OF OTHER VARIABLES AS PERCEIVED BY BOTH STUDENTS AND TEACHERS

Besides the main variables along personal and social characteristics of students and teachers another set of variables of researcher's interest was purposively taken for the study. The operationalization of variables and its measurement as perceived by both students and teachers was presented below:

3.10.1 Resource availability

Resource availability refers to the availability of fund, research material, raw materials and literatures for the purpose of conducting a research. A score of 'one' was given to response 'yes' and 'zero' to response 'no' respectively regarding the availability of resources. The extent of availability of resources for yes response was then calculated based on three point continuum that is very much available, available and less available with a scores 3, 2 and 1 respectively.

The maximum and minimum score that could be attained by a student respondents was 'one hundred and eighty' and 'sixty' and 'one hundred and thirty five' and 'forty five' by teacher respondents respectively. The results were then presented in frequency and percentage for parameters under extent of availability.

3.10.2 Resource attainment difficulty

Resource attainment difficulty refers to the difficulty in attaining the fund, research material, raw materials and literatures for the purpose of conducting a research. Regarding the questions on whether there is any difficulty in getting the resources a score of 'one' was given to response 'yes' and 'zero' to response 'no' respectively. If yes, the extent of difficulty in attaining resources for PG research was calculated using a three point continuum very difficult, difficult and less difficult with a scores of 1, 2 and 3 respectively.

The maximum and minimum score that could be attained by a student respondent was 'one hundred and eighty' and 'sixty' and 'one hundred and thirty five' and 'forty five' by a teacher respectively. The results were presented in frequency and percentage for various parameters under extent of difficulty.

3.10.3 Research work environment as perceived by students

Research work environment in this study refers to the surrounding conditions where the researchers work. It can be technical, human and organizational environment. For the question on whether the research work environment is doable a score of 'one' was given to every 'yes' response and 'zero' for 'no' response. If response yes, the extent of workability was then calculated using three point continuums *viz.* very much, much and not much with a scores of three, two and one respectively.

The maximum and minimum score that could be attained by a student respondent was 'one hundred and eighty' and 'sixty' respectively. The results were expressed in terms of frequency and percentage.

3.10.4 Acquaintance support as perceived by students

Acquaintance support in this study refers to the extent of help the students is getting from his/her classmates, teachers, departments and other departments. A score of one was given to every 'yes' response and zero for 'no' response regarding the questions on whether the respondents get any help or

support from others. For measuring the extent of support for the response 'yes' the scoring procedure followed was presented below:

Category	Score
Very much	3
Much	2
Not much	1

The maximum and minimum score that could be attained by a student respondent was 'one hundred and eighty' and 'sixty' respectively and the results were also expressed in terms of frequency and percentage.

3.10.5 Researcher satisfaction

Researcher's satisfaction refers to a short-term attitude resulting from an evaluation of students' educational experience, services and facilities. For measuring the researchers satisfaction on whether they are satisfied or not with their research work a score of 'one' was given to every 'yes' response and 'zero' for 'no' response. The scoring for the extent of satisfaction with a response yes is presented below:

Category	Score
Very much	3
Much	2
Not Much	1

The maximum and minimum score that could be attained by a student respondent was 'one hundred and eighty' and 'sixty' respectively. The results were also conveyed in frequency and percentage.

3.10.6 Publishing difficulty as perceived by students

It refers to the difficulty that the students encountered while publishing their research paper. A score of 'one' was given to every 'yes' response and 'zero'

for 'no' response concerning the questions on whether the researchers faced any difficulty in publishing. The extent of difficulties for response yes were calculated using a three point continuums with a score of one, two and three respectively.

The maximum and minimum score that could be attained by a student respondent was 'one hundred and eighty' and 'sixty' respectively. The results were also expressed in terms of frequency and percentage.

3.10.7 Usefulness of conferences or seminars as perceived by students

It refers to the extent of usefulness of conferences or seminars for PG research as perceived by the students. The scoring procedure was illustrated below.

Category	Score
Very Useful	3
Useful	2
Less Useful	1

The maximum and minimum score that could be attained by a student respondent was 'one hundred and eighty' and 'sixty' respectively. The results were also presented in frequency and percentage.

3.11 CONSTRAINTS OF PG RESEARCH

In order to find out the constraints of PG research, a set of questions that was open ended was administered to both students and teachers. The constraints were listed based on the response as perceived by students and teachers respectively. The responses of the respondents were recorded and categorized based on commonality. The frequency and percentage of each constraint was calculated based on the responses of the subjects. The constraints were later expressed as rank based upon the total percentage.

3.12 SUGGESTIONS FOR IMPROVEMENT

Suggestions for improvement as perceived by teachers were delineated. The same was documented after discussing with experts for arriving at major strategies as suggestive for improvement.

3.13 DATA COLLECTION PROCEDURED

A checklist was prepared based on the review of literature and it was used for desk study on the content pattern (appendix V). Also a well-structured pretested questionnaire prepared was used for data collection (appendix III and IV) from both categories of respondents. After preparation of a draft questionnaire it was pre tested by conducting a preliminary study in a non-sample population and suitable modifications were made in the questionnaire, which was finalized after the discussion with the subject matter specialists. A separate questionnaire has been prepared for students and teachers respectively. The questionnaire was then directly administered to the Post-graduate students and teachers. There were multiple choice questions, open ended questions and questions with rating scale.

3.14 STATISTICAL TOOLS USED IN THE STUDY

The collected data were scored, tabulated and analyzed using statistical methods as described below.

3.14.1 Mean

Mean is a numerical average of a set of values. The respondents were grouped into categories with reference to mean as check of the selected personal and social characteristics. After grouping into categories their frequencies and percentages were worked out.

3.14.2 Frequency

A frequency is the number of times a data value occurs in a particular cell. It is denoted by a letter f.

3.14.3 Percentage analysis

After grouping the theses based on selected parameters and respondents based on perceived usefulness, attitude and some personal and social characteristics into various categories, a simple percentage was worked out to find out the percentage distribution of both the theses and respondents. Percentage analysis was also used for interpretation of the results of some variables.

3.14.4 Quartiles

Quartiles were used to find out the variables in order to divide the data set into three quarters. This was used to categories the theses based on the mean number of words in an abstracts, mean number of references and mean number of pages. It was also used for dividing the theses into high, medium and low with respect to different parameters and also for finding out which departments or divisions falls under these category.

3.14.5 Standard deviation

Standard deviation is a measure of dispersion to provide an idea about the variability of parameter such as number of words in title and abstract, number of objectives, number of references and alike.

4.3.6 Correlation analysis

Correlation analysis was done to explain the relationship between the sub-components of attitude and the overall attitude of the students. Correlation coefficient is utilized to gauge the quality of the relationship between two variables. The significance of the correlation coefficient was tested at 5 per cent and 1 per cent levels of significance.

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

3.14.6 Skewness

Skewness can be defined as departure from symmetry or lack of symmetry of frequency distribution. It was checked for distribution of theses based on number of words in the title and number of objectives. A distribution is said to be positives if the frequency curve has a longer tail on the right hand side as compared to the left hand side and negative if vice versa. A normal distribution has a skewness of 0, so if the distribution is closed to zero then it is probably close to normal. The distribution is said to be highly skewed if the skewness value is less than -1 or greater than +1, and moderately skewed if it is between -1 to -½or between +½and +1. The distribution is said to be roughly symmetric if the skewness is between -½ and½ (Brown, 2016).

3.15 HYPOTHESIS SET UP FOR THE STUDY

Lundberg's (1942) defined that "Hypothesis is a hunch, guess, imaginative ideas, which becomes the basis for action or investigation". Whereas Kerlinger (1973) defined, "Hypothesis is a conjectural statement of the relation between two or more variables".

In the view of deliberations made in chapter on review of literature and prospective arguments that could arise out of the study, the following hypotheses were set up and investigation was made to test these hypotheses.

H1: There exist no difference in the perception on usefulness of PG research as perceived by students and teachers.

H2: The content pattern attributes is not appropriate enough to explain the qualitative features of theses submitted by all departments

H3: There exists no gap for the future thrust area for PG research as perceived by KAU scientist in relation to ex-post-facto themes covered for the last 10 years.

H4: The thrust areas framed by the University for PG research is fully touched or covered.

H5: All the sub component construct scores for measuring the attitude of students towards PG research are above the overall median.

H6: All the sub-component constructs of students attitude towards PG research does not have a significant influence on the overall attitude of the students

RESULTS & DISCUSSIONS

CHAPTER - IV

RESULTS AND DISCUSSIONS

This chapter deals with the results and discussions based on the analysis of data obtained after research. The results are normally written and are supported by tables and/or graphs which points to the key findings that help in proper inference. The discussions that follow will help the researcher to interpret and explain the significance of findings on the research problem being investigated. In this study the results and discussions together forms the chapter to facilitate an easy understanding of the interpretation drawn from the study. Therefore, the results and discussions are presented under the following heads.

4.1 Trends in PG research

4.2 Content patterns of post graduate research studies in terms of different attributes

4.3 Main variables

4.4 Personal and social characteristics of students and teachers

4.5 Other important variables of the study

4.6 Constraints of PG research

4.7 Suggestions for improvement

4.8 Hypothesis set up for the study

4.1 TRENDS IN PG RESEARCH

Trends in PG research in this study is operationalised as a pattern of gradual change in a research process or the general tendency of data to move in certain direction overtime. The trends based on research themes and thrust areas envisage the different motivations for choosing the area of research interest or the necessity of doing research in the area identified as important.

The results on trends of PG research for the period of 10 years from 2012 to 2017 is presented under the following sub-heads:

4.1.1 Number of theses published per year

4.1.2 Year wise categorization of theses under each division

4.1.3 Year wise categorization of theses under each PC groups

4.1.4 Categorization of touched and untouched thrust areas under each PC groups

4.1.5 Comparison between similar PC groups

4.1.6 Gaps in research themes

4.1.1 Number of theses published per year

The number of theses published in this study refers to a unit that forms a part of the system of counting year wise. The results for number of PG theses published at College of Agriculture, Vellayani from 2012 to 2017 is shown in table 2.

Table 2: Distribution of PG theses published from 2012 to 2017

N=287

Sl. No.	Year	f	%
1	2012	21	7.32
2	2013	38	13.24
3	2014	46	16.03
4	2015	43	14.98
5	2016	68	23.69
6	2017	71	24.74
Total		287	100

On analysis of table 2 it was observed that there were 287 theses published from 2012 to 2017 at College of Agriculture, Vellayani. The total number of

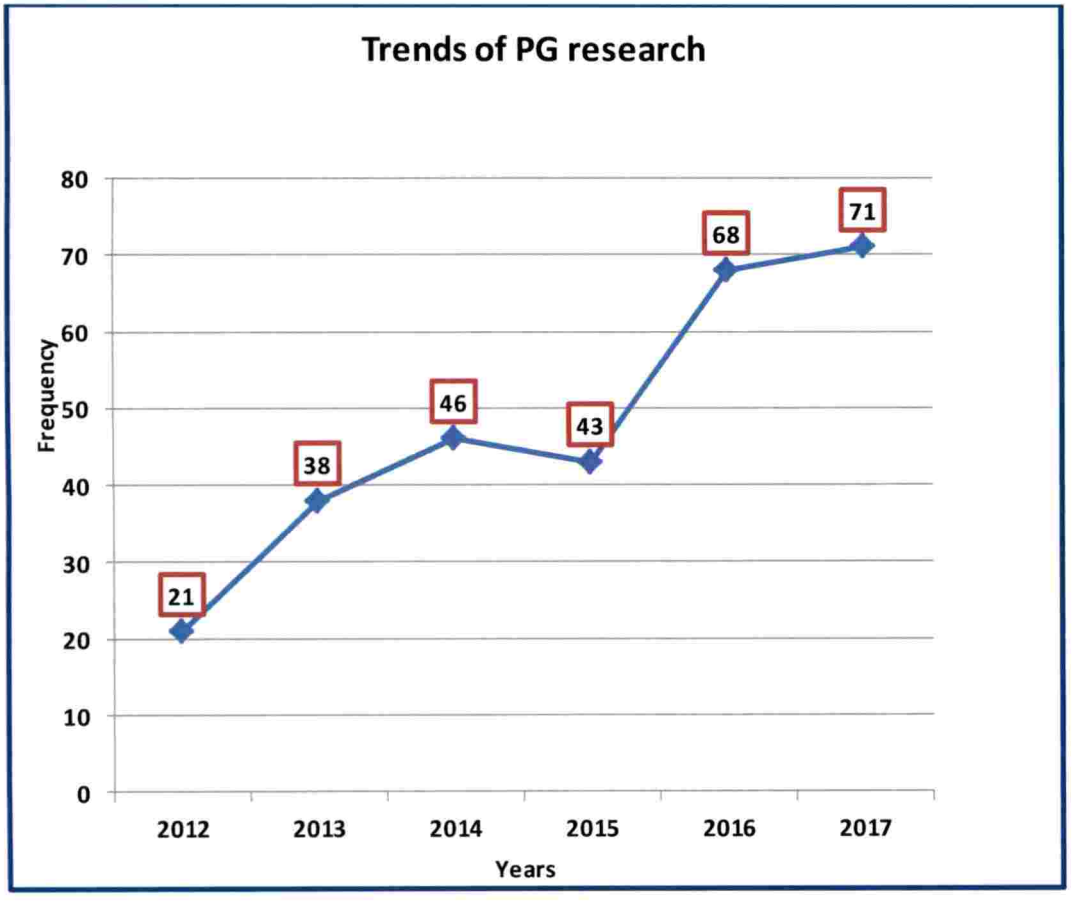


Fig.4: Trends of PG theses published from 2012-2017 (N=287)

theses published in 2017 was 71 followed by 68 theses in 2016, 46 theses in 2014, 43 theses in 2015, 38 theses in 2013 and only 21 theses published in 2012. Looking at fig.4 it was observed that the number of theses published during 2012 to 2017 showed an increasing trend. However, a slight decline was observed for number of theses in the year 2015.

The main cause shown for the increasing trend in terms of the number of theses submitted year wise could be due to the increasing number of students admitted and the increasing number of seats for PG admission as year progresses. The above results also revealed that the number of theses published slightly declined in 2015 which might be due to student's attrition or dropping out from university after getting a job or because of marriage.

4.1.2 Year wise categorization of theses under each division

Division in this study is operationalized as those theses that can be grouped into one. Under each division the thesis were categorized both year wise and department wise and the results were presented under the table 3, 4, 5, 6 and 7 respectively.

Table 3: Categorization of theses under crop production division

Sl. No.	Year	Agronomy n=41		SSAC n=25		Horticulture n=43		Overall N=109	
		f	%	f	%	f	%	f	%
1	2012	6	14.64	1	4.00	6	13.95	13	11.93
2	2013	7	17.07	3	12.00	5	11.63	15	13.76
3	2014	5	12.19	3	12.00	8	18.61	16	14.68
4	2015	4	9.76	4	16.00	7	16.28	15	13.76
5	2016	9	21.95	7	28.00	10	23.25	26	23.85
6	2017	10	24.39	7	28.00	7	16.28	24	22.02
Total		41	100	25	100	43	100	109	100.00

It can be inferred from the above table that a total 109 theses was published in crop production. Out of which 41 theses was published in

Department of Agronomy, 25 theses in Department of Soil Science and Agricultural Chemistry and 43 theses in Department of Horticulture. Overall, 23.85 per cent of the theses were published in the year 2016 followed by 22.02 per cent published in 2017, 14.68 per cent in 2014, 13.76 per cent in 2013 and 2015 respectively and only 11.93 per cent in 2012.

Department wise analysis revealed that out of the 41 theses in Agronomy, 24.39 per cent were published in 2017 followed by 21.95 per cent in 2016, 17.07 per cent in 2013, 14.64 per cent in 2012, 12.19 per cent in 2014 and 9.76 per cent in 2015. Out of 25 theses in SSAC, 28.00 per cent were published in 2016 and 2017, 16.00 per cent in 2015, 12.00 per cent in 2013 and 2014 and 4.00 per cent in 2012. Likewise, in Horticulture it was observed that out of 43 theses, 23.25 per cent were published in 2016 followed by 18.61 per cent in 2014, 16.28 per cent in 2015 and 2017, 13.95 per cent in 2012 and 11.63 per cent published in 2013.

An overall analysis of the study over different years elucidated that there was a slight decline in the percentage of theses submitted for the periods from 2014 to 2015 in case of Agronomy and Horticulture respectively.

Hence, it can be inferred that there was an increasing trend in terms of number of theses submitted as year progressed from 2012-13 to 2016-2017 under crop production division.

Table 4: Categorization of theses under crop protection division

Sl. No.	Year	Entomology n=35		Plant Pathology n=25		Overall N=60	
		f	%	f	%	f	%
1	2012	0	0.00	1	4.00	1	1.67
2	2013	6	17.14	5	20.00	11	18.33
3	2014	5	14.28	5	20.00	10	16.67
4	2015	7	20.00	5	20.00	12	20.00
5	2016	8	22.86	3	12.00	11	18.33
6	2017	9	25.72	6	24.00	15	25.00
Total		35	100	25	100	60	100

On review of table 4, it can be seen that under crop protection division a total of 60 theses were published from 2012 to 2017. Out of which 35 theses were from Department of Entomology and 25 theses were from Department of Plant Pathology.

In general, it was observed that 25.00 per cent of the theses were published in 2017 followed by 20.00 per cent in 2015, 18.33 per cent in 2013 and 2016, 16.67 per cent in 2014 and only 1.67 per cent in 2012. Department wise revealed that there were 25.72 per cent theses published in Department of Entomology during the year 2017 followed by 22.86 per cent in 2016, 20.00 per cent in 2015, 17.14 per cent in 2013 and 14.28 per cent in 2014. Likewise, in Department of Plant Pathology, 24.00 per cent of the theses were published in 2017 followed by 20.00 per cent in 2013, 2014 and 2015 respectively, 12.00 per cent in 2016 and only 4.00 per cent published in 2012.

Over the years an overall analysis clarified that there was a slight decline in the percentage of theses submitted for the periods from 2013 to 2014 in Department of Entomology and 2015-2016 in Department of Plant Pathology respectively. Nonetheless it can be inferred that as year progressed from 2012-13 to 2016-2017 there was an increasing trend in terms of number of theses submitted under crop protection division.

Table 5: Categorization of theses under crop improvement division

Sl. No.	Year	PBG n=23		Plant Physiology n=7		Microbiology n=6		PBT n=11		Overall N=47	
		f	%	f	%	f	%	f	%	f	%
1	2012	2	8.68	0	0.00	0	0.00	0	0.00	2	4.26
2	2013	3	13.04	0	0.00	0	0.00	2	18.18	5	10.64
3	2014	5	21.74	1	14.29	1	16.67	1	9.09	8	17.02
4	2015	1	4.35	1	14.29	1	16.67	0	0.00	3	6.38
5	2016	7	30.44	4	57.13	2	33.33	4	36.36	17	36.17
6	2017	5	21.75	1	14.29	2	33.33	4	36.36	12	25.53
Total		23	100	7	100	6	100	11	100	47	100

From table 5 it can be seen that there were 47 theses in crop improvement division of which 23 theses were from Department of Plant Breeding and Genetics, 7 theses from Department of Plant Physiology, 6 from Department of Microbiology and 11 from Department of Plant Biotechnology.

Overall the results displayed that 36.17 per cent of the theses were published in 2016 followed by 25.53 per cent in 2017, 17.02 per cent in 2014, 10.64 per cent in 2013, 6.38 per cent in 2015 and only 4.26 per cent in 2012. Considering the department alone it was observed that 30.44 per cent of the theses from Department of Plant Breeding and Genetics were published in 2016 followed by 21.75 per cent in 2014 and 2017, 13.04 per cent in 2013, 8.68 per cent in 2012 and 4.35 per cent in 2015. In Department of Plant Physiology 57.13 per cent of the theses were published in 2016 followed by 14.29 per cent in 2014, 2015 and 2017 respectively. Of the entire theses in Microbiology 33.33 per cent were published in 2016 and 2017 and 16.67 per cent were published in 2014 and 2015 respectively. In Department of Plant Biotechnology it was observed that 36.36 per cent of the theses were published in 2016 and 2017 respectively, 18.18 per cent in 2013 and 9.09 per cent in 2014.

A comprehensive analysis of the theses over different years explicate that there was a slight decline in the percentage of theses published under Department of Plant Breeding and Genetics from 2014-2015 and 2016-2017 whereas for the theses published in Department of Plant Physiology the decline was observed from 2016- 2017 and 2013-2014 in Department of Plant Biotechnology.

Hence, from a cursory investigation it can be inferred that there was an increasing trend in the number of PG theses published under crop improvement division from 2012-2016 and slightly drop from 2016-2017.

Table 6: Categorization of theses under social science division

Sl. No.	Year	Agricultural Extension n=34		Agricultural Economics n=9		Community Science n=23		Overall N=66	
		f	%	f	%	f	%	f	%
1	2012	2	5.88	2	22.22	1	4.35	5	7.58
2	2013	3	8.82	0	0	4	17.39	7	10.61
3	2014	6	17.65	1	11.11	5	21.74	12	18.18
4	2015	6	17.65	3	33.33	4	17.39	13	19.69
5	2016	7	20.59	1	11.11	5	21.74	13	19.69
6	2017	10	29.41	2	22.22	4	17.39	16	24.24
Total		34	100	9	100	23	100	66	100

On perusal of the above it was observed that there were 66 theses published in social science division out of which 34 theses were from Department of Agricultural Extension, 9 from Department of Agricultural Economics and 23 theses were from Department of Community Science. Overall outlook of the table reveal that 24.24 per cent of the theses were published in 2017, 19.69 per cent in 2015 and 2016, 18.18 per cent in 2014, 10.61 per cent in 2013 and 7.58 per cent in 2012.

Exclusively, in Department of Agricultural Extension 29.41 per cent of the theses were published in 2017 followed by 20.59 per cent in 2016, 17.65 per cent in 2014 and 2015, 8.82 per cent in 2013 and 5.88 per cent in 2012. Likewise, in Department of Agricultural Economics, 33.33 per cent of the theses were published in 2015 followed by 22.22 per cent each in 2012 and 2017 and 11.11 per cent in 2014 and 2016 respectively. Department of Community science revealed that of the total 23 theses, 21.74 per cent were published in 2014 and 2016, 17.39 per cent in 2013, 2015 and 2017 respectively and only 4.35 per cent in 2012.

An overall analysis of the theses over the years explained that there was a slight decline in the percentage of theses published from 2012-2014 and 2015-2016 in Department of Agricultural Economics and 2014-2015 and 2016-2017 in

Department of Community Science. However, it can be inferred that as the year progressed from 2012-2017, there was an increasing number of theses published under social science division.

Table 7: Categorization of theses under Agricultural Statistics department

N=5

Sl. No.	Year	f	%
1	2012	0	0
2	2013	0	0
3	2014	0	0
4	2015	0	0
5	2016	1	20
6	2017	4	80
Total		5	100

From the table above it can be inferred that there were only 5 theses in Department of Agricultural Statistics out of which 80.00 per cent theses were published in 2017 and 20.00 per cent were published in 2016. This clearly showed that from 2016-2017 there are an increasing number of theses published from Department of Agricultural Statistics.

On perusal of fig.5 it was observed that irrespective of the difference in the total number of theses published from 2012-2017 under each division the graph showed an increasing trend which is similar with the study conducted by Siddaramaiah and Raghavendra (1983) and Verma (2017). Also maximum number (109) of theses was published in crop production division followed by 66 theses in social science division, 60 theses in crop production division, 47 theses in crop improvement and only 5 theses in Department of Agricultural statistics.

Furthermore, it may very well be inferred that the fundamental explanations behind the distinctions in number of theses published under the five divisions relies upon the number of teachers engaged in that particular department or number of students admitted varied with the change in departments.

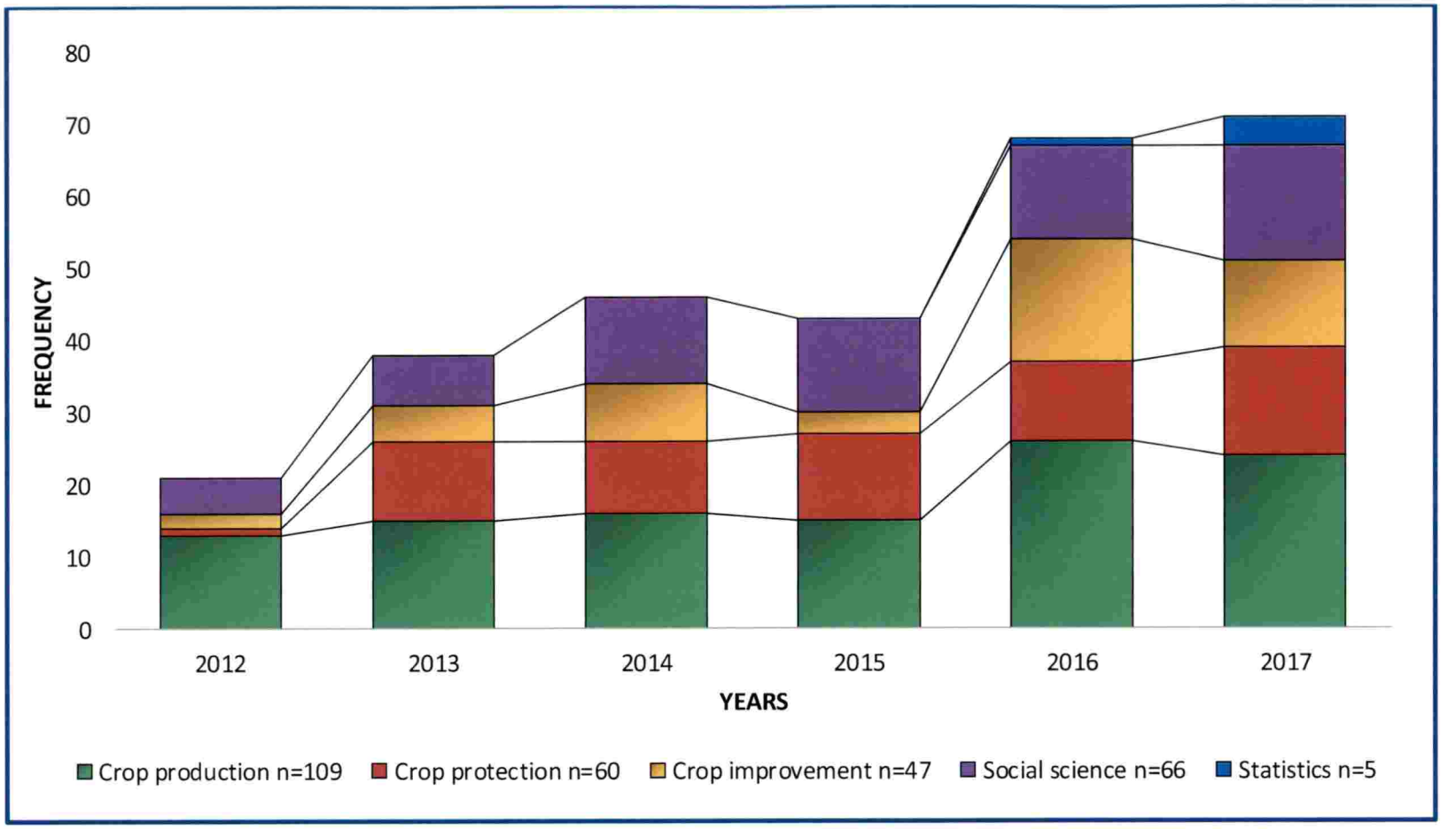


Fig.5: Trends of PG theses published from 2012-2017 in all division (N=287)

4.1.3 Year wise categorization of theses under each PC group

Project-coordination (PC) groups refer to the different major field of study framed by the University for research purpose. These groups were framed basically for easier management and evaluation by the project coordinators. The result on the number of theses published under each PC groups based on years is illustrated in table 8.

Table 8 was categorised into two parts, first part is the distribution of theses under the common PC groups from 2008 to 2017 and secondly is the distribution of theses under the uncommon PC groups from 2008 to 2014.

For the common PC groups from 2008-2017, it was observed that over the years a total of 62 theses were published in 'agricultural extension and development studies' (AEDS) with a mean of 6 theses each year. This was then followed by 47 theses in 'vegetables' (Veg) with a mean of 5 theses each year, 38, 37 and 35 theses in 'biotechnology, biochemistry and plant physiology' (BBPP), 'food science and nutrition' (FSN) and 'crop pest and beneficial insects' (CPBI) with average of four thesis. 'rice', 34, 30 and 29 theses in 'soil health and organic farming'(SHOF),'plant pathogens and beneficial microbes' (PPBM) and 'rice' with a mean of three thesis each, 20, 19, 18 and 15 theses in 'agricultural Economics, statistics and agri-business management' (AESBM), 'post-harvest technology and value addition'(PHTVA), 'field crops- cereals other than rice, millets, pulses, oilseeds, fodder crops and green manure crops'(FC) and 'aromatic and medicinal plants'(AMP) respectively with a mean of two theses each and 'spices and plantation crops' (SPC), 'fruits' (FR), 'floriculture'(FL), 'farming system research and climate studies'(FSRCS), 'sugar crops and tuber crops'(STC) with a mean of 1 thesis each.

For the uncommon PC groups it was observed that a total of 50 theses was published from 2008 to 2014 in 'plant protection' (PP) with an average of 7 theses each year. This was followed by 21 and 18 theses in 'soils and agronomy' (SA) and 'beneficial organisms' (BO) with a mean of three theses each and 8, 7 and 5 theses in

Table 8: Distribution of number of theses published under each PC groups from 2008 to 2017

Common PC groups (N=10)												
PC Groups	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**	**Mean**
1	1	1	1	3	5	2	5	1	5	5	29	3
2	0	1	0	0	0	2	2	2	2	2	11	1
3	2	2	5	4	5	7	8	4	3	7	47	5
4	1	1	1	1	1	2	0	2	1	2	12	1
5	1	0	0	1	0	1	3	1	4	7	18	2
6	1	1	1	0	2	1	3	1	1	1	12	1
7	2	1	0	0	3	1	2	2	1	3	15	2
8	0	1	0	2	1	0	8	8	7	11	38	4
9	2	3	1	3	0	1	0	8	6	10	34	3
10	0	0	0	0	0	0	0	5	2	5	12	1
11	0	0	0	0	0	0	0	9	12	14	35	4
12	0	0	0	0	0	0	0	8	8	14	30	3
13	0	2	2	2	2	2	2	2	1	4	19	2
14	3	4	1	5	6	4	3	4	2	5	37	4
15	0	0	0	0	0	0	0	6	7	7	20	2
16	0	4	6	4	7	4	7	10	10	10	62	6
17	0	1	1	0	1	0	0	1	2	2	8	1
Uncommon PC groups (N=7)												
18	0	4	1	4	3	3	6	0	0	0	21	3
19	2	7	2	8	9	9	13	0	0	0	50	7
20	1	1	0	5	3	5	3	0	0	0	18	3
21	0	0	2	0	2	2	3	0	0	0	9	1
22	0	0	0	2	0	3	2	0	0	0	7	1
23	0	1	1	1	0	0	2	0	0	0	5	1

*1-Rice; 2- Spices and Plantation Crops (Including palms); 3- Vegetables; 4- Fruits; 5-Field Crops- cereals other than rice, millets, pulses, oilseeds, fodder crops and green manure crops; 6-Floriculture; 7- Aromatic and Medicinal Plants; 8- Biotechnology, Biochemistry and Plant Physiology; 9- Soil Health and Organic farming; 10- Farming System Research and Climate Studies; 11-Crop Pests and Beneficial insects; 12- Plant Pathogens and Beneficial Microbes; 13- Post- Harvest technology and Value Addition; 14- Food Science and Nutrition; 15- Agricultural Economics, Statistics and Agri-Business Management; 16- Agricultural Extension and Development studies; 17- Sugar Crops and Tuber Crops; 18-Soils and Agronomy; 19- Plant Protection; 20- Beneficial Organisms; 21- Agro Economic Studies; 22- Gender studies; 23- Natural Resource Management

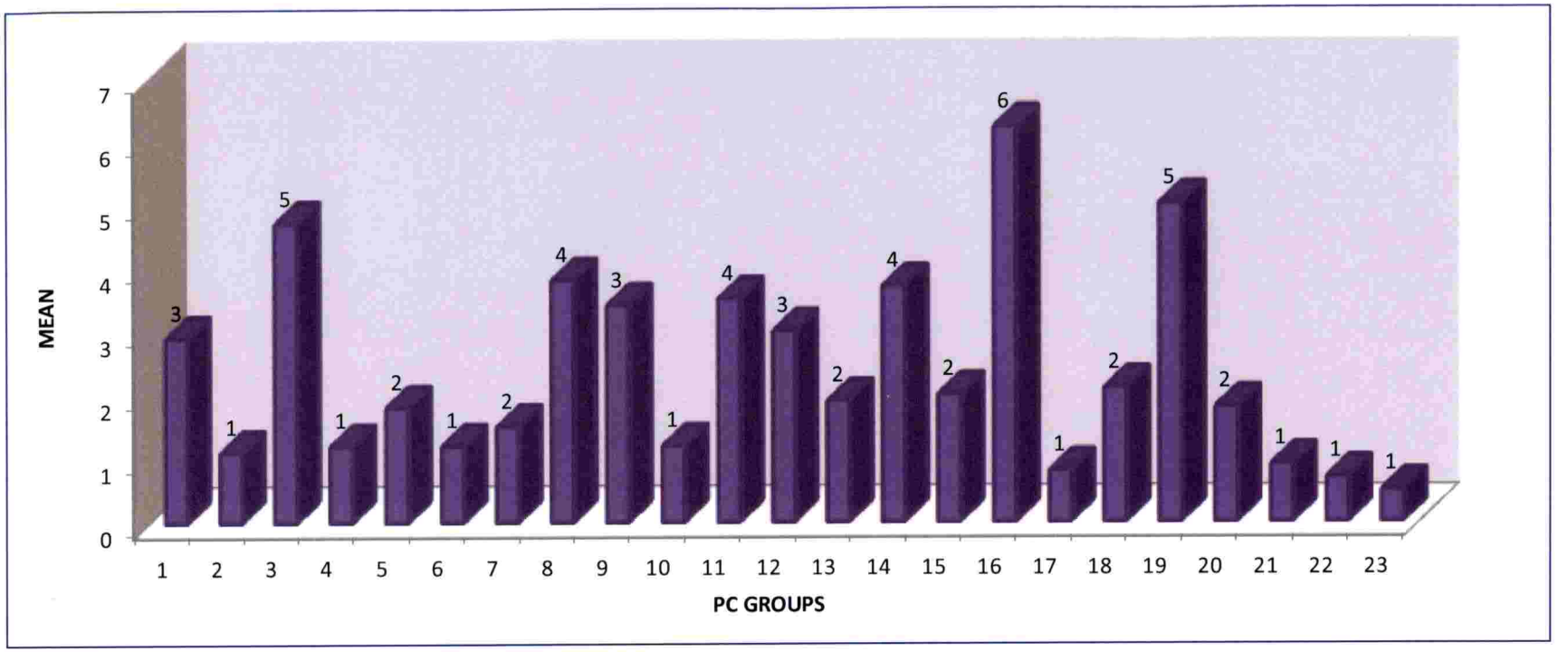


Fig.6: Mean distribution of theses under each PC groups from 2008 to 2017

*1-Rice; 2- Spices and Plantation Crops (Including palms); 3- Vegetables; 4- Fruits; 5-Field Crops- cereals other than rice, millets, pulses, oilseeds, fodder crops and green manure crops; 6- Floriculture; 7- Aromatic and Medicinal Plants; 8- Biotechnology, Biochemistry and Plant Physiology; 9- Soil Health and Organic farming; 10- Farming System Research and Climate Studies; 11- Crop Pests and Beneficial insects; 12- Plant Pathogens and Beneficial Microbes; 13- Post- Harvest technology and Value Addition; 14- Food Science and Nutrition; 15- Agricultural Economics, Statistics and Agri-Business Management; 16- Agricultural Extension and Development studies; 17- Sugar Crops and Tuber Crops; 18-Soils and Agronomy; 19- Plant Protection; 20- Beneficial Organisms; 21- Agro Economic Studies; 22- Gender studies; 23- Natural Resource Management

'agro-economic studies' (AES), 'gender studies' (GS) and 'natural resource management' with a mean of one thesis each.

4.1.4 Categorization of touched and untouched thrust areas and analyzing the gaps

Thrust area refers to the areas of research that has been thrust upon each PC groups cutting across all the departments mainly for research purpose. The results of the touched and untouched thrust areas under each PC groups for two periods from 2008 to 2014 and 2015 to 2017 are presented in table 9 and 10 accordingly.

On analysis of table 9 and fig.7 it can be observed that overall there were 22 PC groups during 2008 to 2014 of which 12 PC groups have more than 50.00 per cent untouched thrust areas. 'Sugar and tuber crops' (STC) along with 'spices and plantation crops'(SPC) were found to have the highest with 90.00 per cent untouched thrust areas. This was followed by 72.72 per cent from 'coconut and other palms'(COP) and 'pulses and oilseeds' (POS), 69.23 per cent from 'floriculture' (FR), 66.67 per cent from 'fruits' (FR) and 'gender studies' (GS), 61.54 per cent from 'beneficial organisms'(BO), 60.00 per cent from 'forage and green manures' (FGM) crops, 55.55 per cent from 'aromatic and medicinal plants' (AMP), 54.54 per cent from 'beneficial insects' (BI) and 'natural resource management' (NRM), 46.15 per cent from 'post-harvest technology' (PHT) and 'organic farming' (OF), 41.67 per cent from 'food science and nutrition'(FSN), 40.00 per cent from 'rice and rice based cropping systems' (RBC) and 'agro-economic studies' (AES), 33.33 per cent from 'plant protection'(PP), 25.00 per cent of 'soil and agronomy'(SA), 17.65 per cent from 'agricultural extension and development studies'(AEDS), 10.00 per cent from 'vegetables' (VEG). 'Crop physiology and biochemistry' (CPB) were found to have no thrust areas which were untouched.

Table 9: Categorization of touched and untouched thrust areas under each PC group from 2008 to 2014

PC groups	PC Groups (2008-2014)	No. Thrust areas		Total	Untouched %
		Touched	Untouched		
1.	Rice and rice based cropping system (RBC)	9	6	15	40.00
2.	Coconut and other palms (COP)	3	8	11	72.72
3.	Vegetables (VEG)	18	2	20	10.00
4.	Sugar and tuber crops (STC)	1	9	10	90.00
5.	Fruits (FR)	4	8	12	66.67
6.	Floriculture (FL)	4	9	13	69.23
7.	Spices and plantation crops (SPC)	1	9	10	90.00
8.	Pulses and oilseeds (POS)	3	8	11	72.72
9.	Forage and green manure crops (FGM)	2	3	5	60.00
10.	Aromatic and medicinal plants (AMP)	4	5	9	55.55
11.	Soils and agronomy (SA)	12	4	16	25.00
12.	Plant protection (PP)	8	4	12	33.33
13.	Biotechnology (BT)	5	6	11	54.55
14.	Post-harvest technology (PHT)	7	6	13	46.15
15.	Agricultural extension and development studies (AEDS)	14	3	17	17.65
16.	Beneficial organisms (BO)	5	8	13	61.54
17.	Food science and nutrition (FSN)	7	5	12	41.67
18.	Organic farming (OF)	7	6	13	46.15
19.	Gender studies (GS)	4	8	12	66.67
20.	Agro- economic studies (AES)	6	4	10	40.00
21.	Natural resource management (NRM)	5	6	11	54.54
22.	Crop physiology and biochemistry (CPB)	3	0	3	0.00

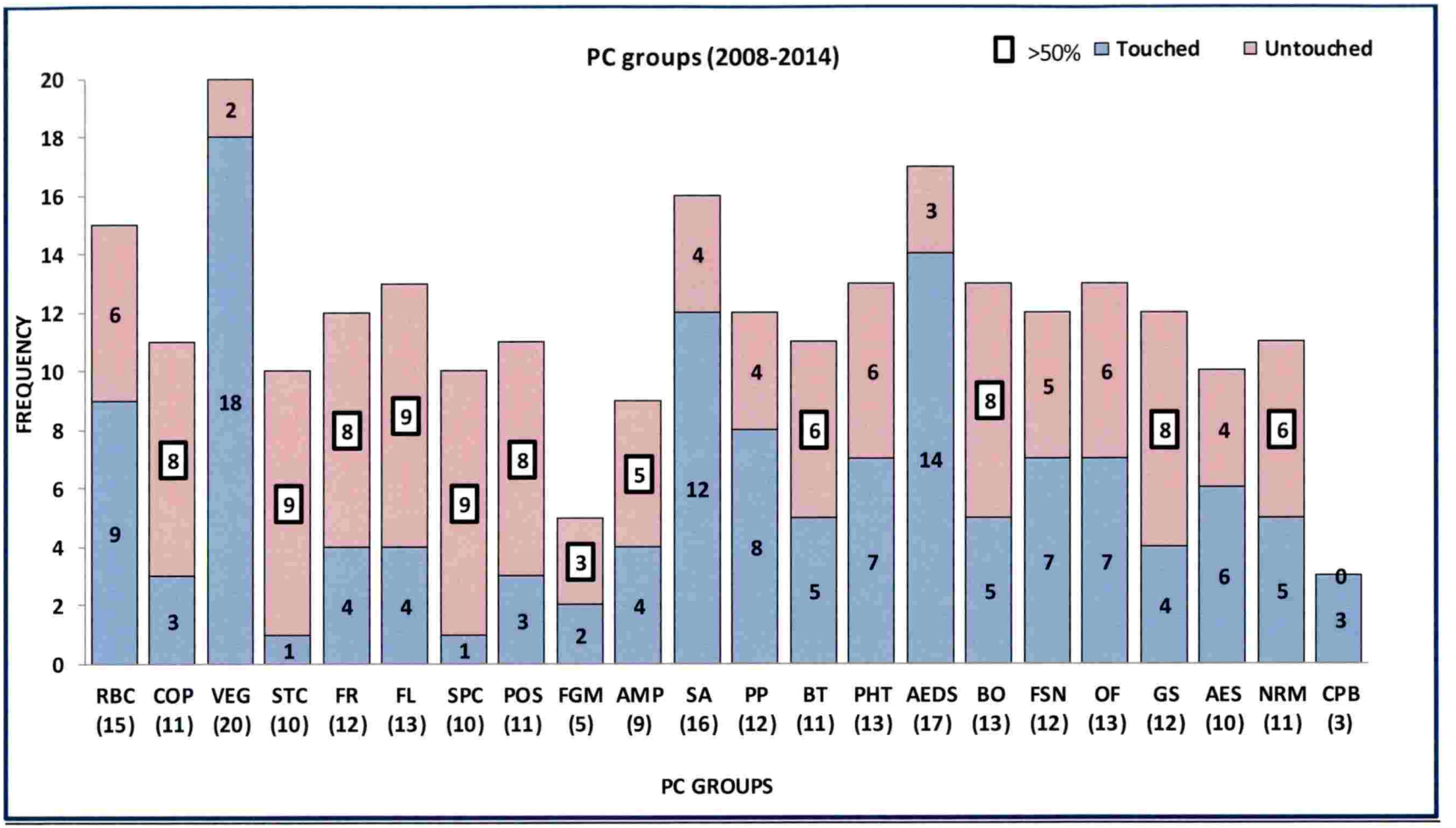


Fig.7: Frequency distribution of touched and untouched thrust areas in each PC groups from 2008-2014

Table 10: Categorization of touched and untouched thrust areas under each PC group from 2015 to 2017

Sl. No.	PC Groups (2015-2017)	No. Thrust areas		Total	Untouched %
		Touched	Untouched		
1.	Rice (R)	5	5	10	50.00
2.	Spices and Plantation crops (SPC)	4	8	12	66.67
3.	Vegetables (VEG)	7	4	11	36.36
4.	Fruits (FR)	3	11	14	78.57
5.	Field crops (FC)	7	17	24	70.83
6.	Floriculture (FL)	2	5	7	71.43
7.	Aromatic and Medicinal Plants (AMP)	2	5	7	71.43
8.	Biotechnology, Biochemistry and plant physiology (BBPP)	9	3	12	25.00
9.	Soil health and organic farming (SHOF)	9	3	12	25.00
10.	Farming system research and climate studies (FSRCS)	5	6	11	54.55
11.	Crop pest and beneficial insects (CPBI)	7	4	11	36.36
12.	Plant pathogens and beneficial microbes (PPBM)	4	6	10	60.00
13.	Post-harvest technology and value addition (PHTAV)	3	8	11	72.73
14.	Food science and nutrition (FSN)	5	9	14	64.29
15.	Agricultural economics, agricultural statistics and agribusiness management (AESBM)	6	5	11	45.46
16.	Agricultural extension and development studies (AEDS)	12	0	12	0.00
17.	Sugarcane and tuber crops (STC)	3	7	10	70.00

Likewise, analysis of fig.8 revealed that there were 17 PC for the period from 2015 to 2017. Of which 11 PC groups were found to have 50.00 per cent or more number of untouched thrust area.

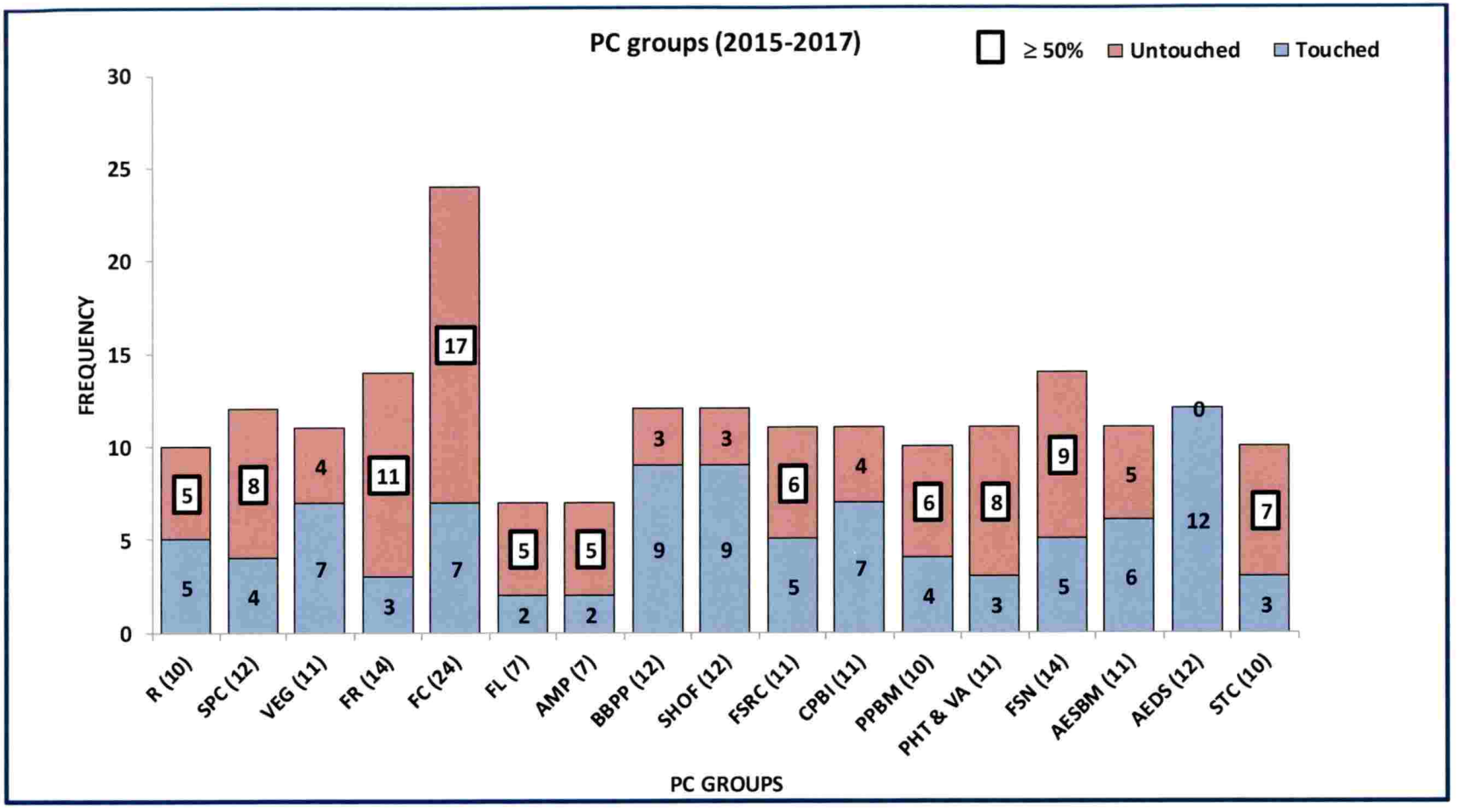


Fig.8: Frequency distribution of touched and untouched thrust areas in each PC groups from 2015-2017

On perusal of the above table it can be seen that 78.57 per cent of the untouched thrust areas were from PC group 'fruits' (FR) followed by 72.73 per cent from 'post-harvest technology and value addition'(PHT&AV), 71.43 per cent from 'floriculture' (FL) and 'aromatic and medicinal plants' (AMP), 70.83 per cent from 'field crops' (FC), 70.00 per cent from 'sugarcane and tuber crops' (STC), 66.67 per cent from 'spices and plantation crops'(SPC), 64.29 per cent from 'food science and nutrition' (FSN), 60.00 per cent from 'plant pathogens and beneficial microbes' (PPBM), 54.55 per cent from 'farming system research and climate studies'(FSRCS), 45.46 per cent from 'agricultural economics, agricultural statistics and agri-business management' (AESBM), 36.36 per cent from 'vegetables' (VEG) and 'crop pest and beneficial insects' (CPBI) and only 25.25 per cent from 'biotechnology, biochemistry and plant physiology'(BBPP) and 'soil health and organic farming' (SHOF).

However, it was also essential to know the thrust area with maximum number of theses under each PC group for a better understanding. Such PC groups with maximum number of theses and the range of touched area for the period 2008-2014 and 2015- 2017 were identified and presented in table 11 and table 12 respectively.

Table 11: Thrust areas for PG research under each PC groups for a period from 2008 to 2014

Code	Thrust areas	Theses touched upon	
		Maximum	Range
I.	**Rice and Rice Based Cropping System (RBC); N=15**		
RBC 4	Integrated Nutrient Management- use of organics and inorganics, Nutrient use efficiency, use of ameliorants	3	1-3 (n=9)
RBC 12	Ecofriendly and integrated plant nutrient management for sustainable rice production	3	
RBC 13	Molecular markers for yield, quality and resistance to biotic and abiotic stresses	3	
II.	**Coconut and Other Palms (COP); N=11**		
COP 4	Nutrient management and irrigation requirement	2	1-2 (n=3)
III.	**Vegetables (Veg); N=20**		

Veg 1	Breeding in solanaceous vegetables for- yield, quality, biotic stress, resistance to biotic stress	5	1-5 (n=18)
IV.	**Sugar and Tuber Crops (STC); N=10**		
STC 2	Standardization of agro-techniques for tuber crops and breeding for yield, quality, pest and disease resistance	3	3 (n=1)
V.	**Fruits (FR); N=12**		
FR 9	Development of technologies for export-oriented cultivation of fruits	3	1-3 (n=4)
VI.	**Floriculture (FL); N=13**		
FL 1	Germplasm collection, conservation, evaluation and improvement of export oriented flowers, foliage, aquatic plants and other plants of ornamental value	4	1-4 (n=4)
VII.	**Spices and Plantation Crops (SPC); N=10**		
SPC 3	Breeding for high yield and quality	1	1 (n=1)
VIII.	**Pulses and Oilseeds (POS); N=11**		
POS 11	Identification /development of promising varieties/ cultures in underexploited legumes of humid tropics	2	1-2 (n=3)
IX.	**Forage and Green Manure Crops (FGM); N=5**		
FGM 2	Standardization of agro techniques for fodder and green manure crops in different farming systems	1	1 (n=2)
FGM 5	Utilization of non -conventional forages	1	
X.	**Aromatic and Medicinal Plants (AMP); N=9**		
AMP 8	Development of cultivation practices for high value medicinal plants suitable for the State	4	1-4 (n=4)
XI.	**Soils and Agronomy (SA); N=16**		
SA 8	Agronomic management of crops including weed management and herbicides	5	1-5 (n=12)
XII.	**Plant Protection (PP); N=12**		
PP 9	Alternate methods for managing insect pest, diseases nematodes and weeds as a substitute for banned chemicals Kerala	16	1-16 (n=8)
XIII.	**Biotechnology (BT); N=11**		
BT 2	In vitro crop improvement	5	1-5 (n=5)
BT 11	Integrated biotechnology	19	1-19 (n=5)
XIV.	**Post-Harvest Technology(PHT); N=13**		
PHT 7	Value addition and product diversification	4	1-4 (n=7)
XV.	**Agricultural Extension and Development Studies (AEDS); N=17**		
AEDS 14	Impact assessment of technologies and refinement	8	1-8 (n=14)
XVI.	**Beneficial Organisms (BO); N=13**		
BO 3	Mushrooms as food, medicine and bioconversion agents	8	1-8 (n=5)

XVII.	**Food Science and Nutrition (FSN); N=12**		
FSN 4	Quality evaluation of foods and food products	6	1-6 (n=7)
XVIII.	**Organic Farming (OF); N=13**		
OF	ii. Quality assessment and post-harvest technology	4	1-4 (n=7)
XIX.	**Gender Studies (GS); N=12**		
GS 7	Gender impact of farm technologies, extension policies, development programmes and farm support initiatives	3	1-3 (n=4)
XX.	**Agro-Economic Studies (AES); N=10**		
AES 2	Farm management and production economics	3	1-3 (n=6)
XXI.	**Natural Resource Management (NRM); N=11**		
NRM 2	Monitoring of natural resource degradation and adaptation to mitigate its adverse effects on agricultural production systems	1	1 (n=5)
NRM 3	Remote sensing, GIS and other ICT tools for improvement in agricultural education, research and advisory services	1	
NRM 5	Integrated input management for sustained soil health and crop productivity	1	
NRM 8	Inter-disciplinary initiatives for farming systems and watershed research	1	
NRM 11	Precision Farming	1	
XXII.	**Crop Physiology and Biochemistry (CPB); N=3**		
CPB 1	Stress physiology-physiological basis of crop responses to biotic stresses, abiotic stresses and crop resilience to climate change	2	1-2 (n=3)

n= number of thrust areas touched upon; N= Total number of thrust areas

Table 12: Thrust areas for PG research under each PC groups for a period from 2015 to 2017

Code	Thrust areas	Theses touched upon	
		Maximum	Range
I.	**Rice (R); N=10**		
R 4	Development of location specific agro techniques for sustainable rice production	3	1-3 (n=5)
R 5	Management of abiotic stresses	3	
II.	**Spices and Plantation Crops (SPC); N=12**		
SPC 1	Germplasm collection, conservation and evaluation	2	1-2

SPC 6	Integrated nutrient management	2	(n=4)
III.	**Vegetables (Veg); N=11**		
Veg 1	Development of F1 hybrids in major vegetables	3	1-3 (n=7)
Veg 3	Development of packages for protected cultivation / precision farming for high productivity	3	
Veg 5	Adaptability, improvement and large scale multiplication of under-exploited and ethnic vegetables, and cool season vegetables	3	
IV.	**Fruits (FR); N=14**		
FR 3	Refinement of propagation and management methods	3	1-3 (n=3
V.	**Field Crops – cereals (other than rice), millets, pulses, oil seeds, fodder crops and green manure crops (FC); N=24**		
FC 5	Agro techniques for yield maximization and quality improvement including mulching, fertigation and weed management	3	1-3 (n=7)
FC 19	Developing package for plant protection, higher yield and quality.	3	
VI.	**Floriculture (FL); N=7**		
FL 2	Standardization of production technology and improvement of cut flowers and other ornamentals	2	1-2 (n=2)
VII.	**Aromatic and Medicinal Plants (AMP); N=7**		
AMP 3	Nursery and agro techniques in Medicinal & Aromatic Plants	4	2-4 (n=2)
VIII.	**Biotechnology, Biochemistry and Plant Physiology (BBBP); N=12**		
BBP 8	Physiological approaches for increasing crop productivity and stress tolerance	7	1-7 (n=9)
BBP 11	Integrated biotechnology- Integration of Plant Biotechnology with industrial, environmental, animal, medical, food, algal biotechnology and metagenomics	36	1-36 (n=9)
IX.	**Soil Health and Organic Farming (SHOF); N=12**		
SHOF 2	Soil Fertility evaluation and nutrient management for sustaining soil health and yield maximization.	5	1-5 (n=9)
X.	**Farming System Research and Climate Studies (FSRCS); N=11**		
FSRCS 5	Integrated resource management in cropping/farming systems	7	1-7 (n=5)
XI.	**Crop Pest and Beneficial Insects (CPBI); N=11**		

CPBI 3	Strategy for Pest management	8	1-8 (n=7)
XII.	**Plant pathogens and beneficial microbes (PPBM); N=10**		
PPBM 2	Development of novel strategies, beneficial microbes, their improved strains and biomolecules for ecofriendly management of crop diseases, crop nutrition, crop growth enhancement and bio control of weeds.	16	2-16 (n=5)
XIII.	**Post-harvest technology (PHT); N=11**		
PHT 1	Postharvest management in major and minor crops	3	1-3 (n=3)
XIV.	**Food science and nutrition (FSN); N=14**		
FSN 4	Food Processing, Value addition and product diversification in foods.	4	1-4 (n=5)
XV.	**Agricultural economics, agricultural statistics and agribusiness management (AESBM); N=11**		
AESBM 2	Theoretical and applied studies	7	1-7 (n=6)
XVI.	**Agricultural extension and development studies (AEDS); N=12**		
AEDS 8	Extension management and development studies	11	1-11 (n=12)
XVII.	**Sugarcane and tuber crops (STC); N=10**		
STC 7	Development of package of practices including organic package of practices in tuber crops	3	1-3 (n=3)

n= number of thrust areas touched upon. N= Total number of thrust areas

On perusal of the overall results it can be summarized that during 2008 to 2014 the highest percentage of untouched thrust areas was found to be 90.00 per cent that of 'sugarcane and tuber crops' (STC) and 'spices and plantation crops' (SPC). However, during 2015 to 2017 it was observed that 'fruits' (FR) have the highest untouched percentage with 78.57 per cent of the thrust are being untouched. This clearly indicates that the number of untouched thrust areas slightly decreases over the years. The results also pinpoint that hundred per cent of the thrust areas under the PC groups 'crop physiology and biochemistry' (CPB) were touched during 2008 to 2014 and 'agricultural extension and development studies' (AEDS) during 2015 to 2017. The list of the untouched thrust area can be observed from appendix II.

4.1.5 Comparison between similar PC groups

Comparison here refers to the consideration of the similarities or dissimilarities between the thrust areas under the two categories of PC groups.

The similar PC groups were identified and selected from both categories of period i.e. 2008 to 2014 and 2015 to 2017 for comparison and the results are demonstrated in the table 13.

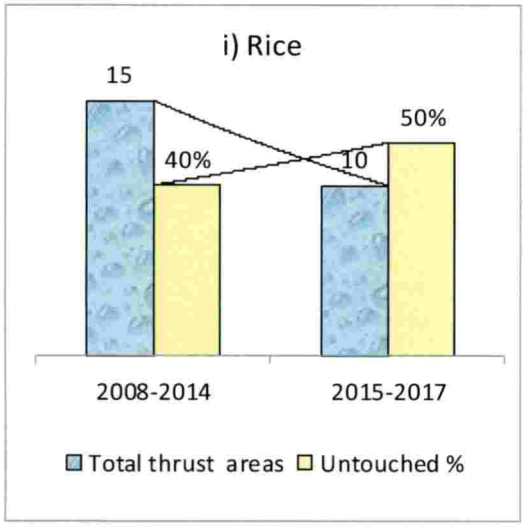
Table 13: Comparison between similar PC groups

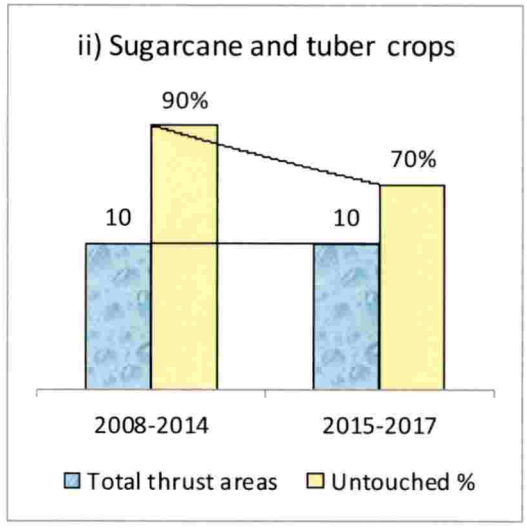
Sl. No.	PC groups	Total thrust areas		Untouched thrust areas			
		2008-14	2015-17	2008-14		2015-17	
				f	%	f	%
1	Rice	15	10	6	40.00	5	50.00
2	Sugarcane and tuber crops	10	10	9	90.00	7	70.00
3	Vegetables	20	11	2	10.00	4	36.36
4	Floriculture	13	7	9	69.23	5	71.43
5	Fruits	12	14	8	66.67	11	78.57
6	Spices and Plantation crops	10	12	9	90.00	8	66.67
7	Aromatic and medicinal plants	9	7	5	55.55	5	75.45
8	Post-harvest technology	13	11	6	46.15	8	72.73
9	Agricultural Extension and development studies	17	12	3	17.67	0	0.00
10	Food Science and Nutrition	12	14	5	41.67	9	64.29
	Total	131	108	62		62	

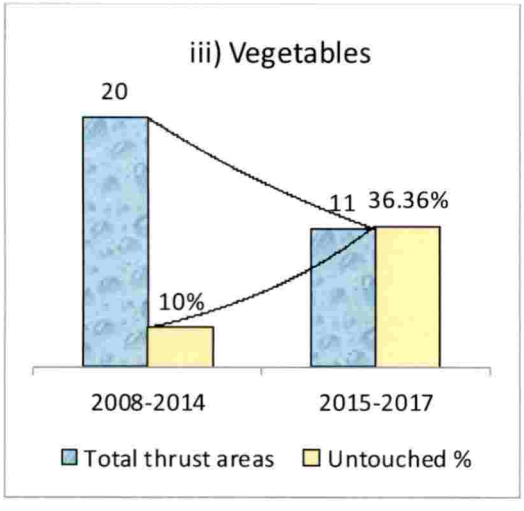
An unparalleled comparison has been made between the similar PC groups from both period i.e. 2008 to 2014 and 2015 to 2017. From fig.9 it can be seen that the total number of thrust area on PC group 'rice' reduced from fifteen to ten in numbers but the untouched percentage of thrust areas increased from 40.00 per cent to 50.00 per cent. In 'vegetables', the total thrust areas reduced from twenty to eleven but the untouched thrust area increased from 10 per cent to 36.36 per

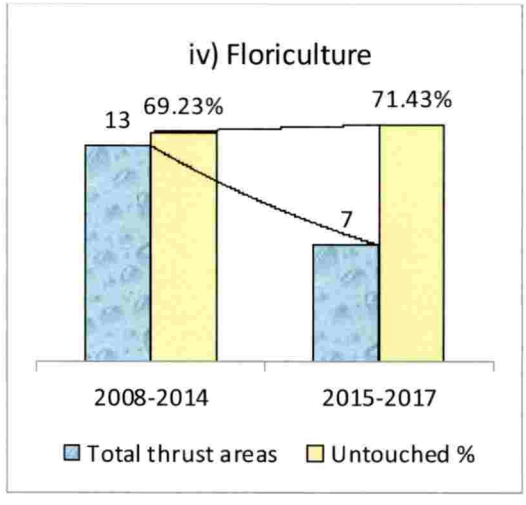
cent. In 'fruits' the total thrust area upturn so does the untouched thrust area (from 66.67% to 78.57%). Similarly, in 'food science and nutrition' the total thrust area rises from twelve to fourteen and also the untouched percentage from 41.67 per cent to 64.29 per cent. Looking into 'sugarcane and tuber crops' the result showed an equivalent number of thrust areas in both categories and the untouched thrust area drops from 90.00 per cent to 70.00 per cent. In 'floriculture' the total thrust area slackens from thirteen to seven but the untouched percentage rises from 69.23 per cent to 71.43 per cent. The same was witnessed in 'aromatic and medicinal plants' and 'post-harvest technology'. In 'aromatic and medicinal plants the total number of thrust area reduced from nine to seven and the untouched percentage increased from 55.55 per cent to 71.43 per cent whereas in 'post-harvest technology' the total number of thrust area dropped from thirteen to eleven while the untouched percentage increased from 46.15 per cent to 72.73 per cent. Regarding 'spices and plantation crops' it can be seen that the total number of thrust areas increased over the years but the untouched percentage decreased from 90.00 per cent to 66.67 per cent. However in 'agricultural extension and development studies' the total number of thrust area were found to lessened from seventeen to twelve and also the untouched percentage dropped from 17.67 per cent to zero.

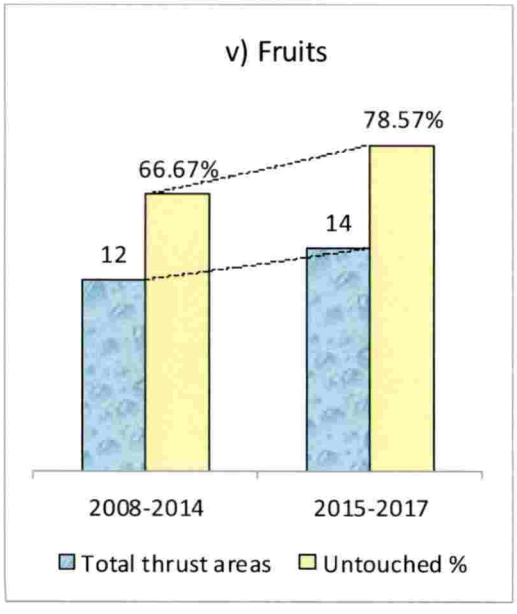
Hence, from the above results it can be abridged that of the ten PC groups, the total number of thrust areas in six PC groups i.e. rice, vegetables, floriculture, aromatic and medicinal plants, post-harvest technology and agricultural extension and development studies have reduced as the year progressed from 2008 to 2017. However, it was interesting to note that the untouched percentage of thrust areas increased in all those PC groups except for 'agricultural extension and development studies' wherein all the thrust area were covered. It was also fascinating to note that in the case of 'sugarcane and tuber crops' and 'spices and plantation crops' the untouched thrust areas were the highest (90.00%) for a period from 2008 to 2014, but the trends showed an improvement in the later period (2015-2017) wherein the untouched thrust areas dropped to 70.00 per cent

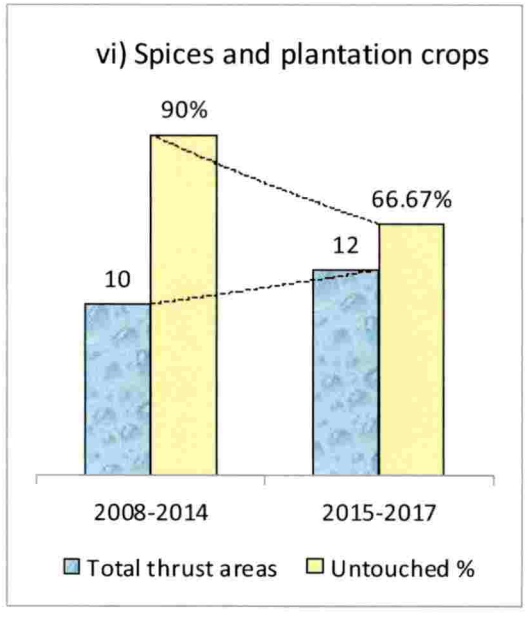

i) Rice
15
40%
10
50%
2008-2014
2015-2017
Total thrust areas
Untouched %


ii) Sugarcane and tuber crops
10
90%
10
70%
2008-2014
2015-2017
Total thrust areas
Untouched %


iii) Vegetables
20
10%
11
36.36%
2008-2014
2015-2017
Total thrust areas
Untouched %


iv) Floriculture
13
69.23%
7
71.43%
2008-2014
2015-2017
Total thrust areas
Untouched %


v) Fruits
12
66.67%
14
78.57%
2008-2014
2015-2017
Total thrust areas
Untouched %


vi) Spices and plantation crops
10
90%
12
66.67%
2008-2014
2015-2017
Total thrust areas
Untouched %

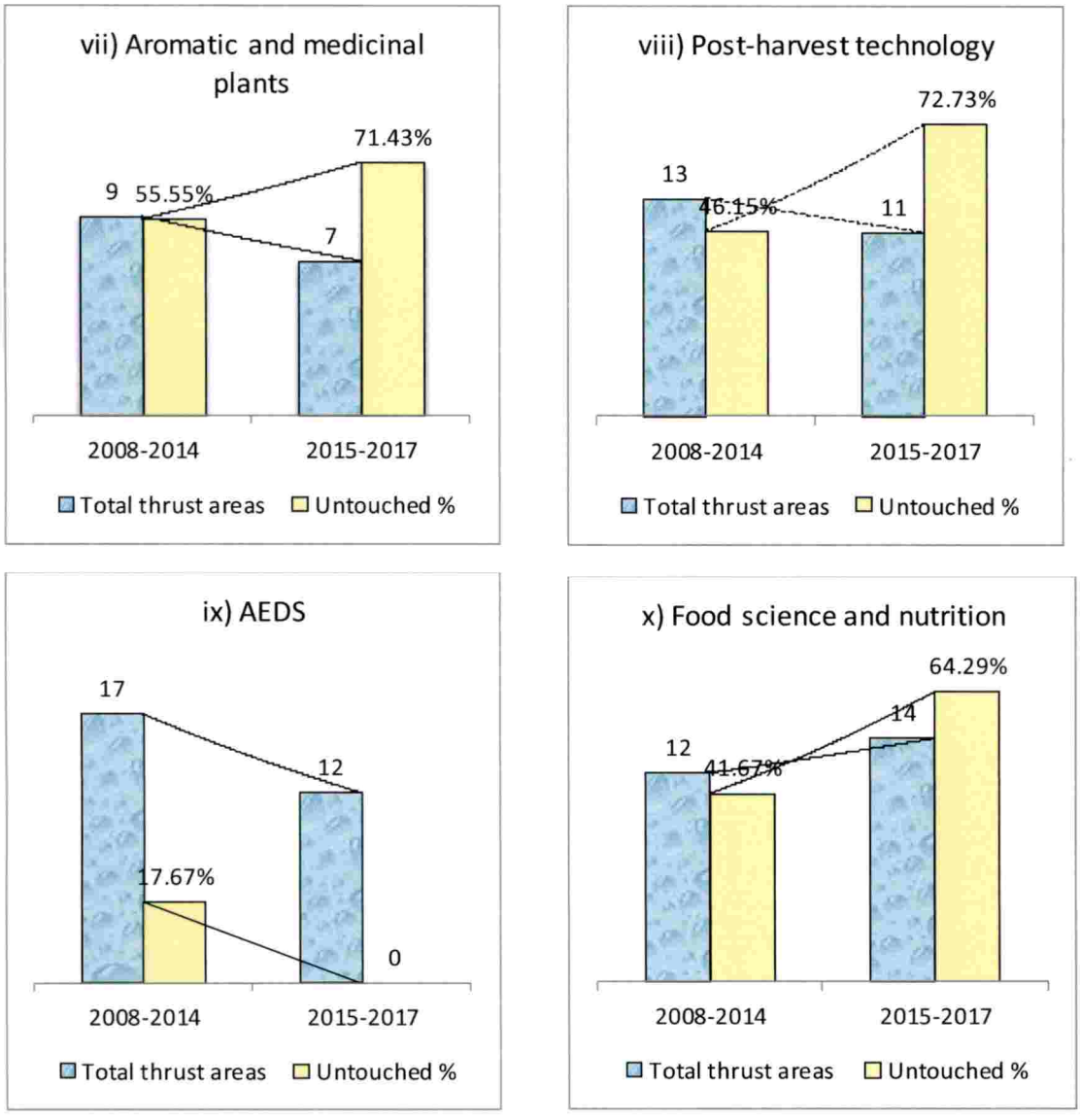


Fig.9: Graphical representation of comparison made between similar PC groups

i) Rice ii) Sugar and tuber crops iii) Vegetables iv) Floriculture v) Fruits vi) Spices and Plantation crops vii) Aromatic and Medicinal Plants viii) Agricultural Extension and Development Studies ix) Post-Harvest Technology x) Food Science and Nutrition.

and 66.67 per cent respectively. But in the case of 'fruits' the untouched thrust areas increased from 66.67 per cent to 78.57 per cent.

A comparison had also been made to find out the similar thrust areas that were remaining untouched for a period from 2015 to 2017. With regards to 'rice' seven similar thrust areas were observed for both periods out of which thrust areas R1(Collection, conservation and cataloguing of rice germplasm), R8 (Mechanization in rice cultivation), R9 (Post-harvest technology in rice) and R10 (Socioeconomic dimensions of rice cultivation in Kerala) still remain untouched in the later year. In 'spices and plantation crops' also 7 similar thrust areas were witnessed and of which SPC3 (Breeding for pest and disease resistance / tolerance), SPC7 (In situ moisture conservation and irrigation management), SPC8 (Integrated pest and disease management) and SPC10 (Post-harvest handling and value addition) remain untouched in the 2015 to 2017 thrust areas. Regarding 'fruits' 3 similar thrust areas were found, in which FR5 (Management of pest and diseases) and FR9 (High tech fruit culture *viz.* high density planting, fertigation, tree size control, protected cultivation, canopy regulation etc.) remain untouched. In case of 'floriculture' the result showed that of the 4 similar thrust areas, 2 thrust areas specifically FL3 (Evaluation of indigenous flora and introduction of new ornamentals) and FL 4(Post-harvest handling, value addition and market studies) remain untouched. Concerning 'post-harvest technology' of the 2 similar thrust areas identified one thrust area remained untouched i.e. PHT11 (Quality control studies). For 'food science and nutrition' the outcomes uncovered 4 similar thrust areas of which FSN1 (Food security, food consumption pattern and nutritional status) was touched till 2012 but remain untouched till 2015 whereas FSN2 (Nutritional problems of the community) was touched till 2014 and remain untouched after that.

The reasons behind the upsurge in percentage of untouched thrust areas might be because of non-availability of raw materials or facilities, lack of awareness on part of the student about the thrust areas may also be the reasons, lack of expertise on those particular thrust areas, the thrust areas framed was of less importance for the farming community and alike.

4.1.6 Gaps in research themes

Gap in this study refers to the breach between the research themes framed by the university and the teacher perception about the adequacy regarding those research themes irrespective of the department they belonged.

The results regarding the gaps in research themes as perceived by teachers from 16 departments are instantiated in table 14.

Table 14: Gaps in research themes based on teacher's perception of adequacy

Sl. No.	Department	Average weightage	Gaps %
1	Agronomy	7	30
2	Soil Science and Agricultural Chemistry	7	30
3	Vegetable Science	8	20
4	Pomology and Floriculture	7	30
5	Plantation Crops and Spices	9	10
6	Post-Harvest Technology	9	10
7	Entomology	7	30
8	Plant Pathology	7	30
9	Plant Breeding and Genetics	9	10
10	Plant Physiology	9	10
11	Microbiology	2	80
12	Plant Biotechnology	8	20
13	Agricultural Extension	6	40
14	Agricultural Economics	9	10
15	Community Science	7	30
16	Agricultural Engineering	8	20
	Mean	7	30

On perusal of the above table, it can be inferred that of the total 16 departments, teachers from 5 departments (Plantation Crops and Spices, Post-harvest Technology, Plant Breeding and Genetics, Plant Physiology and Agricultural

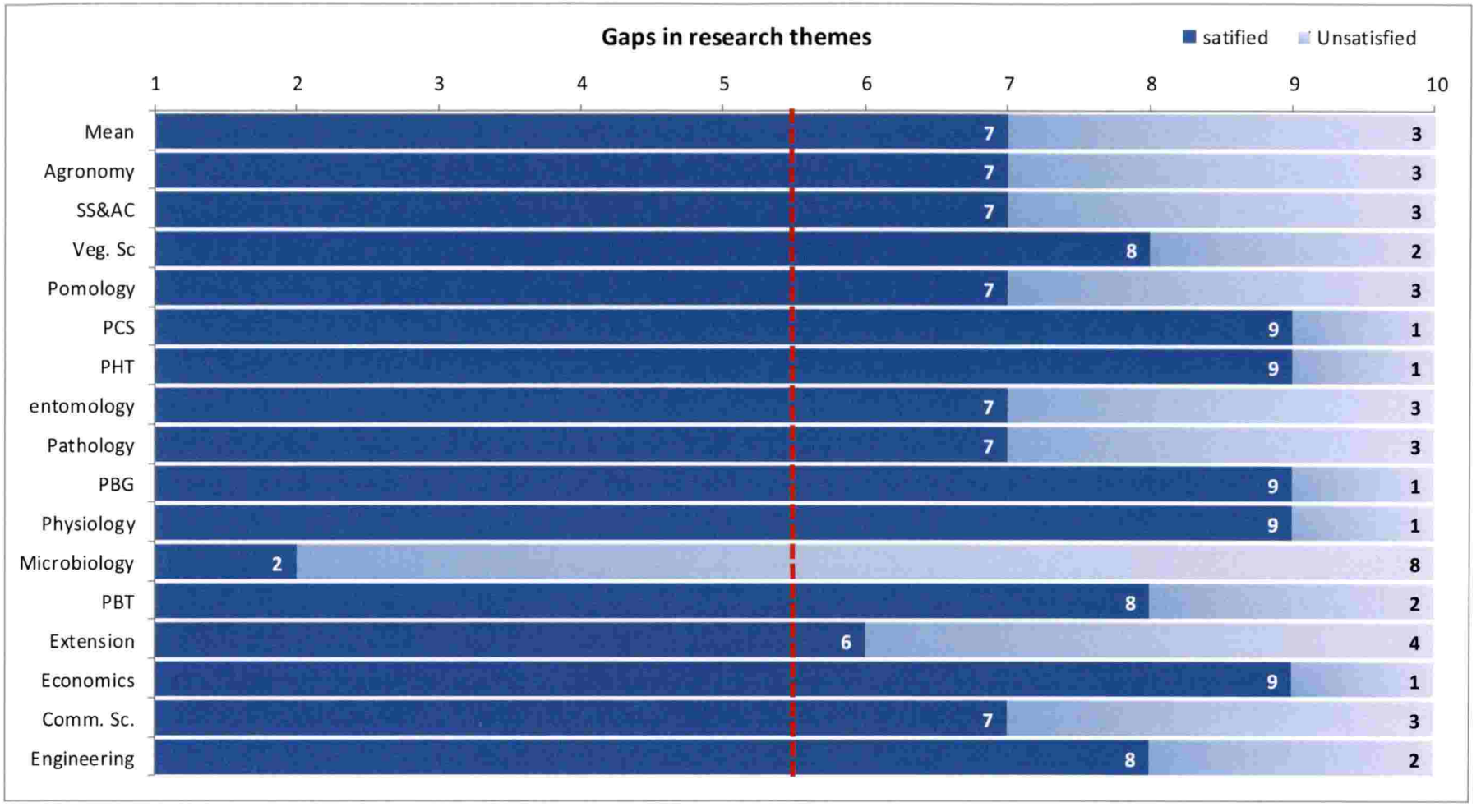


Fig.10: Representation of gaps in research themes based on teacher's perception of adequacy

economics) were satisfied with 90 per cent of the research themes framed by the university for their departments followed by teachers from Department of Vegetable Science, Plant Biotechnology and Agricultural Engineering with 80 per cent. Teachers from department of Agronomy, Soil Science and Agricultural Chemistry, Pomology and Floriculture, Entomology, Plant Pathology and Community Science perceived that they were pleased with 70 per cent of the research themes whereas, teachers from Department of Agricultural Extension were contented with 60 per cent of the research themes and department of Microbiology were satisfied with only 20 per cent of their research themes.

The above outcomes demonstrated that dependent on the teachers perception of adequacy regarding the research themes that was framed by the university the gaps is more (80%) in Department of Microbiology and less (below 50%) in the other departments. However, this cannot give a clear indication because of the fact that the gap was calculated based only on the responses of very few teachers. But the average gap irrespective of the department was found to be 30 per cent.

Therefore, such gaps can be addressed either by incorporating new thrust areas that had been suggested by the teachers or by removing the thrust areas that have not been touched for almost a decade. The gaps can also be reduced by giving proper guidance to the students to take up research on those untouched thrust areas.

4.2 CONTENT PATTERNS OF POST GRADUATE RESEARCH STUDIES IN TERMS OF DIFFERENT ATTRIBUTES

A total of 'fourteen' attributes (4.2.1 to 4.2.14) were selected in general for the study of content pattern of the theses in all departments. However 'seven' more attributes (4.2.15 to 4.2.21) was selected for theses belonging to Department Agricultural Extension. The results were explained based on the parameters that are listed below:

4.2.1 Number of words in title of theses

4.2.2 Title with scientific names

4.2.3 Number of words in abstract

4.2.4 Number of objectives

4.2.5 Number of references in thesis

4.2.6 References based on years

4.2.7 Types of sources in reference

4.2.8 Types of errors in references

4.2.9 Number of pages

4.2.10 Number of tables, figures, plates, appendices and abbreviations

4.2.11 Types of research design

4.2.12 Statistical methods used

4.2.13 Locale of study

4.2.14 Crops or areas

4.2.15 Sample size

3.7.16 Nature or types of respondents

4.2.17 Sampling Methods

4.2.18 Interview Techniques

4.2.19 Types of data

4.2.20 Dependent variables

4.2.21 Independent variables

4.2.1 Number of words in title of theses

Number of words in title refers to the distinct meaningful element of writing that constitutes the title of the theses. The results regarding the distribution of theses based on the number of words in title for division of crop production, crop protection, crop improvement, social science and others is illustrated in table 15, 16, 17, 18 and 19.

Table 15: Distribution of crop production theses based on number of words in title

Category	Agronomy (n=41)			SSAC (n=25)			Horticulture (n=43)			Total (N=109)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>14	2	4.88	>16	5	20.00	>16	6	13.95	13	11.93
Medium (M±SD)	8 to14	33	80.49	9 to16	19	76.00	9 to16	33	76.74	85	77.98
Low (M-SD)	<8	6	14.63	<9	1	4.00	<9	4	9.30	11	10.09
Total		41	100		25	100		43	100	109	100
	Mean=10.85; SD=2.83; SE=0.44; Min-Max=5-17			Mean=13.12; SD=3.32; SE=0.66; Min-Max=7-19			Mean=12.48; SD=3.74; SE=0.29; Min-Max=6-19				

Table 15 revealed the number of words in the title of theses belonging to the crop production division. It was observed that 77.98 per cent of the theses were medium worded irrespective of the departments under crop production division followed by 11.91 per cent of theses that were high worded and 10.09 per cent that were low worded. The range for low worded, medium worded and high worded theses varies for different department.

Department wise categorization revealed that Agronomy theses topped the list with 80.49 per cent of the theses being medium worded followed by Horticulture 76.74 per cent and SSAC with 76.00 per cent. 20.00 per cent of SSAC theses were highly worded followed by Horticulture and Agronomy theses with 13.95 per cent and 4.88 per cent respectively. Agronomy theses topped the list of low worded title with 14.63 per cent followed by Horticulture and SSAC with 9.30 and 4.00 per cent respectively.

Hence, it can be inferred that majority of theses under crop production division irrespective of the different departments were medium worded. However, Agronomy theses topped the list for both medium and low worded theses and Soil Science and Agricultural Chemistry theses surpassed other departments in high

worded category. The maximum and minimum number of words were 19 (SSAC and Horticulture) and 5 (Agronomy) respectively.

Table 16: Distribution of crop protection theses based on number of words in title

Category	Entomology (n=35)			Plant Pathology (n=25)			Total (N=60)	
	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>16	4	11.43	>15	4	16.00	8	13.33
Medium (M±SD)	9-16	27	77.14	9-15	19	76.00	46	76.67
Low (M-SD)	<9	4	11.43	<9	2	8.00	6	10.00
Total		35	100		25	100	60	100
	Mean=12.74; SD=3.36; SE=0.57; Min-Max=6-21			Mean=12.2; SD=3.09; SE=0.62; Min-Max=6-19				

From table 16 it was comprehended that 76.67 per cent of the theses were medium worded regardless of the departments under crop protection division. Also 13.33 per cent and 10.00 per cent of the theses were both high and low worded respectively. The range for medium worded theses was 9-16 and 9-15 words for Entomology and Plant Pathology respectively and department wise categorization revealed that Entomology theses topped the list with 77.14 per cent of theses being medium worded followed by Plant Pathology theses with 76.00 per cent. Low worded theses had less than 9 words and it was observed that 11.43 per cent of Entomology theses was low worded followed by Plant Pathology theses with eight per cent. High worded theses had more than 16 words and Plant Pathology theses topped the category with 16.00 per cent theses being high worded. This was followed by Entomology theses with 11.43 per cent.

Hence, it can be abridged that majority of theses under crop protection division irrespective of the different departments were medium worded. However, Entomology theses topped the list for low worded theses with 11.43 per cent and Plant Pathology theses surpassed Entomology with 16.00 per cent of theses being

high worded. The maximum and minimum number of words were 21(Entomology) and 6 (Entomology and Plant Pathology) respectively.

Table 17 revealed the number of words in the title of theses belonging to crop improvement division. From the table it was noticed that 76.60 per cent of the theses were medium worded title irrespective of the departments under crop improvement division followed by 14.89 per cent of the theses which were low worded and only 8.51 per cent of the theses that were high worded.

Department wise classification uncovered that Crop Physiology (CP) theses topped the list with 85.71 per cent of theses being medium worded followed by Plant Biotechnology (PBT) theses with 81.82 per cent, Plant Breeding and Genetics (PBG) theses with 73.91 per cent and Microbiology theses (66.67%) . In low category it was observed that 17.40 per cent of Plant Breeding and Genetics (PBG) theses were low worded followed by Microbiology theses with 16.67 per cent, Crop Physiology (CP) with 14.29 per cent and Plant Biotechnology (PBT) with 9.09 per cent. However a glimpse of high worded category disclosed that Microbiology theses topped the category with 16.67 per cent. This was followed by Plant biotechnology (PBT) and Plant Breeding and Genetics (PBG) theses with 9.09 per cent and 8.69 per cent respectively.

Majority of theses under crop improvement division irrespective of the different departments were medium worded. However, Plant Breeding and Genetics theses topped the list for low worded theses (17.40%) and Microbiology theses surpassed Plant Biotechnology and Plant Breeding and Genetics with 16.67 per cent of theses being high worded.

From table 18 it can be seen that 66.66 per cent of the social science theses were medium worded followed by 16.67 per cent of theses which were both high and low worded separately. Department wise categorization bared that Community science theses topped the list with 73.91 per cent of theses being medium worded followed by Agricultural Economics theses with 66.67 per cent and Agricultural Extension theses with 61.76 per cent respectively. The table

Table 17: Distribution of crop improvement theses based on number of words in title

Category	PBG(N=23)			Plant physiology (N=7)			Microbiology (n=6)			PBT (n=11)			Total (N=47)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>18	2	8.69	>17	0	0.00	>14	1	16.67	>17	1	9.09	4	8.51
Medium (M±SD)	9-18	17	73.91	12-17	6	85.71	9-14	4	66.67	10-17	9	81.82	36	76.60
Low (M-SD)	<9	4	17.40	<12	1	14.29	<9	1	16.67	<10	1	9.09	7	14.89
Total		23	100		7	100		6	100		11	100	47	100
	Mean=13.30; SD=4.16 SE=0.87; Min-Max=7-22			Mean=14.29; SD=2.29 SE=0.87; Min-Max=11-17			Mean=11.83; SD=2.56 SE=1.05; Min-Max=8-15			Mean=13.36; SD=3.56 SE=1.07; Min-Max=7-19				

Table 18: Distribution of social science theses based on number of words in title

Category	Agricultural Extension (n=34)			Agricultural Economics (n=9)			Community Science (n=23)			Total (N=66)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>17	5	14.71	>15	2	22.22	>15	4	17.39	11	16.67
Medium (M±SD)	9-17	21	61.76	9-15	6	66.67	7-15	17	73.91	44	66.66
Low (M-SD)	<9	8	23.53	<9	1	11.11	<7	2	8.7	11	16.67
Total		34	100		9	100		23	100	66	100
	Mean=12.82;SD= 4.2; SE=0.72; Min-Max=6-22			Mean=11.78;SD= 3.19; SE-=1.06; Min-Max=8-17			Mean=11.09;SD= 4.37; SE= 0.91; Min-Max=5-25				

further showed that 23.53 per cent of Agricultural Extension theses were low worded followed by Agricultural Economics theses with 11.11 per cent and Community science theses with only 6.72 per cent. In high worded category Agricultural Economics theses topped the category with 22.22 per cent followed by Community Science theses with 17.39 per cent and Agricultural Extension theses with 14.71 per cent.

Hence, it can be concluded that majority of theses under social science division irrespective of the different departments were medium worded. However, Agricultural Extension theses topped the list for low worded theses (23.53%) and Agricultural Economic theses exceeded Agricultural Extension and Community Science with 22.22 per cent of theses being high worded. The minimum and maximum numbers of words were observed in Community Science theses with 5-25 words.

Table 19 reveals the number of words in the title of theses belonging to Agricultural Statistics department. It was observed that all the theses were medium worded (60.00%) and 20.00 per cent of theses were both high and low worded. The range for medium worded theses was 10-16 words.

Table 19: Distribution of Agricultural statistics theses based on number of words in title

N=5

Category	Class limits	f	%
High (M+SD)	>16	1	20.00
Medium (M±SD)	10-16	3	60.00
Low (M-SD)	<10	1	20.00
Total		5	100
Mean=13; SD=2.92; SE=1.30; Min-Max=9-17			

Even though there is no fixed limit prescribing number of words in a title for research, care should be taken to use fewer words yet descriptive enough to

depict the research scope. Typically it is suggested in many reviews, 10-15 words for the title. However, it differs in different departments and it can go up to 20 words, if essential. Considering the aforesaid limits, it was clear that minimum-maximum range of words in the title of crop production ranged from 5-19, crop protection (6-20), crop improvement (7-22), social science theses (5-25) and agricultural statistics (9-17). Majority of the theses belonging to different departments have medium number of words in the title. However there was further scope for bringing down the number of words to less than 15 in the title of theses.

However our interest was to get a clear picture of the entire theses submitted at College of Agriculture, Vellayani based on the number of words in the title and it was good to note that 76.99 per cent of the theses were with 6 to 15 words in the title.

Table 20: Summarization of the number of words in the title

N=287

Interval	f	%
3 to 6	3	1.05
6 to 9	35	12.19
9 to12	81	28.22
12 to 15	105	36.58
15 to 18	43	14.98
18 to 21	13	4.54
21 to 24	6	2.09
24 to 27	1	0.35
Total	287	100
Min-Max= 5-25		**Mean=12.57**

On analysis of fig.11 it was found that the graph slightly tilts to the right which shows that some of the theses have number of words more than mean value. But when checked with the skewness it revealed that the distribution of data were symmetric with a skewness of 0.50. The number of words in the title is not in agreement with Cherry (2019).

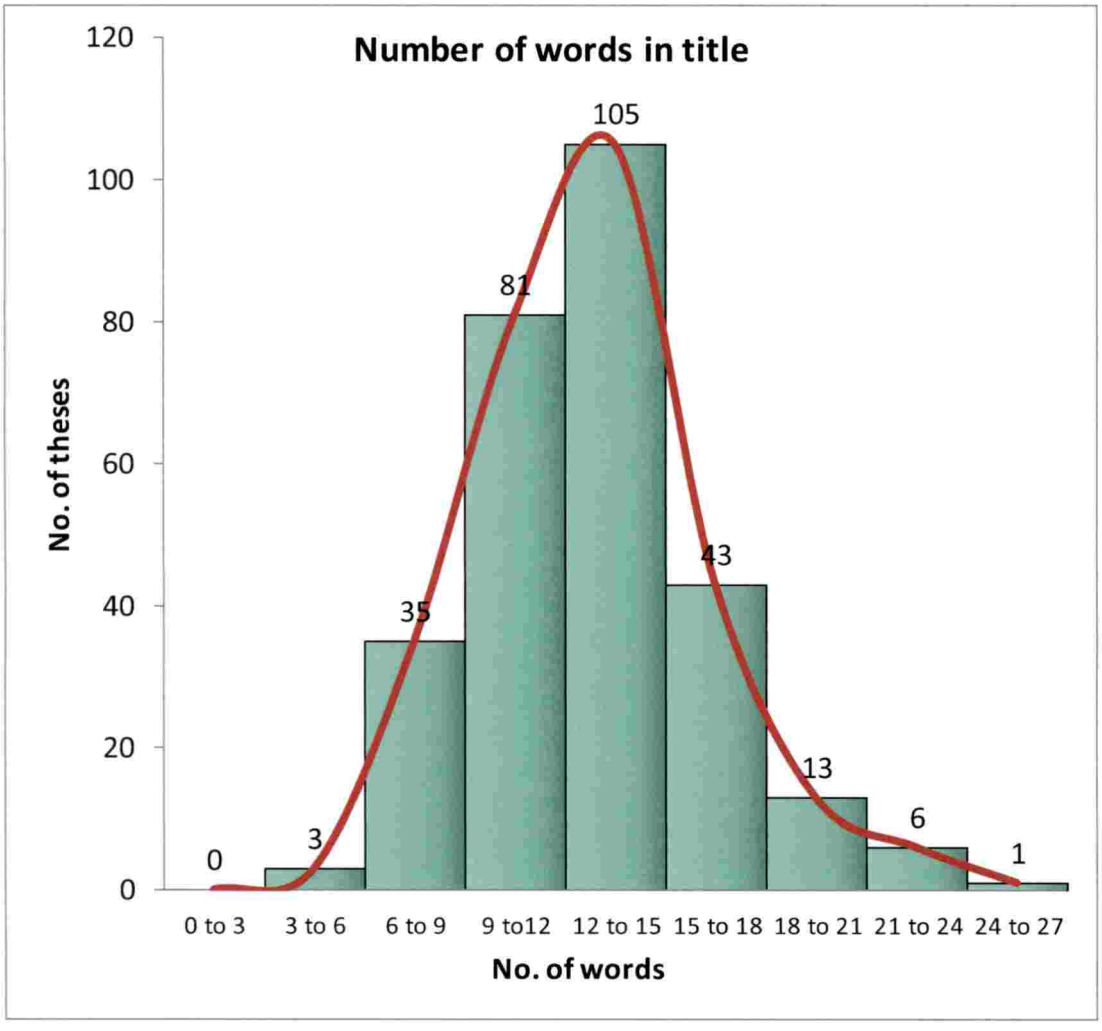


Fig.11: Histogram representation of number of words in the title

4.2.2 Title with scientific name

Title with scientific name here refers to the theses with taxonomic name that consist of a genus or species of any crops or organisms in the title. The results regarding the departments with scientific name in the title of the theses are displayed in table 21.

Table 21: Distribution of theses with scientific name in the title

Sl. No.	Department	N	Theses with scientific name	
			N	%
1	Agronomy	41	26	63.41
2	Soil Science and Agricultural Chemistry	25	6	24.00
3	Vegetable Science	14	14	100.00
4	Pomology and Floriculture	9	9	100.00
5	Plantation Crops And Spices	8	7	87.5
6	Post-Harvest Technology	12	7	58.33
7	Entomology	35	23	65.72
8	Plant Pathology	25	16	64.00
9	Plant Breeding and Genetics	23	18	78.26
10	Plant Physiology	7	7	100.00
11	Microbiology	6	2	33.33
12	Plant Biotechnology	11	9	81.82

It can be inferred from the above table that of the 16 departments, 12 departments have theses with scientific name in the title and the maximum (100%) was observed in Department of Plant Physiology, Vegetable Science and Pomology and Floriculture followed by Plantation Crops and Spices (87.50%), Plant Biotechnology (81.82%), Plant Breeding and genetics (78.26%), Entomology (65.72%), Plant Pathology (64.00%), Agronomy (63.00%), Post-Harvest Technology (58.33%) and Microbiology, Soil Science And Agricultural Chemistry with 33.33 per cent and 24.00 per cent respectively.

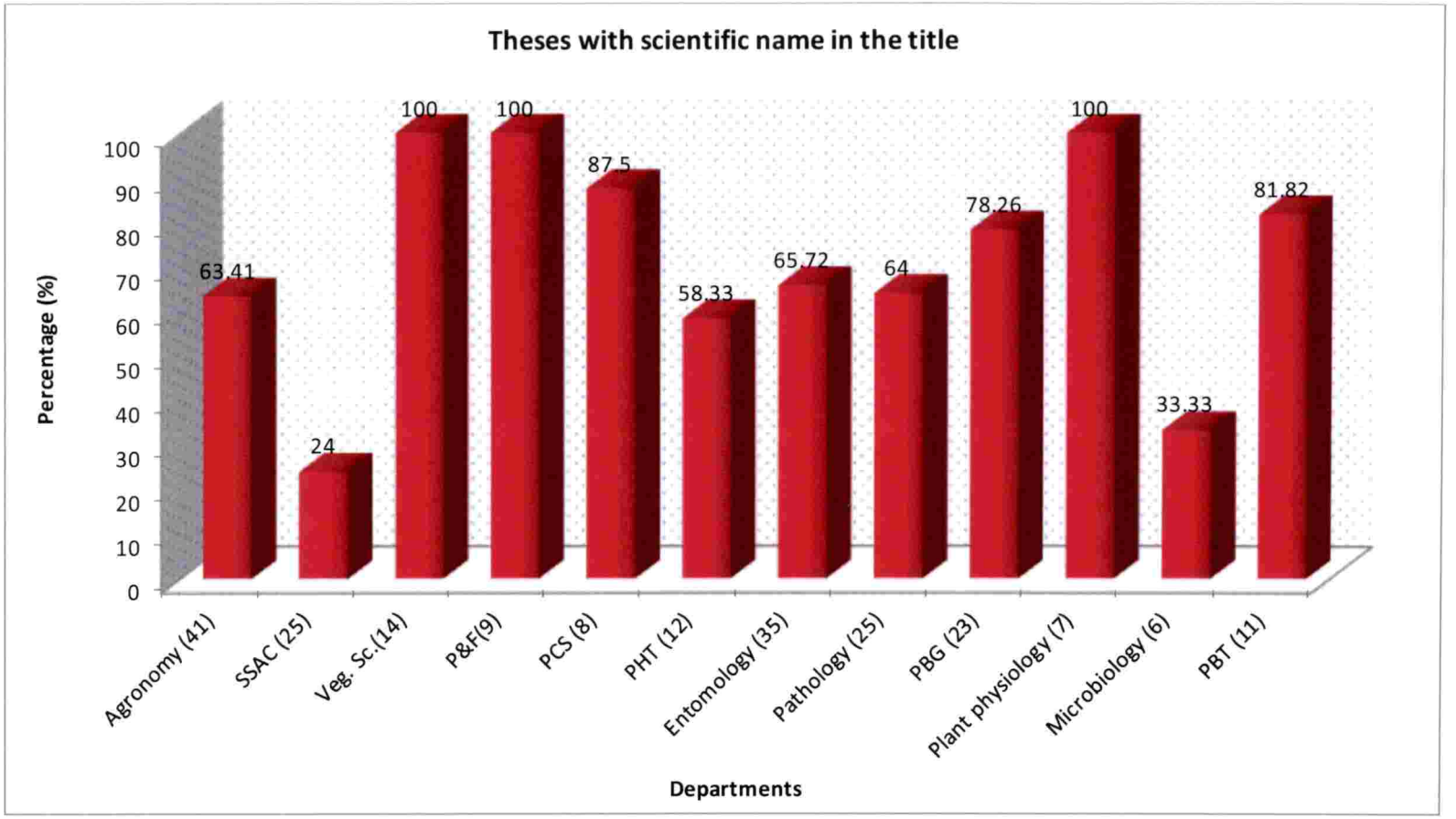


Fig.12: Department wise representation of theses with scientific name in the title

Therefore, it can be presumed that majority of the theses belonging to the division of crop production, crop protection and crop improvement tend to include scientific name in the title.

4.2.3 Number of words in abstract

Number of words in an abstracts refers to the number of words that constitutes a brief summary of thesis. The results on the distribution of theses based on the number of words in an abstract for division of crop production, crop protection, crop improvement, social science and agricultural statistics is illustrated in table 22, 23, 24, 25 and 26.

An investigation of table 22 uncovered that 68.81 per cent of the theses have medium number of words in abstracts regardless of the departments under crop production division and 20.18 per cent and 11.01 per cent of theses were high and low worded respectively.

Table 22:. Distribution of crop production theses based on the number of words in an abstract

Category	Agronomy (n=41)			SSAC (n=25)			Horticulture (n=43)			Total (N=109)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>700	12	29.26	>792	4	16.00	>656	6	13.95	22	20.18
Medium (M±SD)	400-700	26	63.42	448-792	18	72.00	478-656	31	72.09	75	68.81
Low (M-SD)	<400	3	7.32	<448	3	12.00	<478	6	13.95	12	11.01
Total		41	100		25	100		43	100		
	Mean=700.05 SD=300.71 SE=46.96 Min-Max=363-1976			Mean=620.32 SD=172.18 SE=34.44 Min-Max=252-974			Mean=557.9 SD=110.73 SE=1.60 Min-Max=351-1031				

Department wise analysis revealed that 72.09 per cent of Horticulture theses have a medium number of words in abstract followed by 72.00 per cent of SSAC and 63.42 per cent of Agronomy. The table also showed that Horticulture

department lead with 13.95 per cent of the theses has low number of words followed by SSAC theses with 12.00 per cent and Agronomy theses with 7.32 per cent respectively. In high category Agronomy theses topped the list with 29.26 per cent followed 16.00 per cent of SSAC and 13.95 per cent of Horticulture theses separately.

Therefore, it can be abridged that more than 60 per cent of the theses under crop production division have medium number of words in abstracts. However, Horticultural theses topped the list with 13.95 per cent of the theses being low worded and Agronomy theses surpassed SSAC and Horticulture with 29.26 per cent of the theses being highly worded. The minimum (252) and maximum (1976) number of words were from SSAC and Agronomy respectively.

Table 23: Distribution of crop protection theses based on the number of words in abstract

Category	Entomology (n=35)			Plant Pathology (n=25)			Total (N=60)	
	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>716	7	20.00	>694	4	16.00	11	18.33
Medium (M±SD)	495-716	21	60.00	442-694	16	64.00	37	61.67
Low (M-SD)	<495	7	20.00	<442	5	20.00	12	20.00
Total		35	100		25	100	60	100
	Mean=605.34; SD=110.23; SE=18.63; Min-Max=383-793			Mean=568.08; SD=125.98; SE=25.19; Min-Max=302-767				

From table 23 it was witnessed that 61.67 per cent of the theses were medium worded irrespective of the departments under crop protection division and 18.33 per cent and 20.00 per cent of theses were both high and low worded respectively. The range for medium worded theses was 495-716 and 442-694 words and department wise categorization revealed that Plant Pathology theses topped the list with 64.00 per cent of theses being medium worded followed by Entomology theses (60.00%). Low worded theses had less than 495 and 442

words respectively and it was observed 20.00 per cent of both Entomology and Plant Pathology theses was low worded. Highly worded theses had more than 716 and 694 words for Entomology and Plant Pathology respectively and Entomology theses topped the category with 20.00 per cent theses being highly worded. This was followed by Plant Pathology theses with 16.00 per cent.

Hence, from the above results a statement can be made that majority of theses under crop protection division were medium worded. Though, Entomology theses surpassed Plant pathology with 20.00 per cent of theses being highly worded. The minimum (302) and maximum (793) number of words were from Plant Pathology and Entomology respectively.

Table 24 represents the distribution based on number of words in an abstract of crop improvement theses. On perusal of the table it was observed that 68.09 per cent of the theses were medium worded irrespective of the departments under crop improvement division followed by 17.02 per cent and 14.89 per cent of theses which were both high and low worded respectively. The range for medium worded theses was 416-673, 434-983, 466-675 and 457-776 words respectively and department wise categorization revealed that Plant Physiology theses topped the list with 85.71 per cent of theses being medium worded followed by Microbiology theses (66.67%), Plant Breeding and Genetics (65.22%) and Plant Biotechnology (63.64%). Low worded theses had less than 416, 434, 466 and 457 words respectively and it was observed that 18.18 per cent of Plant Biotechnology theses was low worded followed by Plant Breeding and Genetics theses (17.39%) and Microbiology theses (16.67%). High worded theses had more than 673, 983, 675 and 776 words respectively and Plant Biotechnology theses topped the category with 18.18 per cent theses being high worded. This was followed by Plant Breeding and Genetics, Microbiology and Crop Physiology theses with 17.39, 16.67 and 14.29 per cent.

Hence, it can be inferred that majority of theses under crop improvement division irrespective of the different departments were medium worded. However,

Table 24: Distribution of crop improvement theses based on the number of words in abstract

Category	PBG (N=23)			Plant physiology (N=7)			Microbiology (n=6)			PBT (n=11)			Total (N=47)	
	Class limits	f	%	Class limits	f	%	Class Limits	f	%	Class limits	f	%	f	%
High (M+SD)	>673	4	17.39	>983	1	14.29	>675	1	16.67	>776	2	18.18	8	17.02
Medium (M±SD)	416-673	15	65.22	434-983	6	85.71	466-675	4	66.67	457-776	7	63.64	32	68.09
Low (M-SD)	<416	4	17.39	<434	0	0.00	<466	1	16.67	<457	2	18.18	7	14.89
Total		23	100		7	100		6	100		11	100	47	100
	Mean=544.48; SD=128.83 SE=26.86; Min-Max=363-912			Mean=708.43; SD=274.89 SE=103.90; Min-Max =443-1265			Mean=570.83; SD=104.44 SE=42.64; Min-Max=402-690			Mean=616.18; SD=159.22 SE=48.00; Min-Max=405-893				

Table 25: Distribution of social science theses based on number of words in abstract

Category	Agricultural Extension (n=34)			Agricultural Economics (n=9)			Community Science (n=23)			Total (N=66)	
	Class Limits	f	%	Class Limits	f	%	Class Limits	f	%	f	%
High (M+SD)	>710	4	11.76	>803	2	22.22	>700	2	8.7	8	12.12
Medium (M±SD)	382-710	24	70.59	489-803	6	66.67	400-700	18	78.26	48	72.73
Low (M-SD)	<382	6	17.65	<489	1	11.11	<400	3	13.04	10	15.15
Total		34	100		9	100		23	100	66	100
	Mean=546.47; SD=164.15 SE=28.16 Min-Max=341-984			Mean=646; SD=156.73 SE=52.25 Min-Max=351-872			Mean=549.91; SD=149.81 SE=31.24 Min-Max=282-880				

Plant Biotechnology theses topped the list for low worded theses (18.18%) and also surpassed Plant Breeding and Genetics, Microbiology and Crop Physiology with 18.18 per cent of theses being high worded. The minimum (363) and maximum (1265) number of words were observed from PBG and Plant Physiology respectively.

Table 25 revealed the number of words in abstract of theses belonging to the social science division. Irrespective of the departments under social science division it was observed that 72.73 per cent of the theses were medium worded followed by 15.15 per cent and 12.12 percent of theses that were low and high worded respectively. The range for medium worded theses was 382-700 words and department wise classification revealed that Community Science theses topped the list with 78.26 per cent of theses being medium worded followed by Agricultural Extension theses (70.59%) and Agricultural Economics theses (66.67%). Low worded theses had less than 382 words and it was observed that 17.65 per cent of Agricultural Extension theses was low worded followed by Community Science theses (13.04%) and Agricultural Economic theses (11.11%). High worded theses had more than 700 words and Agricultural Economics theses topped the category with 22.22 percent theses being high worded. This was followed by Agricultural Extension theses with 11.76 per cent and Community Science theses with 8.70 per cent being high worded. The minimum (282) and maximum (984) number of words were observed from Community Science and Agricultural Extension respectively.

Hence, it can be conjectured that a greater number of theses under social science division were medium worded. However, Agricultural Extension theses topped the list for low worded theses (23.53%) and Agricultural Economic theses surpassed Agricultural Extension and Community Science with 22.22 per cent of theses being high worded.

Table 26: Distribution of Agricultural Statistics theses based on the number of words in abstract

N=5

Category	Class limits	f	%
High (M+SD)	>712	0	0.00
Medium (M±SD)	467-712	4	80.00
Low (M-SD)	<467	1	20.00
Total		5	100
Mean=590.8; SD=121.44; SE=54.3; Min-Max=420-720			

Table 26 revealed the number of words in abstract of theses belonging to the agricultural statistics department. It was observed that 80.00 per cent of the theses were medium worded followed by 20.00 per cent which were of low worded and none of the theses were high worded. The range for medium worded theses was 467-712 words. The table below represents the overall scenario of the number of words in abstracts under all division.

Table 27: Summarization of results of mean number of words in theses abstract using quartiles

Category	Class limits	f	%
Low	<583.75	1	25.00
Medium	583.75-601.03	3	50.00
High	>601.03	1	25.00
Total		5	100
Divisions			
Low	Social science		
Medium	Crop production; Crop protection; Agricultural Statistics		
High	Crop improvement		
Q1=583.75; Q2=590.8; Q3=601.03; Min=581; Max=610; Mean=595.5			

From fig.13 the box plot clearly displayed that mean minimum number of words is 581 and mean maximum number of words is 610 but while considering

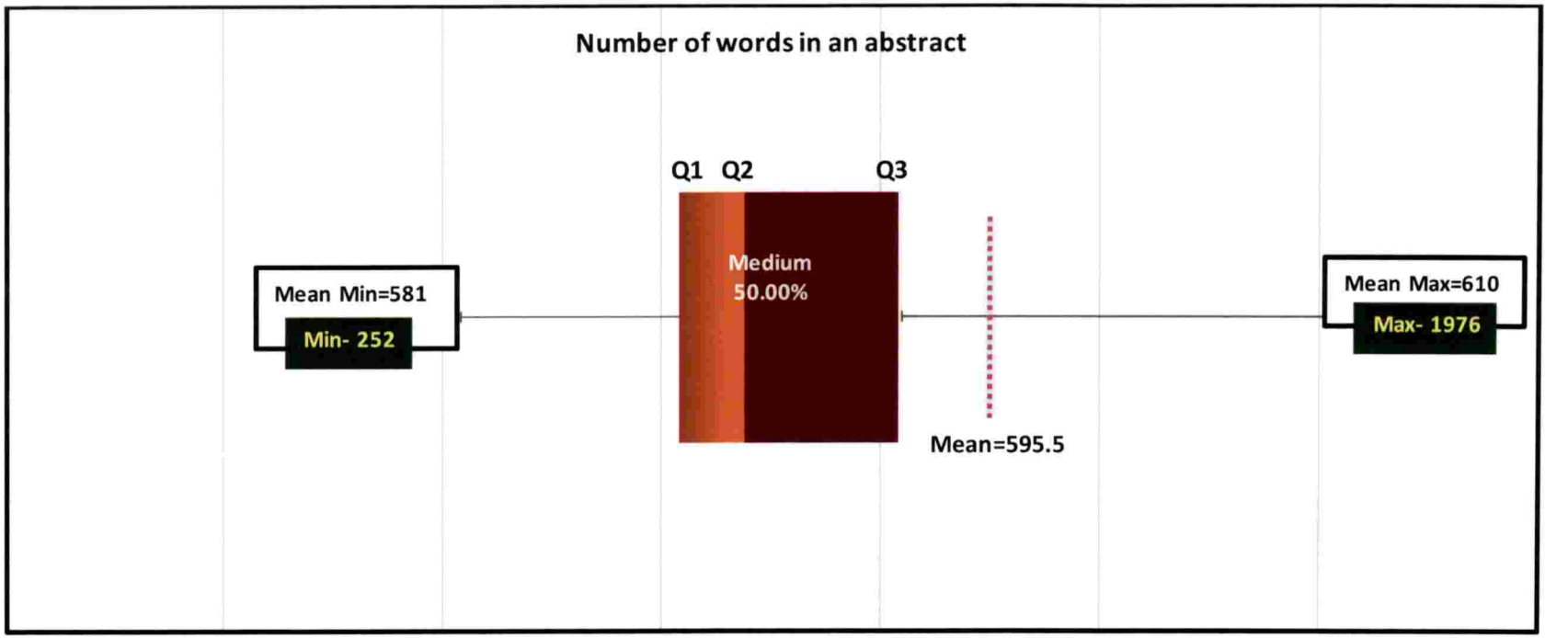


Fig.13: Box plot representation of PG theses based on number of words in abstract

the overall results it can be seen that the minimum and maximum number is 252 and 1976 words and was witnessed in thesis from department of SSAC and Agronomy separately. Using quartile, it was noted that theses from crop production, crop protection and Agricultural Statistics division have medium number of words (584-601) in an abstract followed by social science and crop improvement theses that have low (<584) and high (>601) number of words respectively.

Typically, according to APA format as indicated by Cherry (2019) the abstract should be between 150-250 words and up to 350 words according to Sargeant (2012). But with different in departments the number has gone up to 500 words. Nonetheless care should be taken to use fewer words yet expressive enough to depict the research scope. However there was further scope for bringing down the number of words of an abstract to less than 300 words. It can be done by careful planning of argument in few sentences or by including only the major objectives or hypotheses and also by identifying only the major results from results section.

4.2.4 Number of objectives

Objectives in this study refer to the research objectives that were set forth for the study and are mentioned in the theses. The results regarding the number of objectives outlined by divisions of crop production, crop protection, crop improvement, social science and Agricultural statistics is shown in table 28, 29, 30, 31 and 32 respectively.

On examination of table 28 it was observed that 80.73 per cent of the theses have medium number of objectives followed by 11.00 per cent of theses which have less number of objectives and 8.27 per sent have high number of objectives.

Table 28: Distribution of crop production theses based on the number of objectives

Category	Agronomy (n=41)			SSAC (n=25)			Horticulture (n=43)			Total (n=109)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>3	4	9.76	>3	3	12.00	>4	2	4.65	9	8.27
Medium (M±SD)	2 to 3	32	78.04	2 to 3	16	64.00	2 to 4	40	93.02	88	80.73
Low (M-SD)	<2	5	12.2	<2	6	24.00	<2	1	2.33	12	11.00
Total		41	100		25	100		43	100	109	100
	Mean=2.53 SD=0.84 SE=0.13 Min-Max=1-4			Mean=2.28 SD=1.31 SE=0.26 Min-Max=1-7			Mean=2.67 SD=0.94 SE=0.15 Min-Max=1-6				

Categorization made department wise showed that 93.02 per cent of the Horticulture theses have medium number of objectives followed by 78.04 per cent of Agronomy and 64.00 per cent of SSAC. Considering the theses with low number of objectives, 24.00 per cent were from SSAC followed by 12.20 per cent and 2.33 per cent from Agronomy and Horticulture respectively. Whereas, 12.00 per cent of the theses that have high number of objectives were from SSAC department followed by 9.76 per cent from Agronomy theses and 4.65 from Horticulture theses.

Hence, it can be concluded that more than 80 per cent of theses under crop production division were having an average number of objectives. The minimum and maximum number of objectives was 1 and 7 respectively. However, SSAC theses topped the list for both high and low category.

From the table 29 it can be inferred that 88.33 per cent of the theses irrespective of the departments under crop protection division have medium number of objectives followed by 11.67 per cent that have high number objectives.

Table 29: Distribution of crop protection theses based on the number of objectives

Category	Entomology (n=35)			Plant Pathology (n=25)			Total (N=60)	
	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>5	4	11.43	>6	3	12.00	7	11.67
Medium (M±SD)	2 to 5	31	88.57	2 to 6	22	88.00	53	88.33
Low (M-SD)	<2	0	0.00	<2	0	0.00	0	0.00
Total		35	100		25	100	60	100
	Mean=3.34; SD=1.47; SE=0.25; Min-Max=2-7			Mean=4.12; SD=2.26; SE=0.45; Min-Max=2-9				

The range for medium number of objectives were 2-5 and 2-6 respectively and department wise categorization indicated that Entomology theses topped the list with 88.57 per cent theses have medium number of objectives followed by Plant Pathology theses with 88.00 per cent. High number objectives had more than 5 and 6 number of objectives respectively and Plant Pathology theses topped the category with 12.00 per cent theses which surpassed Entomology theses (11.43%).

However, it can be concluded that majority of theses belonging to crop production division have medium number of objectives with minimum of 2 and maximum of 9 objectives.

On review of table 30 it was observed that 89.36 per cent of the theses under crop improvement division have medium number of objectives followed by 6.38 per cent and 4.26 per cent that have low and high number of objectives respectively.

The range for medium number objectives theses was 2-5,2-3,1-3 and 2-3 objectives respectively and department wise categorization revealed that Microbiology and Plant Physiology theses topped the list with all of the theses having medium number of objectives followed by Plant Biotechnology and Plant

Table 30: Distribution of crop improvement theses based on the number of objectives

Category	PBG (N=23)			Plant Physiology (N=7)			Microbiology (n=6)			PBT (n=11)			Total (N=47)	
	Class Limits	f	%	Class Limits	f	%	Class Limits	f	%	Class limits	f	%	f	%
High (M+SD)	>5	1	4.35	>3	0	0	>3	0	0	>3	1	9.09	2	4.26
Medium (M±SD)	2 to 5	19	82.61	2 to 3	7	100	1 to 3	6	100	2 to 3	10	90.91	42	89.36
Low (M-SD)	<2	3	13.04	<2	0	0	<1	0	0	<2	0	0	3	6.38
Total		23	100		7	100		6	100		11	100	47	100
	Mean=3.00; SD=1.45 SE=0.30; Min-Max=1-6			Mean=2.57; SD=0.53 SE=0.20; Min-Max=2-3			Mean=2.00; SD=0.89 SE=0.37; Min-Max=1-3			Mean=2.45; SD=0.69 SE=0.21; Min-Max=1-4				

Table 31: Distribution of social science theses based on the number of objectives

Category	Agricultural Extension (n=34)			Agricultural Economics (n=9)			Community Science (n=23)			Total (N=66)	
	Class Limits	f	%	Class Limits	f	%	Class Limits	f	%	f	%
High (M+SD)	>5	4	11.77	>4	2	22.22	>3	1	4.35	7	10.61
Medium (M±SD)	3 to 5	28	82.35	2 to 4	4	44.45	1 to 3	18	78.26	50	75.75
Low (M-SD)	<3	2	5.88	<2	3	33.33	<1	4	17.39	9	13.64
Total		34	100		9	100		23	100	66	100
	Mean=3.88; SD=1.25 SE=0.22; Min-Max=2-7			Mean=3; SD=1.00 SE=0.33; Min-Max=2-5			Mean=2.17; SD=1.03 SE=0.22; Min-Max=2-7				

Breeding and Genetics theses with 90.91 per cent and 82.61 per cent respectively. Theses that had less than two objectives fall under low category and it was observed that 13.04 per cent of Plant Breeding and Genetics theses were having less number of objectives. Theses that have more than three numbers of objectives fall under high category and Plant Biotechnology theses topped the category with 9.09 per cent followed by Plant Breeding and Genetics theses with 4.35 per cent.

Hence, it was briefed that almost 90 per cent of the theses under crop improvement division have medium number of objectives with minimum of one and maximum of 7 objectives respectively. However, Plant Breeding and Genetics theses topped the list for low number of objectives and Plant Biotechnology surpassed Plant Breeding and Genetics with 9.09 per cent being in the high category.

Table 31 revealed the number of objective in social science theses. The results uncovered that 75.75 per cent of the theses have medium number of objectives irrespective of the departments under social science division followed by 13.64 per cent and 10.61 per cent of theses having low and high number of objectives respectively. The range for medium number objectives theses was 3-5, 2-4 and 1-3 objectives respectively and department wise categorization revealed that Agricultural Extension theses topped the list with 82.35 per cent of theses having medium number of objectives followed by Community Science theses with 78.26 per cent and Agricultural Economics theses with 44.45 per cent. In low category it was observed that 22.22 per cent of Agricultural Economics theses were having less number of objectives followed by Agricultural Extension theses with 11.77 per cent and Community Science theses with 4.35 per cent respectively. Similarly, in high category Agricultural Economics theses topped the list with 33.33 per cent followed by Community Science theses with 17.39 per cent and Agricultural Extension theses with 5.88 per cent respectively.

Hence, it can be concluded that almost 80 per cent of theses under social science division were having medium number of objectives with minimum of 2

and maximum of 7 objectives respectively. Though, Agricultural Economics theses topped the list for having low number of objectives with 33.33 per cent it also surpassed Community Science and Agricultural Extension department with 22.22 per cent of theses having high number of objectives.

Table 32: Distribution of Agricultural Statistics theses based on the number of objectives

(N=5)

Category	Class limits	f	%
High (M+SD)	>3	0	0
Medium (M±SD)	2-3	5	100
Low (M-SD)	<2	0	0
Total		5	100
Mean=2.4; SD=0.55; SE=0.24; Max-Min=3-2			

Table 32 revealed the number of objectives in the theses belonging to Agricultural Statistics department and it was observed that hundred per cent of theses have medium number of objectives with a range from 2-3.

Table 33: Summarization of number of objectives in PG theses

Interval	f	%
1 to 2	27	9.41
2 to 3	100	34.84
3 to 4	86	29.97
4 to 5	42	14.63
5 to 6	13	4.53
6 to 7	9	3.14
7 to 8	7	2.44
8 to 9	1	0.35
9 to 10	2	0.70
Total	287	100

From the above results it can be inferred that majority of the theses have medium number of objectives. Nevertheless our interest was to get a clear picture

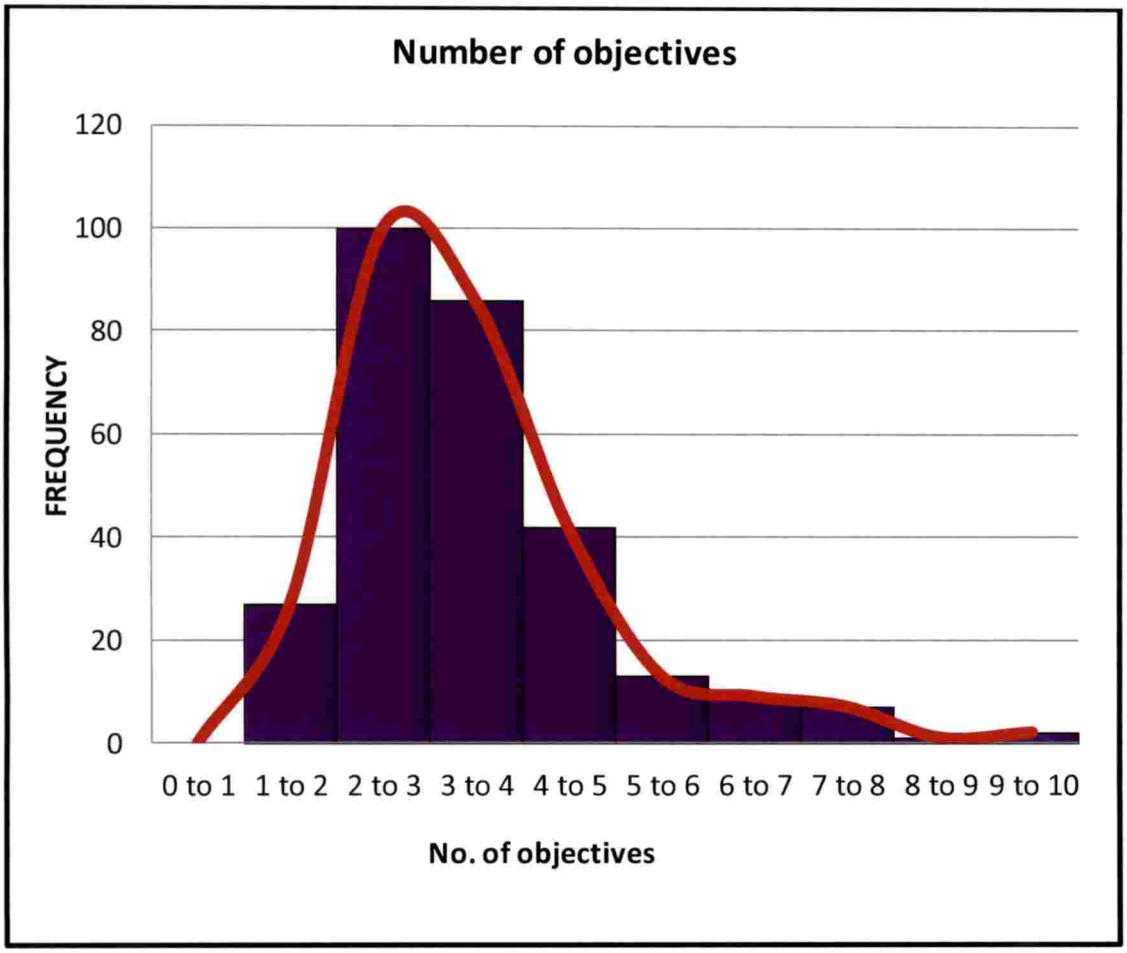


Fig.14: Histogram representation of the number of objectives

of the number of objectives of the entire theses. Table 34 and fig.14 revealed that 64.81 per cent of the theses have 2-4 numbers of objectives which is in partial agreement with the study of Liebano *et al.* (2005). Even though there is no fixed limit prescribing number of objectives in thesis for research, care should be taken to use objectives that could be fulfilled within the given time limit of study. Typically it is suggested that 2-3 objectives in ideal for PG research.

Table 34: Division wise comparison of PG theses based on the number of objectives

Sl. No	Division	Skewness	Distribution
1	Crop production	0.90	Moderately skew to the right
2	Crop protection	1.28	Highly skew to the right
3	Crop improvement	0.83	Moderately skew to the right
4	Social science	1.00	Highly skew to the right
5	Agricultural Statistics	0.60	Moderately skew to the right
6	All division	1.37	Highly skew to the right

From fig. 11 it was noticed that the data were highly skewed to right, which shows that there was a vast difference in the number of objectives taken for different research work. The skewness observed might be because of the influence of crop protection and social science theses having more number of objectives ranging from 7 to 9 which makes the data highly skewed to the right.

4.2.5 Number of references in theses

References here refer to the list of all the sources from which the researchers obtained information for their research work and it is represented in the last page of the thesis. The results regarding the distribution of theses based on the number of references for division of crop production, crop protection, crop improvement, social science and agricultural statistics are illustrated in table 35, 36, 37, 38 and 39.

Table 35: Distribution of crop production theses based total number of references

Category	Agronomy (n=41)			SSAC (n=25)			Horticulture (n=43)			Total (N=109)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>180	6	14.64	>244	5	20.00	>187	7	16.27	18	16.51
Medium (M±SD)	96-180	30	73.17	101-244	18	72.00	99-187	30	69.76	78	71.56
Low (M-SD)	<96	5	12.19	<101	2	8.00	<99	6	13.95	13	11.93
Total		41	100		25	100		43	100	109	100
	Mean=138.78 SD=42.18 SE=6.58 Min-Max=53-246			Mean=172.64 SD=71.44 SE=14.28 Min-Max=82-370			Mean=143.18 SD=44.02 SE=1.01 Min-Max=58-269				

On examination of table 35 it was observed that irrespective of the department under crop production division, 71.56 per cent of the theses have medium number of references followed by 16.51 per cent and 11.93 per cent that had high and low number of references respectively. A glance into each department revealed that 73.17 per cent of Agronomy theses have medium number of references followed by 72.00 per cent of SSAC and 69.76 per cent of Horticulture theses. The table also showed that 13.95 per cent of Horticulture theses have less number of references followed by 12.19 per cent of Agronomy theses and 8.00 per cent of SSAC. SSAC theses were found to top the list in the high category with 20.00 per cent, followed by 16.27 per cent of Horticulture theses and 14.64 per cent of Agronomy theses respectively.

Therefore, it can be abridged that majority of theses under crop production division irrespective of the different departments were having medium number of references. However, Horticulture theses topped the list for low category with 13.95 per cent and SSAC surpassed other department with 20.00 per cent of the theses having high number of references. The minimum (53) and maximum (370) number of references were observed in Agronomy and SSAC respectively.

Table 36: Distribution of crop protection theses based total number of references

Category	Entomology (n=35)			Plant Pathology (n=25)			Total (N=60)	
	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>207	6	17.14	>230	5	20.00	11	18.33
Medium (M±SD)	92-207	24	68.57	117-230	15	60.00	39	65.00
Low (M-SD)	<92	5	14.29	<117	5	20.00	10	16.67
Total		35	100		25	100	60	100
	Mean=149.43; SD=57.09; SE=9.65; Min-Max=72-325			Mean=173.28; SD=56.77; SE=11.36; Min-Max=82-277				

On perusal of the table 36 it was detected that 65.00 per cent of the theses have medium number of references irrespective of the departments under crop protection division followed by 18.33 per cent and 16.67 per cent of theses that have high and low number of references respectively.

The range of theses with medium number of references was 92-207 and 117-230 for Entomology and Plant Pathology theses respectively and department wise cataloguing revealed that Entomology theses topped the list with 68.57 per cent of theses having medium number of references followed by Plant Pathology theses with 60.00 per cent. Low references theses had less than 92 and 117 reviews respectively and it was observed that 20.00 per cent of Plant Pathology theses were having less number of references followed by Entomology theses with 14.29 per cent. Theses with high number of references had more than 207 and 230 numbers of references respectively and Plant Pathology theses topped the category with 20.00 per cent. This was followed by Entomology theses with 17.14 per cent.

Hence, it can be concluded that majority of theses under crop protection division were having medium number of references regardless of the variation in departments. However, Plant pathology theses topped the list for both high and low category and surpassed Entomology theses with 20.00 per cent in each

category. The minimum (72) and maximum (325) number of references were observed in Entomology theses.

From table 37 it can be inferred that 68.09 per cent of the theses contained medium number of references irrespective of the departments under crop improvement division followed by 19.15 per cent and 12.77 per cent of theses that had high and low number of references respectively.

The range of theses for medium number of references was 80-177, 92-285, 99-172 and 144-235 for Plant Breeding and Genetics, Plant Physiology, Microbiology and Plant Biotechnology theses respectively and department wise categorization uncovered that Plant Biotechnology theses topped the list with 72.72 per cent of theses having medium number of references followed by Plant Physiology, Microbiology and Plant Breeding and Genetics theses with 71.42 per cent, 66.66 per cent and 65.22 per cent respectively. Low category had less than 80, 92, 99 and 144 references respectively and it was observed that 18.18 per cent of Plant Biotechnology theses were having less number of references followed by Microbiology, Plant Physiology and Plant Breeding and Genetics theses with16.67, 14.29 and 8.7 per cent respectively. Theses with high number of references had more than 177, 285, 172 and 235 references each and Plant Breeding and Genetics theses outdone the category with 26.08 per cent followed by Microbiology, Plant Physiology and Plant biotechnology theses with 16.67, 14.29 and 9.1 per cent respectively.

Hence, a conclusion can be drawn that majority of the theses under crop production division were having medium number of references regardless of the change in departments. Nonetheless, Plant Biotechnology theses topped the list for low category with 18.18 per cent and Plant Breeding and Genetics theses surpassed Microbiology, Plant Physiology and Plant Biotechnology theses with 26.08 per cent being in high category. The minimum (46) and maximum (380) number of references were observed in PBG and Plant Physiology theses.

Table 37: Distribution of crop improvement theses based total number of references

Category	PBG(N=23)			Plant Physiology (N=7)			Microbiology (n=6)			PBT (n=11)			Total (N=47)	
	Class limits	f	%	Class limits	f	%	Class limits	f	%	Class limits	f	%	f	%
High (M+SD)	>177	6	26.08	>285	1	14.29	>172	1	16.67	>235	1	9.1	9	19.15
Medium (M±SD)	80-177	15	65.22	95-285	5	71.42	99-172	4	66.66	114-235	8	72.72	32	68.09
Low (M-SD)	<80	2	8.7	<95	1	14.29	<99	1	16.67	<114	2	18.18	6	12.77
Total		23	100		7	100		6	100		11	100	47	100
	Mean=128.39; SD=48.77 SE=10.17; Min-Max= 46-218			Mean=189.57; SD=95.08 SE=35.94; Min-Max=77-380			Mean=135.83; SD=36.55 SE=14.92; Min-Max=78-188			Mean=174.64; SD=-60.34 SE=18.19; Min-Max=95-292				

Table 38: Distribution of social science theses based on total number of references

Category	Agricultural Extension (n=34)			Agricultural Economics (n=9)			Community Science (n=23)			Total (N=66)	
	Class limits	f	%	Class limits	f	%	Class Limits	f	%	f	%
High (M+SD)	>162	5	14.71	>106	1	11.11	>284	1	4.35	7	10.61
Medium (M±SD)	78-162	24	70.58	79-106	7	77.78	130-284	20	86.96	51	77.27
Low (M-SD)	<78	5	14.71	<79	1	11.11	<130	2	8.69	8	12.12
Total		34	100		9	100		23	100	66	100
	Mean=117.47; SD=44.59 SE=7.65 Min-Max=51-245			Mean=92.78; SD=13.59 SE=4.53 Min-Max=69-116			Mean=206.65; SD=77.03 SE=16.06 Min-Max=87-477				

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Table 38 revealed the total number of references in the theses belonging to social science division and it was observed from the table that 77.27 per cent of the theses contained medium number of references followed by 12.12 per cent and 10.61 per cent having low and high number of references respectively.

The range of theses with medium number of references was 76-162, 79-106 and 130-284 references for Agricultural Extension, Agricultural Economics and Community Science theses respectively. Department wise categorization revealed that Community Science theses topped the list with 86.96 per cent of theses having medium number of references followed by Agricultural Economics (77.78%) and Agricultural Extension (70.58%) theses. Low category theses had less than 76, 79 and 130 references respectively and it was seen that 14.71 per cent of Agricultural Extension theses were having less number of references followed by Agricultural Economics with 11.11 per cent and Community Science with 8.69 per cent. Theses with high number of references had more than 162, 106 and 284 references respectively and Agricultural Extension theses topped the category with 14.71 per cent. This was followed by Agricultural Economics theses with 11.11 per cent and Community Science theses with 4.35 per cent respectively.

Further, it can be concluded that majority of theses under social science division were having medium number of references. However, Agricultural Extension theses topped the list for both high and low category and surpassed Agricultural Economics and Community Science theses with 14.71 per cent in each category. The minimum (51) and maximum (477) number of references were observed in Agricultural Extension and Community Science theses respectively.

Table 39: Distribution of Agricultural Statistics theses based total number of references

N=5

Category	Class limits	f	%
High (M+SD)	>74	1	20.00
Medium (M±SD)	60-74	3	60.00
Low (M-SD)	<60	1	20.00
Total		5	100
Mean=67; SD=6.75; SE=3.02; Min-Max=58-77			

From table 39 it was observed that 60.00 per cent of the theses in Agricultural Statistics department were having medium number of references and 20.00 per cent of the theses have both of high and low number of references respectively. The range for medium number of reviews is 60-74 references.

The numbers of references were categorized based on mean and standard deviation with mean as check. The overall results based on mean number of references were summarized using quartile and presented in table 40.

Table 40: Summarization of results based on mean number of references in PG theses of all division using quartiles

Category	Class limits	f	%
Low	<102.98	1	20
Medium	102.98-148.04	2	40
High	>148.04	2	40
Total		5	100
Divisions			
Low	Agricultural statistics		
Medium	Crop protection and crop improvement		
High	Crop production and social science		
Q1=102.98; Q2=138.97; Q3=148.04; Min=67; Max=161; Mean=134			

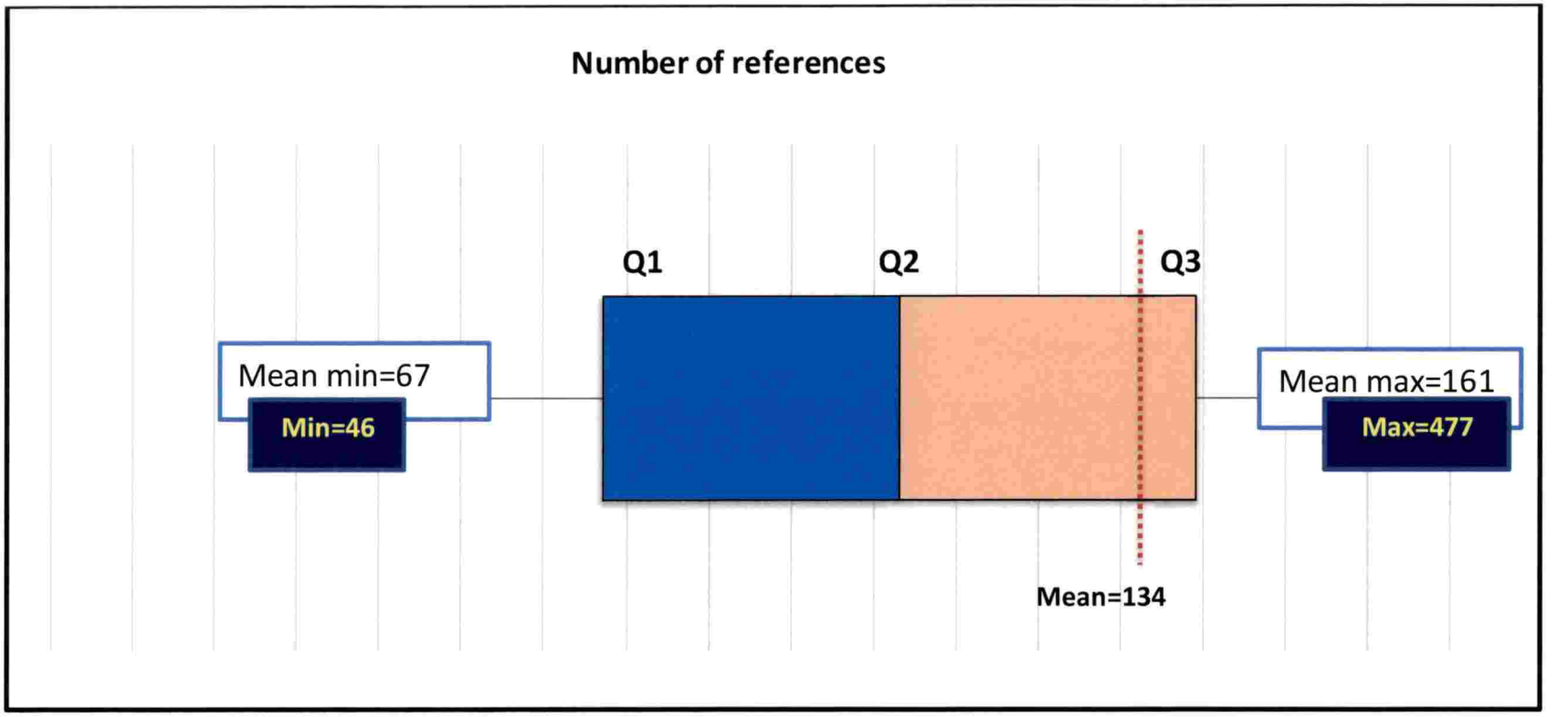

Fig.15: Box plot representation of the number of references in PG theses

The results revealed that theses from Agricultural Statistics department fall under low category with less than 103 references, crop production and social science theses falls under high category with more than 148 references and crop protection and social science theses falls under medium category with references ranging from 103 to 148 in numbers.

Hence, it can be inferred from fig.15 that the mean minimum and mean maximum number of references was 67 and 161 references respectively but looking into the entire theses it was seen that the minimum and maximum number of references was 46 and 477 which was witnessed in Plant Breeding and Genetics and Community Science theses respectively.

4.2.6 Referencing based on years

Reference based on years, in this study is operationalized as the date in which the sources of references were published. The results regarding the distribution of references based on years for each division is illustrated in table 41.

Table 41 and fig.13 revealed that 55.93 per cent of the references were from publications made during 2001 and after followed by 35.79 per cent from 1976 to 2000, 6.60 per cent from 1951 to 1975, 1.31 per cent from 1926 to 1950, 0.36 per cent from 1901 to 1925 and only 0.01 per cent of the references were taken before 1900s.

Division wise distribution showed that 68.70 per cent of the references under social science theses were from publications published after 2001 followed by 58.21 per cent from Agricultural Statistics, 52.92 per cent from crop production, 52.20 per cent from crop improvement and 50.95 per cent of the references from crop protection theses. More than 30 per cent of the references from crop production, crop protection and crop improvement theses were from publications made during 1976 to 2000 followed by 29.85 per cent and 27.88 per cent of the references of social science and Agricultural statistics theses

Table 41: Distribution of references based on years

Category	Crop production n=109		Crop protection N=60		Crop improvement N=47		Social science N=66		Agricultural statistics N=5		Total N=287	
	f	%	f	%	f	%	f	%	f	%	f	%
Up to 1900	0	0.00	2	0.02	3	0.04	0	0.00	0	0.00	5	0.01
1901-1925	26	0.16	88	0.92	39	0.55	2	0.02	1	0.30	156	0.36
1926-1950	227	1.40	175	1.83	125	1.76	24	0.25	9	2.69	560	1.31
1951-1975	1222	7.52	797	8.33	475	6.68	301	3.14	30	8.96	2825	6.60
1976-2000	6176	38.00	3628	37.94	2756	38.77	2671	27.88	100	29.85	15331	35.79
2001 and after	8600	52.92	4872	50.95	3710	52.20	6581	68.70	195	58.21	23958	55.93
Total	16251	100	9562	100	7108	100	9579	100	335	100	42835	100.00

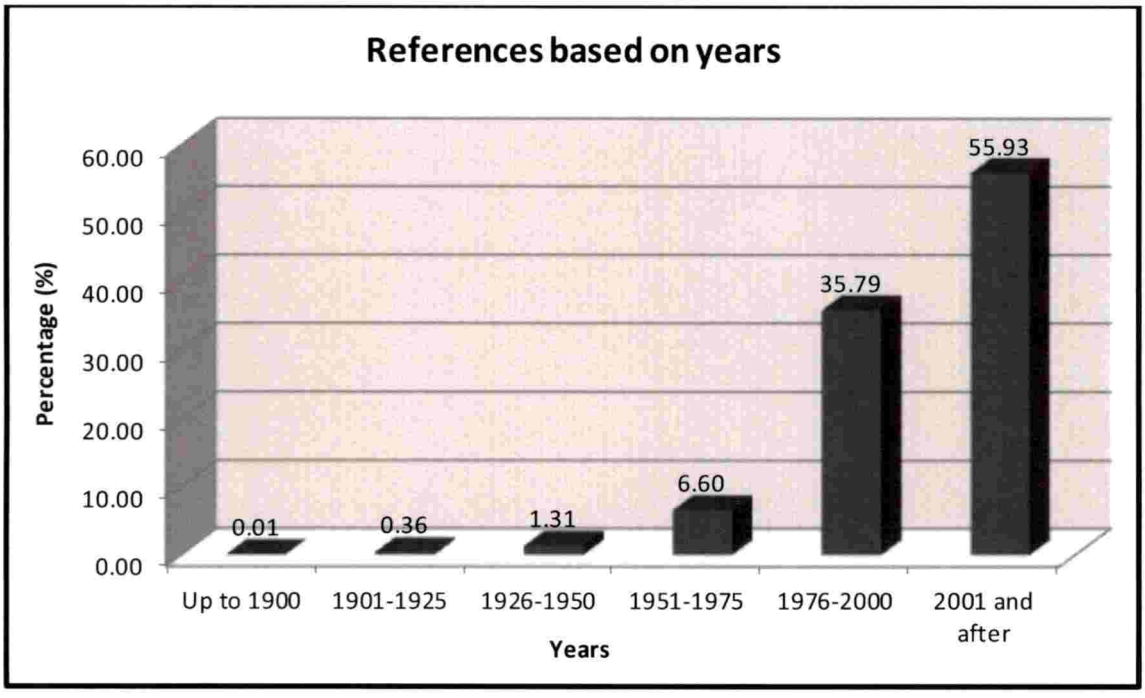

Fig.16: Percentage distribution of references based on years

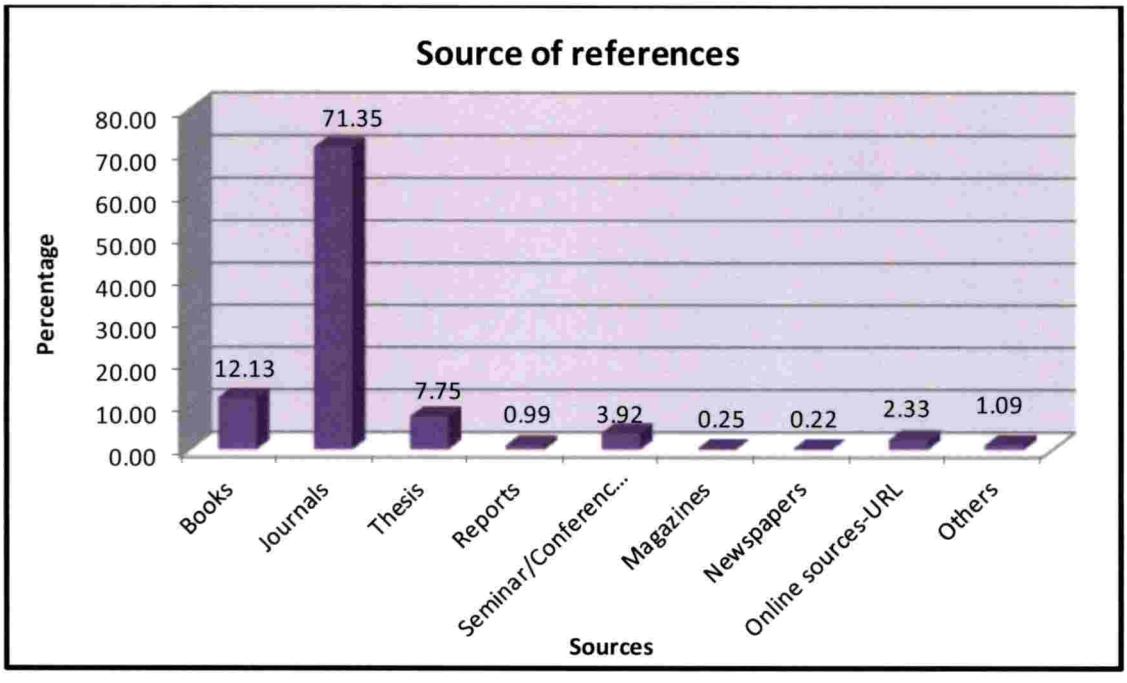

Fig.17: Percentage distribution of references based on the types of sources

respectively. Also 8.96 per cent, 8.33 per cent, 7.52 per cent, 6.88 per cent and 3.14 per cent of the references from Agricultural Statistics, crop protection, crop production, crop improvement and social science theses were taken from publications available during 1951 to 1975 and 2.69 per cent, 1.83 per cent, 1.76 per cent, 1.40 per cent and 0.25 per cent of the references under Agricultural statistics, crop protection, crop improvement, crop production and social science theses were taken from 1926 to 1950 and less than 1 per cent of the references from all departments were on publications made prior to 1900s and 1901 to 1925.

Hence, overall it can be concluded that more than half of the references were from publications made after 2001.

4.2.7 Types of sources in references

Sources of reference refer to the different sources the researchers have consulted while writing his/her thesis. The results regarding the types of sources in reference under each division theses are illustrated in table 42.

From the table 42 and fig.17 it can be seen that in general, 71.35 per cent of the references were taken from 'journals' followed by 12.13 per cent and 7.75 per cent from 'books' and 'thesis' respectively. Also 3.92 per cent and 2.33 per cent were taken from 'seminars or conferences papers' and 'online sources with URL' respectively and around 2.55 per cent of the references were taken from reports, magazines, newspapers and other sources.

Division wise revealed that more than 70 per cent of the references under crop production, crop protection and crop improvement theses were taken from 'journals' followed by 67.16 per cent and 55.64 per cent from social science and Agricultural Statistics theses. The results also showed that more than 12 per cent of the references under crop production, social science and Agricultural Statistics theses were taken from 'books' followed by crop protection and crop improvement theses with 11.51 and 9.96 per cent respectively. Also 15.31 per

cent of the references under social science theses were from 'thesis' followed by 6.57 per cent, 5.91 per cent, 5.61 per cent and 4.67 per cent of the references from Agricultural Statistics, crop production, crop protection and crop improvement theses respectively. Similarly, 4.89 per cent, 4.36 per cent, 3.38 per cent, 2.42 per cent and 1.19 per cent of the references under crop protection, crop production, social science theses, from crop improvement and agricultural statistics were taken from 'seminars or conferences proceedings'. Also 5.15 per cent of the references under social science theses were from 'online sources with URL' followed by 2.69 per cent, 2.08 per cent, 1.41 per cent and 0.94 per cent from agricultural statistics, crop protection, crop production and crop improvement theses respectively. 'Reports' were the sources for 5.67 per cent of the references from Agricultural Statistics followed by less than 2 per cent from crop production, crop protection, crop improvement and social science theses. Less than five per cent *i.e.* 3.27 per cent of social science theses were taken from other sources and a small percentage of the references were taken from 'magazines' and 'seminars or conferences'.

Overall, it can be concluded that more than two-thirds of the references were taken from journals alone, which was on par with crop production, crop protection, crop improvement and agricultural statistics theses except for the references in social science theses with 55.64 per cent from journals. The result does not aligned with the study conducted by Oppenheim and Smith (2001).

Many discussions on online platforms of research like 'research gate' suggest different views on the number and types of references based on sources. Publishers of eminence like Sage and Elsevier have set as a general rule that one source per page average *i.e.,* a paper that has 20 manuscript pages might have about 20 sources. Some researchers are of the view that saturation point of ideas should be the basis of citing references. However, many of such opinion converge to the view that it should have 'quality over quantity' of references that matter in terms of number and sources. Students' misconception that more the references

Table 42: Distribution of references in PG theses based on their sources

Sl. No.	Types of sources	Crop production n=109		Crop protection N=60		Crop improvement N=47		Social science N=66		Agricultural statistics N=5		Total N=287	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Books	1991	12.25	1101	11.51	708	9.96	1344	14.03	50	14.93	5194	12.13
2	Journals	12091	74.4	7149	74.76	5766	81.12	5330	55.64	225	67.16	30561	71.35
3	Thesis	961	5.91	536	5.61	332	4.67	1467	15.31	22	6.57	3318	7.75
4	Reports	130	0.8	68	0.71	29	0.41	176	1.84	19	5.67	422	0.99
5	Seminar/Conferences	709	4.36	468	4.89	172	2.42	324	3.38	4	1.19	1677	3.92
6	Magazines	9	0.06	12	0.13	0	0	83	0.87	3	0.9	107	0.25
7	Newspapers	24	0.15	8	0.08	9	0.13	49	0.51	3	0.9	93	0.22
8	Online sources-URL	229	1.41	199	2.08	67	0.94	493	5.15	9	2.69	997	2.33
9	Others	107	0.66	21	0.22	25	0.35	313	3.27	0	0	466	1.09

they incorporate the better will be the quality that is rarely the actual case. The researcher should learn how to integrate the literature based on the analytical and/or synthetical process of research.

4.2.8 Errors in references

Error in references refers to the inexactitudes in the sources of reference that are deflecting from the format of writing a bibliography. The results regarding the distribution of references with errors for theses belonging to division of crop production, crop protection, crop improvement, social sciences and agricultural statistics is illustrated in table 43.

From overall point of view it can be noticed that the errors in not noting down the page numbers is more with 32.69 per cent of the references followed by not writing the abbreviations correctly with 30.52 per cent, mistakes in titling the journals or books with 27.46 per cent, not aligning the in-text citation in chronological orders with 7.53 per cent and 1.78 per cent of the references did not aligned in alphabetical orders.

Considering division wise it exposed that 71.43 per cent of the references from Agricultural Statistics theses have not included the page numbers, followed by 47.37 per cent, 43.24 per cent, 31.43 per cent and 29.49 per cent of the references from crop improvement, crop protection, social science and crop production theses respectively. Regarding the mistakes in writing the abbreviations, 38.17 per cent of the references were from social science theses followed 26.46 per cent, 9.71 per cent and 5.26 per cent from crop production, crop protection and crop improvement theses respectively. The results also revealed that 32.93 per cent of the references from crop production theses have errors in titling the journals or books followed by 25.29 per cent, 25.28 per cent and 23.68 per cent of the references from crop protection, social science and crop improvement theses separately. More than 20 per cent of the in-text citation from agricultural statistics theses and crop improvement theses were not aligned in

chronological orders followed by 19.12 per cent and 10.00 per cent each from crop protection and crop production theses and only 2.65 per cent of the references were not arranged in alphabetical orders followed by the references from social science and crop production theses with 2.10 and 1.11 per cent respectively.

Hence, from fig.18 it can be concluded that most of references with 'chronological orders' errors and 'without page numbers' errors were from agricultural statistics theses followed by 'abbreviations' from social science theses, 'titling journals/books' from crop production theses, and 'alphabetical orders' errors from crop protection.

The discrepancy in referencing may not essentially be the result of academic dishonesty. Shear carelessness, that is, mixing the authors' names, oversight in arranging references alphabetically, inability to cite the page numbers properly and like could be the reasons for such errors. It can also result from personal understanding and prejudices, *i.e.,* elucidation of the contents of a paper in backing of extrapolation of one's paper. Hence, educating, training and adequate home exercise on good research paper writing may help the students to develop necessary skills to stay careful and pay attention to detail with minimum errors.

Even though inaccuracy were present in all division that does not indicate that all theses from that particular division have errors, nor do all the references have errors. If errors occur in few references it will reflect in the overall result and also it was observed that references in theses from all division do not have all the five errors that have been mentioned above. For instance references from Agricultural Statistics have errors only in not noting the page number and in aligning the in-text citation in chronological orders. Another observation was that if the number of references is more the error will also be more. Other types of mistakes were also noticed but in this study the focus was only on the five types of errors that have been mentioned above.

Table 43: Percentage distribution based on errors in references

Sl. No.	Types of error	Crop production (n=109)		Crop protection (n=60)		Crop improvement (n=47)		Social science (n=66)		Agricultural Statistics (n=5)		Total (N=287)	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Chronological order	99	10.00	65	19.12	27	23.68	56	3.02	2	28.57	249	7.53
2	Alphabetical order	11	1.11	9	2.65	0	0	39	2.10	0	0.00	59	1.78
3	Without page number	292	29.49	147	43.24	54	47.37	583	31.43	5	71.43	1081	32.69
4	Abbreviations	262	26.46	33	9.71	6	5.26	708	38.17	0	0.00	1009	30.52
5	Titling journals/ books	326	32.93	86	25.29	27	23.68	469	25.28	0	0	908	27.46

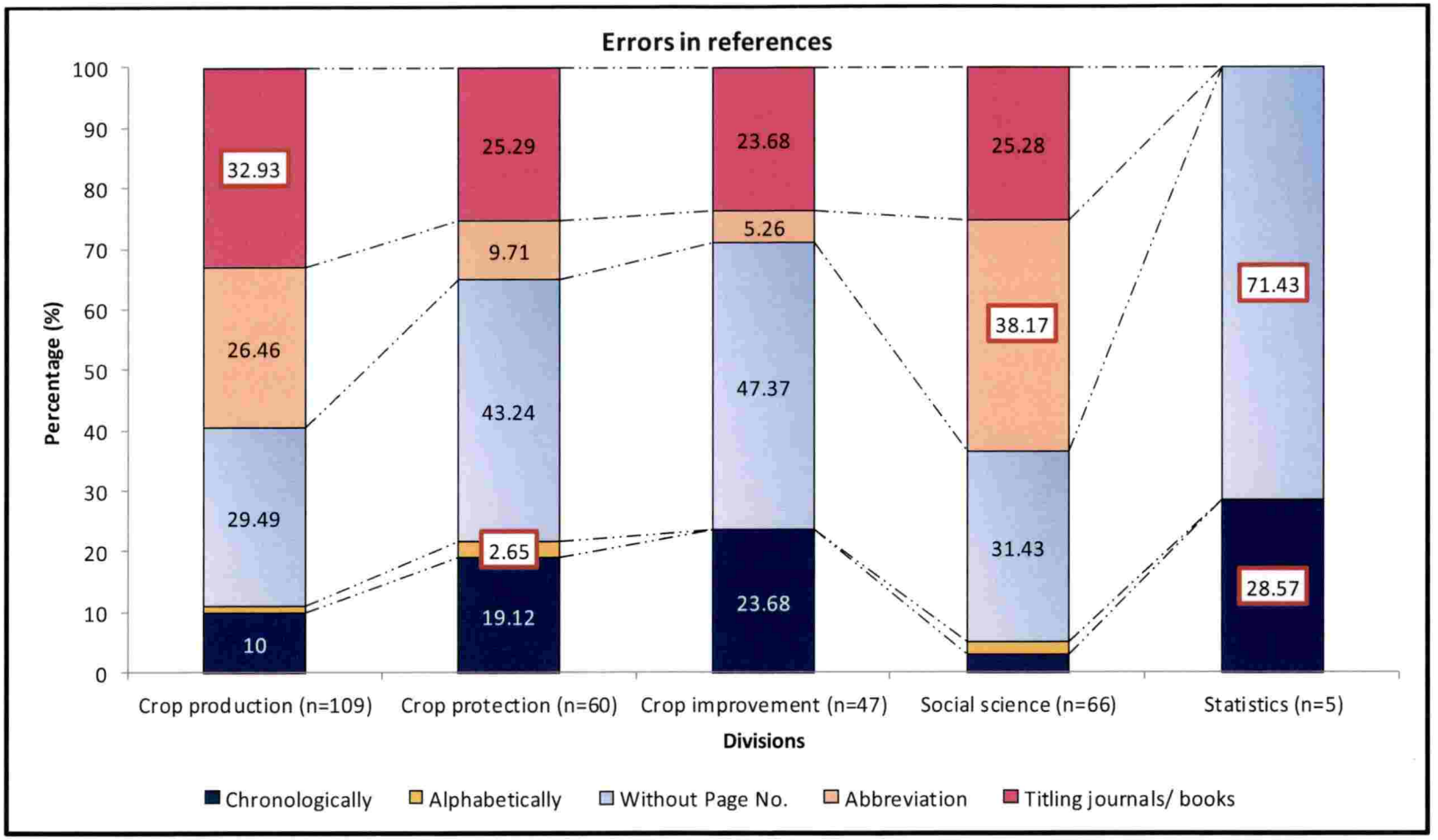

Fig.18: Percentage distribution of references under each divisions based on the types of errors

4.2.9 Number of pages

The number of pages here refers to the pages from introduction chapter to the references that was counted by analyzing the theses. The results regarding the distribution of theses based on mean number of pages for all departments is illustrated in table 44.

Table 44: Distribution of theses based on number of pages

Category	Class limits	f	%
Low	<107.13	4	25.00
Medium	107.13-121.91	8	50.00
High	>121.91	4	25.00
Total		16	100
Q1=107.13; Q2=116.90; Q3=112.91; Mean=116; Min=93.91; Max=144.77			
Departments			
Low	Pomology & Floriculture; Plant Breeding and Genetics; Microbiology; Plant biotechnology		
Medium	Agronomy; Vegetable science; Entomology; Plant Pathology; Plant Physiology; Agricultural Extension; Agricultural Economics; Agricultural Statistics		
High	Soil Science & agricultural chemistry; Plantation crops and spices; Community science		

Table 44 represented the distribution of theses based on mean number of pages using quartile. On perusal, it was observed that 50 per cent of the departments have medium (107-122) number of pages followed by 25 per cent of the department for high (more than 122) and low (less than 121) number of pages respectively. Department of Agronomy, Vegetable Science, Entomology, Plant Pathology, Plant Physiology, Agricultural Extension, Agricultural Economics and Agricultural Statistics have average number of pages followed by Department of Pomology and Floriculture, Plant Breeding and Genetics, Microbiology and Plant Biotechnology that have less number of pages and the theses from Department of Soil Science and Agricultural Chemistry, Plantation Crops and Spices and Community science have high number of pages.

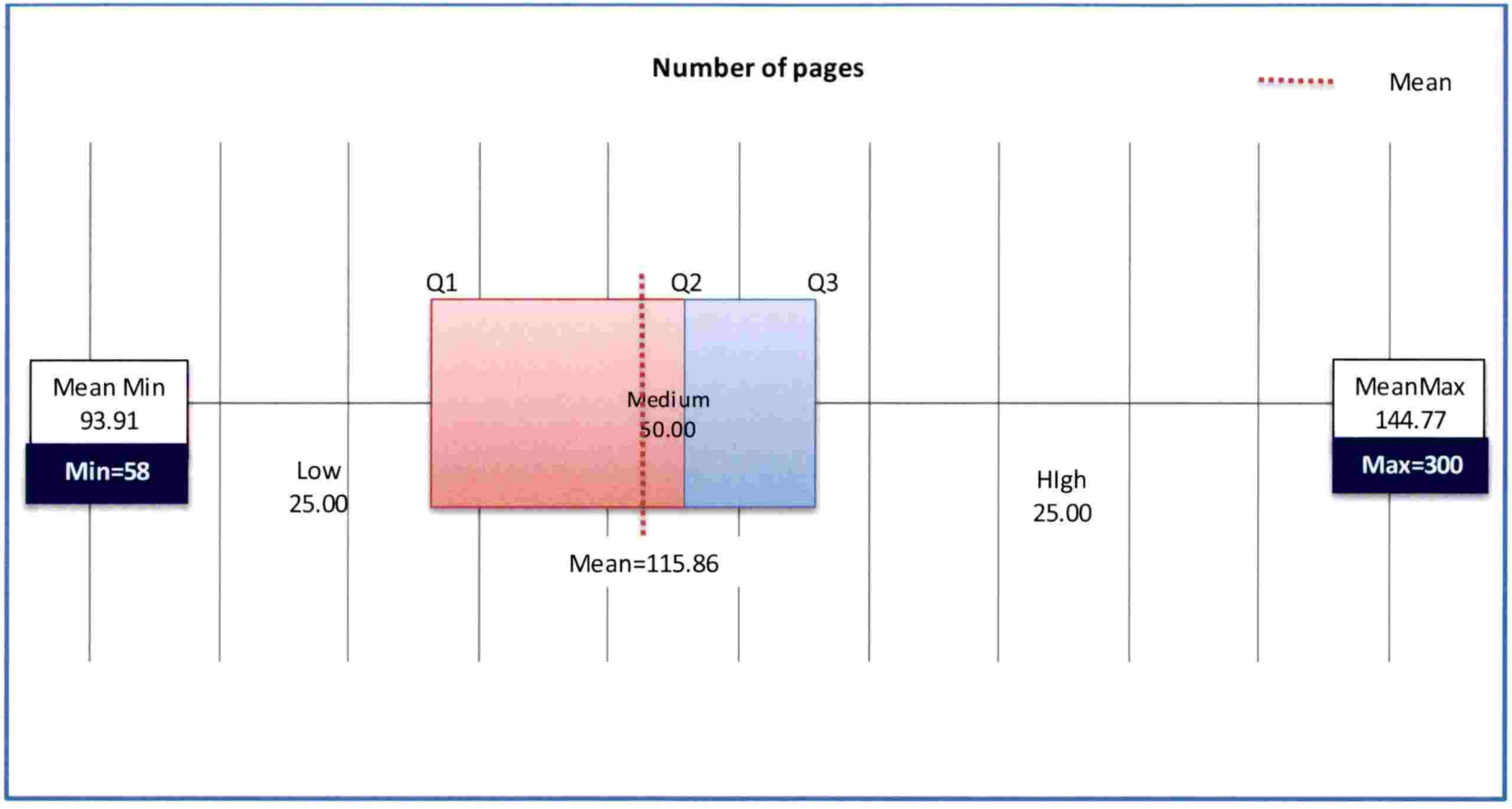

Fig.19: Box plot representation of PG theses based on number of pages

From box plot presented in fig.19 it can be seen that the mean minimum and mean maximum number of pages were 94 and 145 respectively. However, when discerning the entire theses without the mean it revealed that minimum and maximum number of pages was 58 and 300 which was witnessed in Plant breeding and genetics as well as Community Science theses respectively. The results were closed to the findings of Randolph *et al.* (2012).

There is no specific length of theses in terms of number of pages reported. The length of the theses may vary according to the topic and the method of analysis, so the researcher and the advisory committee will determine the appropriate length.

4.2.10 Number of tables, figures, plates, appendices and abbreviations

Number of tables, figures, plates, appendices and abbreviations refers to the list of tables, figures, plates, appendices and abbreviations that were presented before the body of the thesis for quicker and easier navigation to the data in the thesis. The results regarding the average number of tables, figures, plates, appendices and abbreviations were presented in table 45.

From the table it can be inferred that Agricultural Statistics theses have 56 tables followed by social science, crop production, crop protection and crop improvement with 32, 27, 23 and 21 tables each. Regarding the theses with total number of figures the results revealed that Agricultural Statistics theses topped the list with 21 figures followed crop production and social science theses with 16 and 15 figures respectively and 9 figures was observed in both crop protection and crop improvement theses respectively. Crop protection theses was found to have more (16) number of plates followed by crop improvement, crop production, social science and Agricultural Statistics theses with 12, 6, 4 and 2 plates respectively. Agricultural Statistics again was found to have 4 number of appendices followed by crop protection and social science theses with 3 each and crop production and crop improvement theses with an average of 2 and 1

appendix(s) respectively. On the other hand crop production theses was found to have more number of abbreviations with an average of 39 in numbers followed by crop improvement, crop protection, agricultural statistics and social science theses with 36, 34, 28 and 17 abbreviations respectively.

Table 45: Distribution of theses based on number of tables, figures, plates, appendices and abbreviations

Sl. No.	Divisions	Tables		Figures		Plates		Appendices		Abbreviations	
		Total	Mean	Total	Mean	Total	Mean	Total	Mean	Total	Mean
1	Crop production (n=109)	2963	27	1737	16	696	6	229	2	4291	39
2	Crop protection (n=60)	1395	23	534	9	975	16	172	3	2037	34
3	Crop improvement (n=47)	989	21	445	9	543	12	53	1	1682	36
4	Social science (n=66)	2095	32	979	15	281	4	227	3	1124	17
5	Agricultural Statistics (n=5)	282	56	105	21	11	2	18	4	140	28

Therefore, it can be inferred that theses from Agricultural Statistics have more number of tables, figures and appendices that indicated that such department are dealing with huge data, images and also big tables that need to be presented in appendices. Since, there were only 5 theses belonging to Agricultural Statistics departments, it cannot gave a clear indication. So, following Agricultural Statistics it was seen that theses from social science and crop production division have more number of tables and figures respectively. Crop protection theses have more number of plates which is understandable because plates photograph will gives clear and meaningful explanations. Following agricultural statistics theses, crop protection and social science theses have a mean of 3 appendices each after and crop production was found to have more number of abbreviations.

4.2.11 Research Design

Research Design in this study refers to the set of procedure or methods used in collecting and analyzing measures of variables in the problem research. The results on the various research design used by the researchers belonging to crop production, crop protection, crop improvement, social science and Agricultural Statistics division is illustrated in table 44.

Table 46: Distribution of crop production theses based on the research design followed

Sl. No.	Types of design	Agronomy (n=41)		SSAC (n=25)		Horticulture (n=43)		Total (N=109)	
		f	%	f	%	f	%	f	%
1	RBD	23	47.92	34	45.95	17	37.78	74	44.31
2	CRD	10	20.83	18	24.32	19	42.22	47	28.14
3	Factorial-RBD	1	2.08	1	1.35	0	0.00	2	1.20
4	Factorial-CRD	4	8.33	7	9.46	2	4.44	13	7.78
5	Split plot	10	20.83	10	13.51	3	6.67	23	13.77
6	Not mentioned	0	0	4	5.41	4	8.89	8	4.79
	Total	48	100	74	100	45	100	167	100
* non mentioned means 'unique and independent' in this study									

Table 46 revealed the research design used by the researchers belonging to crop production division. It was observed that almost half *i.e.* 44.31 per cent of the theses in crop production division used Randomized Block Design (RBD) as a research design followed by 28.14 per cent used Completely Randomized Design (CRD), 13.77 per cent used split plot design, 7.78 per cent used factorial- CRD and 1.20 per cent used factorial-RBD. It was also observed that 4.79 per cent of the theses did not mention the research design that has been followed.

Department wise revealed that 47.92 per cent of Agronomy theses used RBD followed by 45.95 per cent of SSAC theses and 37.78 per cent of Horticulture theses. It was also seen that more than 40 per cent of theses from Horticulture department used CRD followed by 24.32 per cent and 20.83 per cent from SSAC and Agronomy

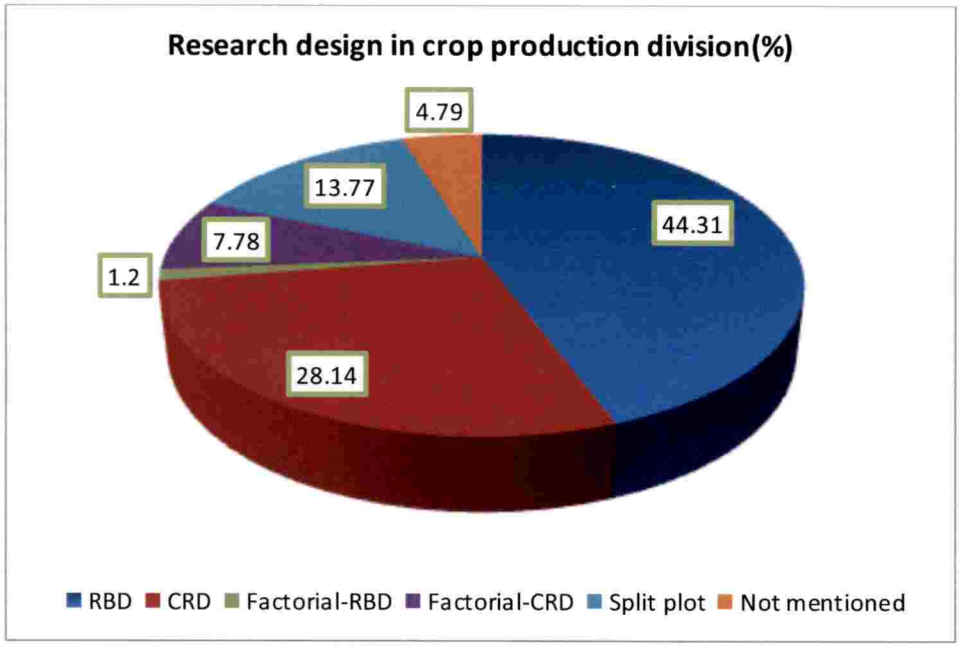

Fig.20: Percentage distribution of research design used in crop production division

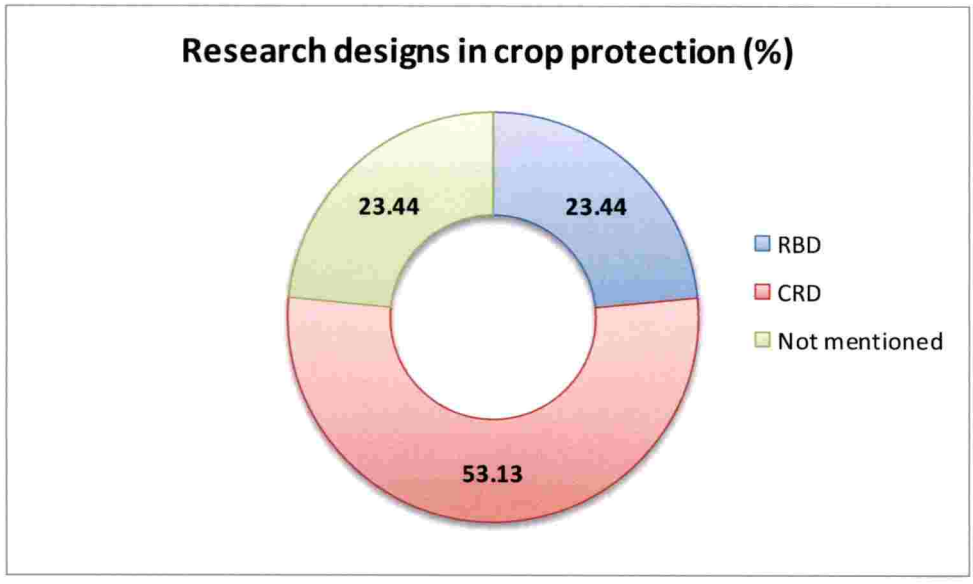

Fig.21: Percentage distribution of research design used in crop protection division

department respectively. There was only 20.83 per cent of Agronomy theses that used split plot design followed by 13.51 per cent and 6.67 per cent from SSAC and Horticulture theses respectively. However, 9.46 per cent, 8.33 per cent and 4.44 per cent of SSAC, Agronomy and Horticulture theses used factorial-RBD separately. Also 8.89 per cent and 5.41 per cent of the theses from Horticulture and SSAC department did not mentioned the design used.

From the above results it can be concluded that more than 70 per cent of the research in Agronomy department were conducted in field (farmers or others) using RBD, Factorial- RBD and Split plot design followed by 60.81 per cent from Department of Soil Science and Agricultural Chemistry. The results also revealed that 46.66 per cent of the researches in Horticulture department were conducted in laboratory or pot culture or green house using CRD and factorial-CRD and about 44.45 per cent were conducted in field using RBD and split plot.

Table 47: Distribution of crop protection theses based on the research design followed

Sl. No.	Types of design	Entomology(n=35)		Plant Pathology (n=25)		Total (N=60)	
		f	%	f	%	f	%
1	RBD	10	26.32	5	19.23	15	23.44
2	CRD	19	50.00	15	57.69	34	53.13
3	Not mentioned*	9	23.68	6	23.08	15	23.44
	Total	38	100	26	100	64	100
* non mentioned means 'unique and independent' in this study							

Overall, it was observed that 53.13 per cent of the theses from crop protection division used Completely Randomized Design (CRD) followed by 23.44 per cent that used Randomized Block Design (RBD) and also 23.44 per cent does not mentioned the design followed for the study.

Looking into each department it was noticed that 57.69 per cent and 50.00 per cent of the Plant Pathology and Entomology theses used CRD. Likewise,

26.32 per cent of Entomology theses and 19.23 per cent of Plant pathology theses used RBD.

Hence, it can be concluded that more than half of the research irrespective of department in crop protection division were conducted either in laboratory, pot culture or greenhouse using CRD and only 23.44 per cent of the research were conducted in field.

Table 48: Distribution of crop improvement theses based on the research design followed

Sl. No.	Types of design	PBG (N=23)		Plant Physiology (N=7)		Microbiology (n=6)		PBT (n=11)		Total (N= 47)	
		f	%	f	%	f	%	f	%	f	%
1	RBD	18	64.29	0	0.00	0	0.00	0	0.00	18	34.62
2	CRD	7	25.00	6	85.71	6	100	6	54.55	25	48.08
3	Split plot	1	3.57	0	0.00	0	0.00	0	0.00	1	1.92
4	Compact family block	2	7.14	0	0.00	0	0.00	0	0.00	2	3.85
5	Not mentioned*	0	0.00	1	14.29	0	0.00	5	45.45	6	11.54
	Total	28	100	7	100	6	100	11	100	52	100
* non mentioned means 'unique and independent' in this study											

On analysis of table 48, the overall results revealed that 48.08 per cent of the theses irrespective of the department in crop improvement division used Completely Randomized Design (CRD) followed by 34.62 per cent that used Randomized Block Design (CRD), 3.85 per cent used compact family block and 1.92 per cent of split plot design. Also 11.54 per cent of theses did not mention the research design followed.

Considering department alone it was seen that all the Microbiology theses used CRD, followed by 85.71 per cent of Crop Physiology, 54.55 per cent of Plant Biotechnology and 25.00 per cent of Plant Breeding and Genetics theses. When looked for the theses that used RBD, Plant breeding and Genetics theses topped

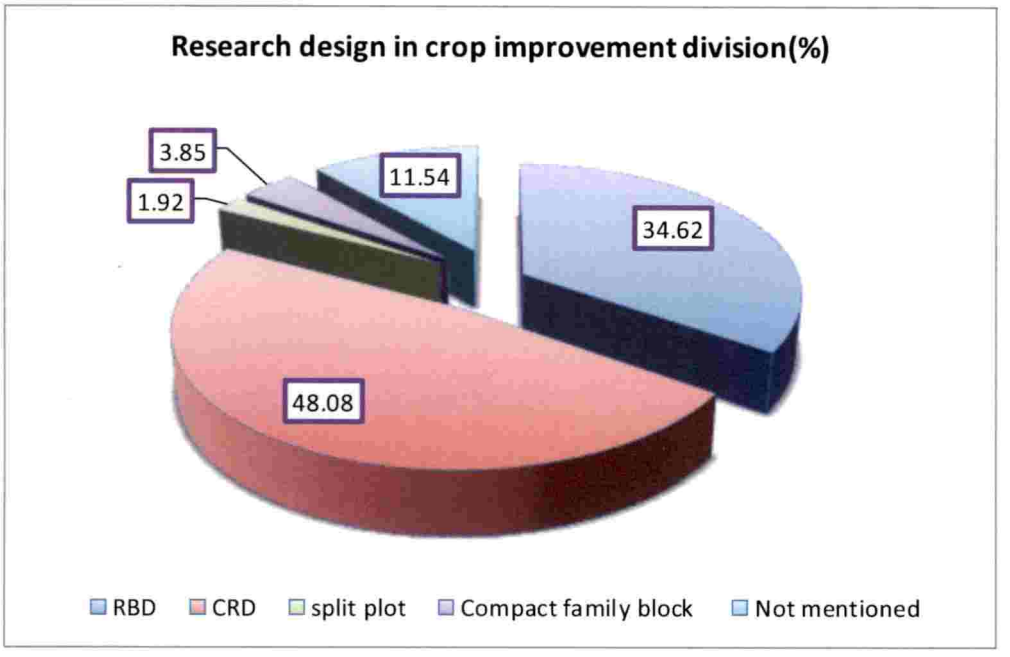

Fig.22: Percentage distribution of research design used in crop improvement division

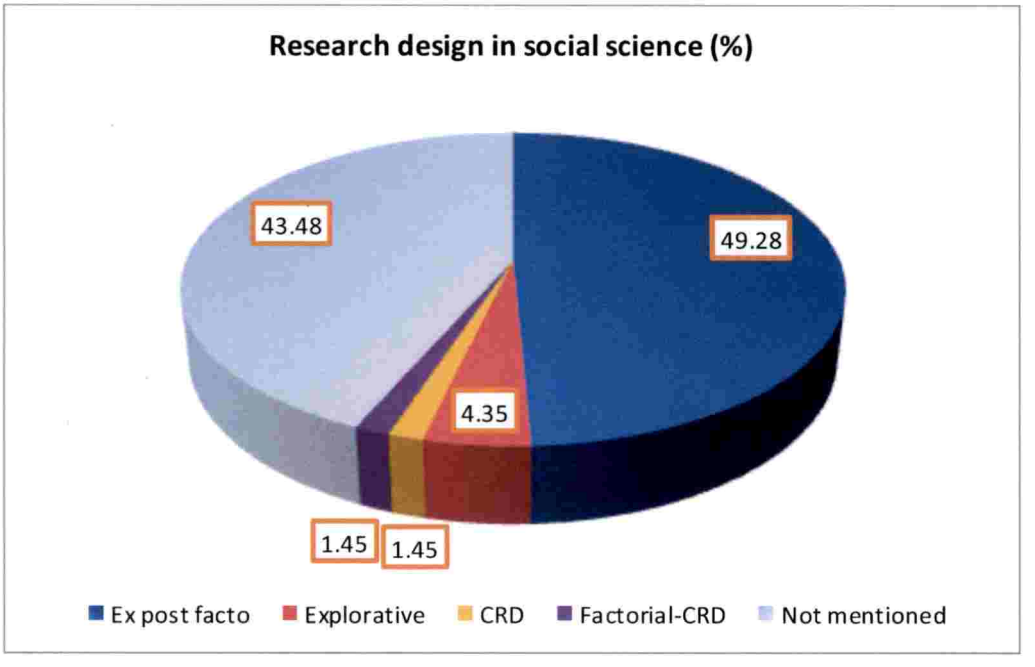

Fig.23: Percentage distribution of research design used in social science division

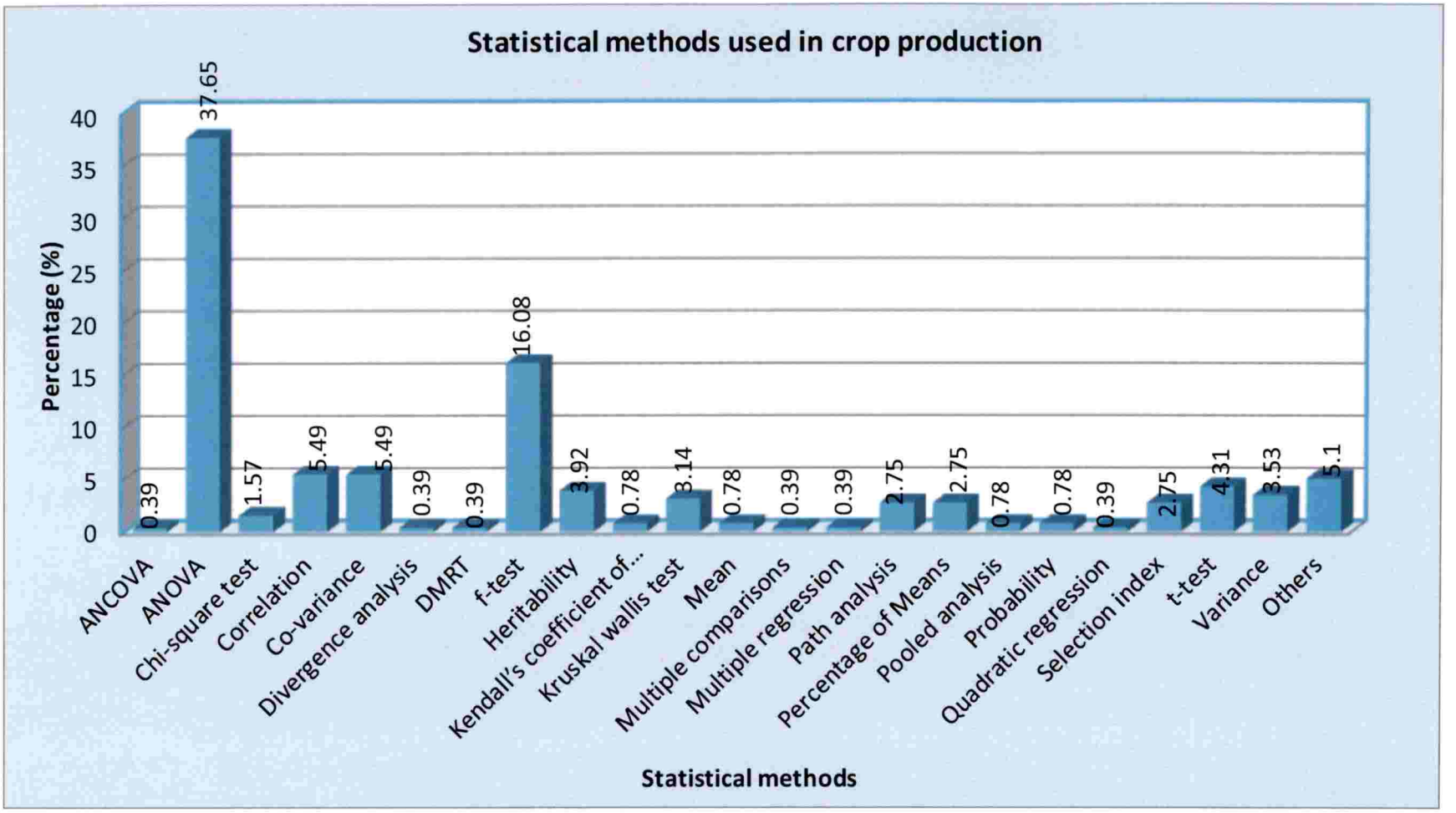

Fig.24: Percentage distribution of statistical methods used in crop production theses

the list with 64.29 per cent. Also 7.14 per cent used compact family block design followed by 3.57 per cent of theses adopted split plot design. The study also showed that 14.29 per cent of Crop Physiology theses and 45.45 per cent of Plant Breeding and Genetics theses did not mention the design followed.

Hence, it can be inferred that 75 per cent of the research in plant breeding and genetics were conducted in field (farmers or others) using RBD, compact family block and split plot design whereas all of the theses in Microbiology followed by 85.71 per cent and 54.55 per cent of Plant Physiology and Plant Biotechnology theses were conducted either in laboratory or pot culture using CRD.

Table 49: Classification of social science theses based on research design used

Sl. No.	Types of design	Agricultural Extension (n=34)		Agricultural Economics (n=9)		Community Science (n=23)		Total (N=66)	
		f	%	f	%	f	%	f	%
1	Ex post facto	34	91.89	0	0.00	0	0.00	34	49.28
2	Explorative	3	8.11	0	0.00	0	0.00	3	4.35
3	CRD	0	0.00	0	0.00	1	4.35	1	1.45
4	Factorial-CRD	0	0.00	0	0.00	1	4.35	1	1.45
5	Not mentioned*	0	0.00	9	100.00	21	91.30	30	43.48
	Total	37	100	9	100	23	100	69	100
* non mentioned means 'unique and independent' in this study									

The above table revealed that majority (91.89%) of Agricultural Extension theses used ex-post facto research design followed by 8.11 per cent that used exploratory research design. Nevertheless, 4.35 per cent of the community science theses followed Completely Randomized Design (CRD) and Factorial-CRD respectively and more than 90 per cent did not mentioned the research design used. Similarly, in Agricultural Economics theses, the researcher did not point out the design that has been followed.

Hence, it can be inferred that there are various research designs that can be used for the study. Majority of the researcher in Agricultural Extension department used ex post facto designs and few used exploratory design to conduct their study, or a combination of both. Whereas, in community science department researcher adopted CRD or Factorial CRD which indicated that few of the study have been conducted in laboratory.

Putting emphasis on all the research designs used by different department irrespective of their division, it can be made known that majority of the social science researches conducted were mainly based on events that have taken place prior to the study.

Some reviews revealed that post-graduation research is just an orientation of students towards more systematic research programme. Therefore, many of the students might not be aware of the research design prevailing in social science research. Crop production researches were mainly conducted on farmer's field or Instructional Farm whereas crop protection researches were primarily in laboratory, pot culture and greenhouse. In case of crop improvement division, the researches were conducted both in field and laboratory.

4.2.12 Statistical methods

Statistical methods refer to the various statistical tools or techniques that were used for analyzing the data of various researches. The results based on statistical methods used by crop production, crop protection, crop improvement, social science and Agricultural Statistics division was illustrated in table 50, 51, 52 and 53.

Table 50 and fig. 24 revealed the statistical methods used in crop production theses. On perusal of the table it was observed that 37.65 per cent of the theses used ANOVA followed by 16.08 per cent that used f-test, 5.49 per cent used correlation and co-variance, 4.31 per cent used t-test, 3.92 per cent used

heritability, 3.53 per cent variance, 3.14 per cent Kruskal Wallis test, 2.75 per cent path analysis, percentage analysis and selection index, 1.57 per cent used chi-square test, 0.78 per cent used Kendall's coefficient of concordance, mean, pooled analysis and probability and only 0.39 per cent of the theses used ANCOVA, divergence analysis, Duncan's multiple range test (DMRT), multiple comparisons, multiple regression and quadratic regression. About 5.1 per cent of the theses used other kind of statistical methods other than the one mentioned above.

Table 50: Distribution of statistical methods used in crop production theses

Sl. No.	Statistical methods	Agronomy (n=41)		SSAC (n=25)		Horticulture (N=43)		Total (N=109)	
		f	%	f	%	f	%	f	%
1	ANCOVA	0	0.00	0	0.00	1	0.72	1	0.39
2	ANOVA	40	50.63	19	50.00	37	26.81	96	37.65
3	Chi-square test	1	1.27	0	0.00	3	2.17	4	1.57
4	Correlation	1	1.27	1	2.63	12	8.70	14	5.49
5	Co-variance	0	0.00	0	0.00	14	10.14	14	5.49
6	Divergence analysis	0	0.00	0	0.00	1	0.72	1	0.39
7	DMRT	1	1.27	0	0.00	0	0.00	1	0.39
8	f-test	28	35.44	11	28.95	2	1.45	41	16.08
9	Heritability	0	0.00	0	0.00	10	7.25	10	3.92
10	Kendall's coefficient of concordance	0	0.00	0	0.00	2	1.45	2	0.78
11	Kruskal Wallis test	0	0.00	0	0.00	8	5.80	8	3.14
12	Mean	2	2.53	0	0.00	0	0.00	2	0.78
13	Multiple comparisons	0	0.00	0	0.00	1	0.72	1	0.39
14	Multiple regression	0	0.00	1	2.63	0	0.00	1	0.39
15	Path analysis	0	0.00	0	0.00	7	5.07	7	2.75
16	Percentage	0	0.00	0	0.00	7	5.07	7	2.75
17	Pooled analysis	0	0.00	0	0.00	2	1.45	2	0.78
18	Probability	2	2.53	0	0.00	0	0.00	2	0.78
19	Quadratic regression	0	0.00	0	0.00	1	0.72	1	0.39
20	Selection index	0	0.00	0	0.00	7	5.07	7	2.75
21	t-test	4	5.06	0	0.00	7	5.07	11	4.31
22	Variance	0	0.00	0	0.00	9	6.52	9	3.53
23	Others	0	0.00	6	15.79	7	5.07	13	5.10
	Total	79	100	38	100	138	100	255	100

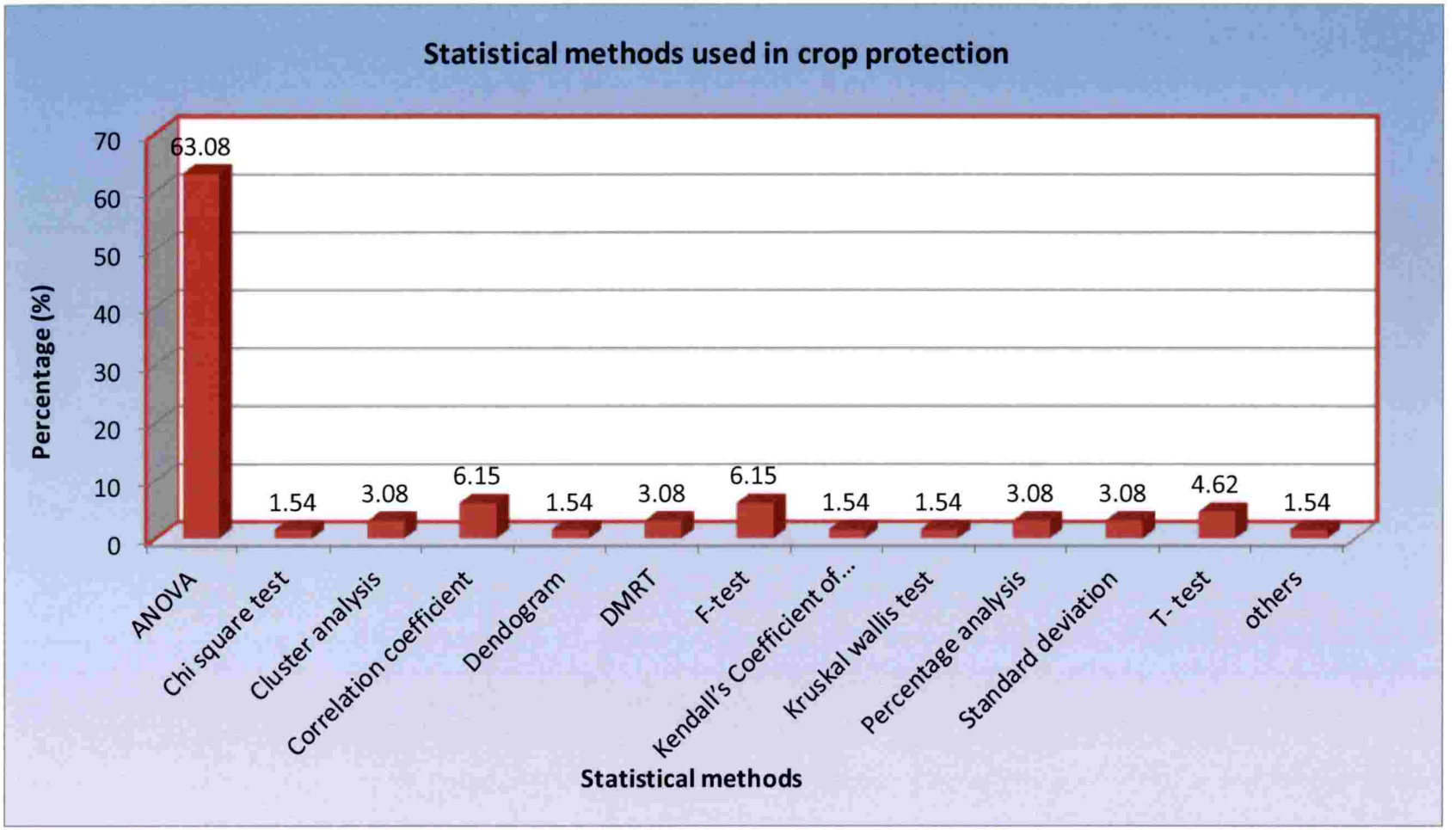

Fig.25: Percentage distribution of statistical methods used in crop protection theses

Department wise revealed that 50.63 per cent and 50.00 per cent of the theses from Agronomy and SSAC used ANOVA followed by 26.81 per cent from Department of Horticulture. Regarding the use of f-test, 35.44 per cent and 28.95 per cent of theses adopted f-test in Agronomy and SSAC and only 1.45 per cent in Department of Horticulture. Also, 8.70 per cent of Horticulture theses used correlation analysis followed by only 2.63 per cent and 1.27 of SSAC and Agronomy respectively. Almost, 5.07 per cent and 5.06 per cent of the Horticulture and Agronomy theses used t-test. Furthermore in Agronomy department, 2.53 per cent used mean and probability and 1.27 per cent used chi-square and DMRT. In SSAC department 2.63 per cent of the theses used multiple regressions and about 15.79 per cent used other kinds of methods. In Horticulture department 10.14 per cent used co-variance, 7.25 per cent used heritability, 6.52 per cent used variance, more than 5 per cent used Kruskal Wallis test, path analysis, percentage and selection index and less than 2 per cent used ANCOVA, divergence analysis, Kendall's coefficient of concordance, multiple comparisons, pooled analysis, quadratic regression respectively. About 5.07 per cent of the horticulture theses used other kind of methods.

Hence, it can be concluded that more than half of the theses in Agronomy and almost 30 per cent of Horticulture theses in SSAC used ANOVA.

On scrutinizing of table 51, the overall results revealed that 63.08 per cent of theses in crop protection division used ANOVA as a statistical method. This was then followed by 6.15 per cent that used correlation and f-test, 4.62 per cent used t-test, 3.08 per cent used percentage analysis, standard deviation, cluster analysis and Duncan's multiple range test (DMRT) and 1.54 per cent used chi square test, Kendall's coefficient of concordance, Kruskal Wallis test and dendogram.

Department wise revealed that in Entomology department 55.56 per cent of the theses used ANOVA followed by 8.89 per cent that used correlation

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coefficient, 6.67 per cent used t-test, 4.44 per cent used percentage, standard deviation, f-test and cluster analysis and 2.22 per cent used chi-square test, Kendall's coefficient of concordance, Kruskal Wallis test, and dendogram. Also 2.22 per cent of theses used other kind of statistical methods. In Plant Pathology, maximum (80.00%) of the theses used ANOVA followed by 10.00 per cent used f-test and DMRT

Table 51: Distribution of statistical methods used in crop protection theses

Sl. No.	Statistical Methods	Entomology (n=35)		Plant Pathology (n=25)		Total (N=60)	
		f	%	f	%	f	%
1	ANOVA	25	55.56	16	80.00	41	63.08
2	Chi square test	1	2.22	0	0.00	1	1.54
3	Cluster analysis	2	4.44	0	0.00	2	3.08
4	Correlation coefficient	4	8.89	0	0.00	4	6.15
5	Dendogram	1	2.22	0	0.00	1	1.54
6	DMRT	0	0.00	2	10.00	2	3.08
7	F-test	2	4.44	2	10.00	4	6.15
8	Kendall's Coefficient of concordance	1	2.22	0	0.00	1	1.54
9	Kruskal Wallis test	1	2.22	0	0.00	1	1.54
10	Percentage analysis	2	4.44	0	0.00	2	3.08
11	Standard deviation	2	4.44	0	0.00	2	3.08
12	T- test	3	6.67	0	0.00	3	4.62
13	Others	1	2.22	0	0.00	1	1.54
	Total	45	100	20	100	65	100

Therefore, it can be concluded that majority of the theses from both Entomology and Plant Pathology department used ANOVA.

Table 52 and fig.26 revealed the statistical methods used in crop improvement division. From the table it was observed that 21.48 per cent of the theses used ANOVA followed by 12.59 per cent used correlation coefficient, 11.11 per cent used variance, 9.63 per cent used heritability, 5.19 used mean, 2.96 per cent used percentage, path analysis and t-tests, 2.22 per cent used divergence analysis, 1.48 per cent used selection index and 0.74 used mean square deviation,

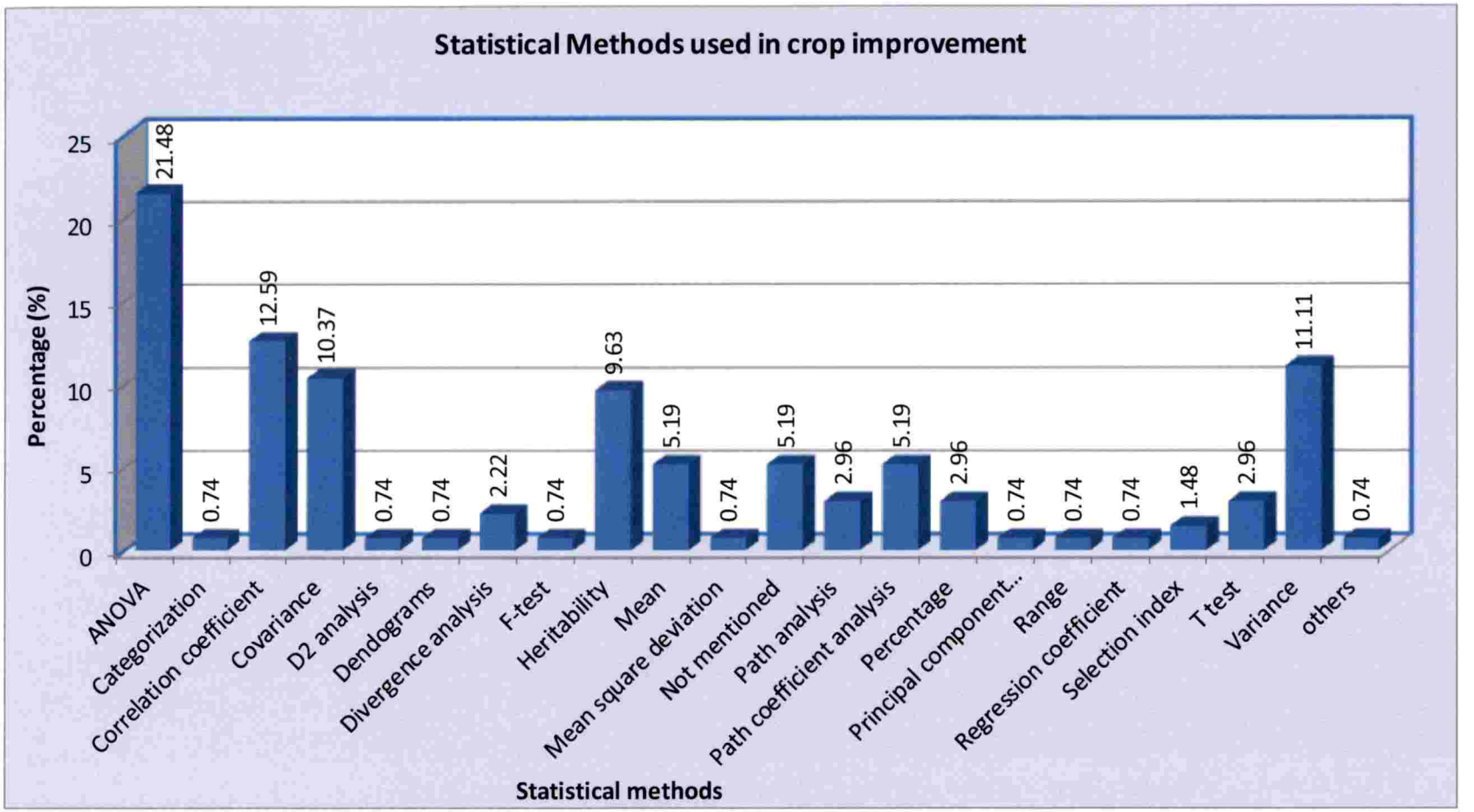

Fig.26: Percentage distribution of statistical methods used in crop improvement theses

regression coefficient, categorization, range, principal component analysis, dendogram, D_2 analysis. Also 0.74 per cent of the theses used other statistical methods and 5.19 per cent did not mentioned the statistical methods used.

Department wise revealed that in Plant breeding and genetics 19.49 per cent of the theses used ANOVA followed by 14.41 per cent used correlation coefficient, 12.71 per cent used variance, 11.86 per cent used covariance, 11.02 per cent used heritability, 5.93 used path coefficient analysis, 5.08 per cent used mean, 3.39 per cent used percentage and path analysis, 2.54 per cent used t-test and divergence analysis, 1.69 per cent used selection index and 0.85 per cent used mean square division, regression, categorization, range, principal component analysis, dendogram and D_2 analysis. In crop physiology 85.71 per cent of the theses does not mentioned the methods used while 14.29 per cent used other methods. In Microbiology department, 71.43 per cent of the theses used ANOVA followed by 14.29 per cent used t-test and the same percentage did not mentioned the statistical methods used. In Plant biotechnology 33.33 per cent of the theses used ANOVA, mean and f-test respectively.

Hence, it can be inferred that majority of the theses from Plant breeding and genetics, Microbiology and Plant biotechnology department used ANOVA.

Table 52: Distribution of statistical methods used in crop improvement theses

Sl. No.	Statistical methods	PBG (n=23)		Plant Physiology (n=7)		Microbiology (n=6)		PBT (n=11)		Total (N=47)	
		f	%	f	%	f	%	f	%	f	%
1	ANOVA	23	19.49	0	0.00	5	71.43	1	33.33	29	21.48
2	Categorization	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
3	Correlation coefficient	17	14.41	0	0.00	0	0.00	0	0.00	17	12.59
4	Covariance	14	11.86	0	0.00	0	0.00	0	0.00	14	10.37
5	D_2 analysis	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
6	Dendograms	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
7	Divergence analysis	3	2.54	0	0.00	0	0.00	0	0.00	3	2.22
8	F-test	0	0.00	0	0.00	0	0.00	1	33.33	1	0.74
9	Heritability	13	11.02	0	0.00	0	0.00	0	0.00	13	9.63
10	Mean	6	5.08	0	0.00	0	0.00	1	33.33	7	5.19
11	Mean square deviation	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
12	Path analysis	4	3.39	0	0.00	0	0.00	0	0.00	4	2.96
13	Path coefficient analysis	7	5.93	0	0.00	0	0.00	0	0.00	7	5.19
14	Percentage	4	3.39	0	0.00	0	0.00	0	0.00	4	2.96
15	Principal component analysis	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
16	Range	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
17	Regression coefficient	1	0.85	0	0.00	0	0.00	0	0.00	1	0.74
18	Selection index	2	1.69	0	0.00	0	0.00	0	0.00	2	1.48
19	T test	3	2.54	0	0.00	1	14.29	0	0.00	4	2.96
20	Variance	15	12.71	0	0.00	0	0.00	0	0.00	15	11.11
21	Others	0	0.00	1	14.29	0	0.00	0	0.00	1	0.74
22	Not mentioned	0	0.00	6	85.71	1	14.29	0	0.00	7	5.19
	Total	118	100	7	100	7	100	3	100	135	100

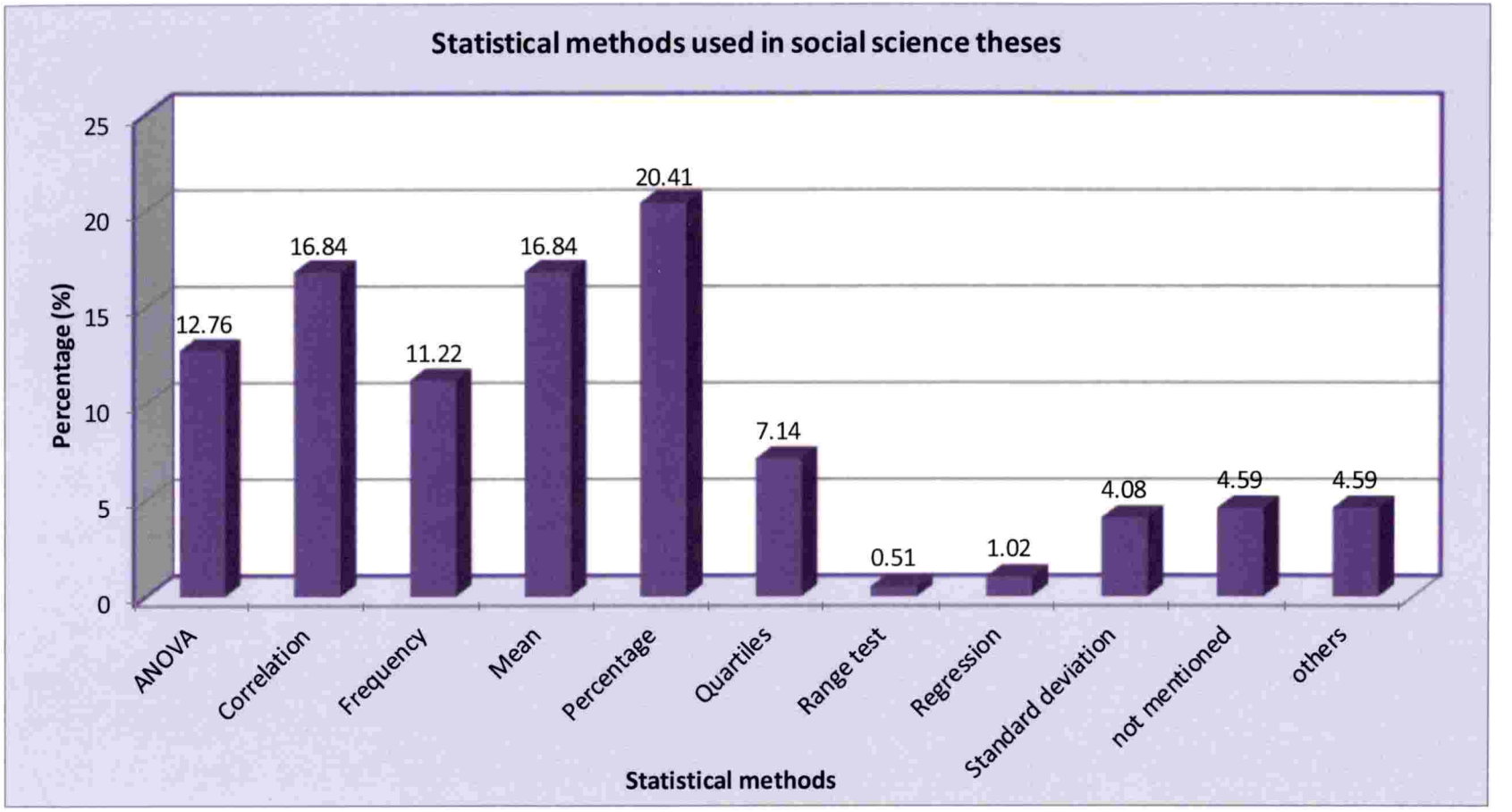

Fig.27: Percentage distribution of statistical methods used in social science theses

Table 53: Distribution of statistical methods used in social science theses

Sl. No.	Statistical methods	Agricultural Extension (n=34)		Agricultural Economics (n=9)		Community science (n=23)		Total (N=66)	
		f	%	f	%	f	%	f	%
1	ANOVA	6	4.41	0	0.00	19	37.26	25	12.76
2	Correlation	33	24.27	0	0.00	0	0.00	33	16.84
3	Frequency	8	5.88	0	0.00	1	1.96	9	4.59
4	Mean	25	18.38	0	0.00	8	15.69	33	16.84
5	Percentage	34	25.00	0	0.00	6	11.77	40	20.41
6	Quartiles	14	10.29	0	0.00	0	0.00	14	7.14
7	Range test	0	0.00	0	0.00	1	1.96	1	0.51
8	Regression	1	0.74	0	0.00	1	1.96	2	1.02
9	Standard deviation	8	5.88	0	0.00	0	0.00	8	4.08
10	Not mentioned	0	0.00	9	100.00	0	0.00	9	4.59
11	Others	7	5.15	0	0.00	15	29.41	22	11.22
	Total	136	100	9	100	51	100	196	100

From table 53 and fig. 27 it was observed that 20.41 per cent of the theses in social science division used percentage analysis followed by 16.84 per cent that used mean and correlation analysis. It was then followed by 12.76 per cent that used ANOVA, 11.22 per cent used other statistical methods, 7.14 per cent used quartiles, 4.59 per cent used frequency and the same did not mentioned the statistical methods used, 4.08 per cent used standard deviation, 1.02 per cent used regression analysis and 0.51 per cent used range test.

In Agricultural Extension 25.00 per cent of the theses used percentage analysis followed by correlation (24.27%), mean (18.38%), quartiles (10.29%), frequency and standard deviation (5.88%), others (5.15%), ANOVA (4.41 %) and regressions (0.74%). In Agricultural Economics all the theses did not mention any statistical methods. In Community Science department 37.26 per cent of the theses used ANOVA followed by 29.41 per cent that used other methods, 15.69 per cent used mean, 11.77 per cent used percentage and 1.96 per cent used frequency, regressions and range test. Therefore, majority of the theses in

agricultural extension department used percentage and correlation analysis whilst majority of the theses from Community Science department used ANOVA.

From the above overall results it can be concluded that ANOVA (37.65%, 63.08% and 21.48%) is the commonly used statistical tools for analysis of theses belonging to crop production, crop protection and crop improvement. Percentage (20.41%), correlation (16.74%) and frequency (11.22%) computation followed by categorization based on mean (16.84%) or quartile (7.4%) were the major statistical tools used in social science division.

The results regarding most of the theses used percentage analysis is parallel with the study of Sujan (1986), Mehra and Trikha (1993), Singh and Gill (1993), Prolima and Kaushik (2000),Thakur and Trikha (2002) and Biswas (2009).

4.2.13 Locale of study

Locale of study here refers to the place of study mentioned as district where the researches were conducted. The results showing the distribution of theses based on locale of study is presented in table 54.

Table 54 and fig.28 gave a clear indication that 81.15 per cent of the research work were conducted in Thiruvananthapuram district either in farmer's field, campus, non-governmental organizations and institutions, schools and alike followed by 3.83 per cent that were conducted in Kollam district, 3.51 per cent in Idukki, 2.88 per cent in Palakkad, 2.24 per cent in Wayanad, 1.60 per cent in Alappuzha, 0.96 per cent in Pathanamthitta, Kottayam and Thrissur, 0.64 per cent in Ernakulam and Kannur and only 0.32 per cent were conducted in Kozhikode and Kasaragod district respectively. Some of the studies were conducted in more than two locations.

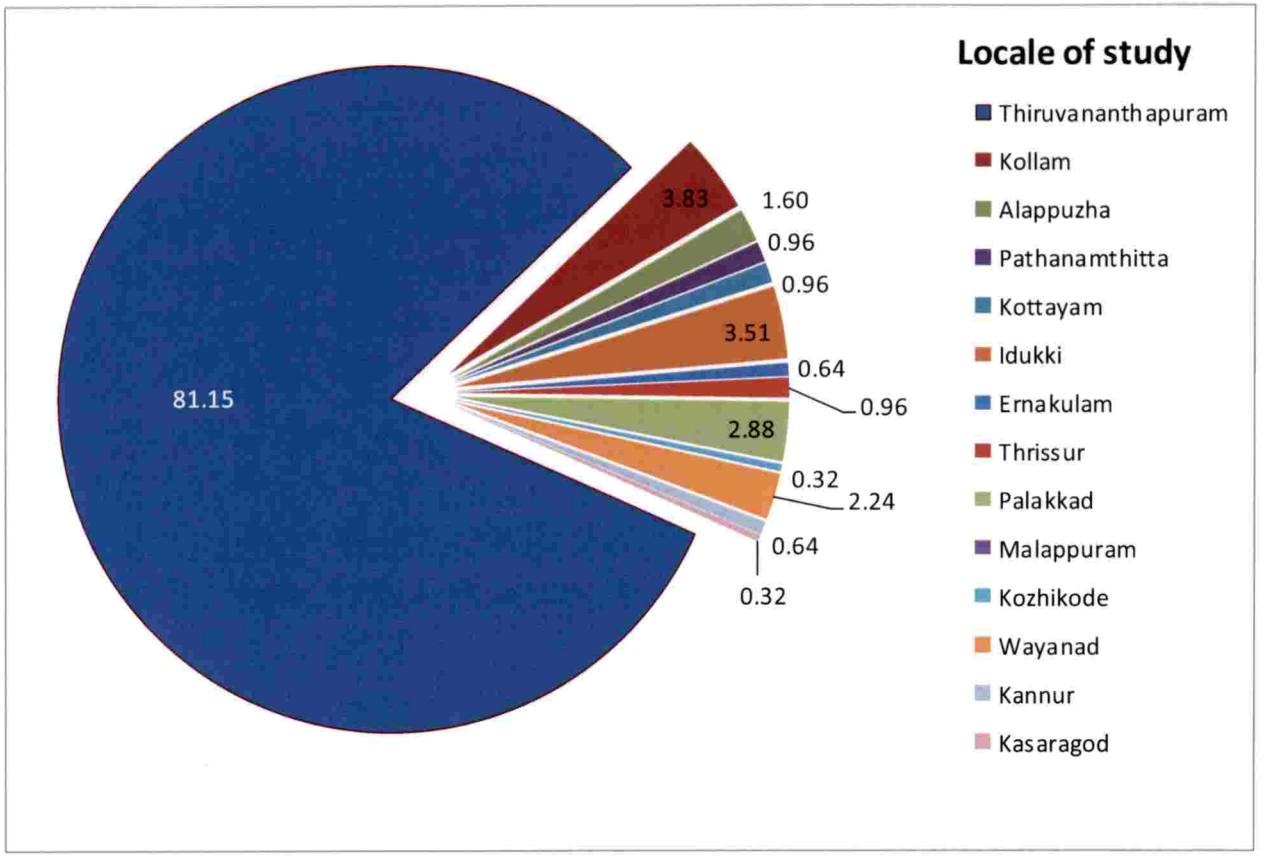

Fig.28: Percentage distribution of PG theses based on locale of study

Table 54: Distribution of theses based on locale of study

N=287

Sl. No.	Districts	f	%
1.	Thiruvananthapuram	254	81.15
2.	Kollam	12	3.83
3.	Alappuzha	5	1.60
4.	Pathanamthitta	3	0.96
5.	Kottayam	3	0.96
6.	Idukki	11	3.51
7.	Ernakulam	2	0.64
8.	Thrissur	3	0.96
9.	Palakkad	9	2.88
10.	Malappuram	0	0.00
11.	Kozhikode	1	0.32
12.	Wayanad	7	2.24
13.	Kannur	2	0.64
14.	Kasaragod	1	0.32
15.	Total	313	100

The results revealed that majority of the research on PG studies are focused in the location where the college is situated. This could be because of the easiness of doing research in terms of time and spatial convenience and the need to facilitate chairman accessibility to student's research work supervision. However, it would be a welcome approach if the research work is extended to other regions covering different agro ecological units so as to make KAU research more visible and at the same time catering to the requirement of diverse cropping or farming systems.

4.2.14 Crops or areas

It refers to the different types of crops taken for the study or the different areas of study other than crops that have been focused upon by the researchers. The results concerning the distribution of theses based on crops and areas focused are illustrated in table 55.

Overall inspection of table 55 and fig. 29 showed that 37.07 per cent of the study was focused on vegetables followed by 13.40 per cent on cereals, 12.46 per cent on fruits, 8.41 per cent on spices, 4.05 per cent on areas other than crops, 3.74 per cent were on plantation crops, 3.12 per cent on flowers and information communication and technology, 2.49 per cent on mushrooms and homesteads, 2.18 per cent on honey bees, 1.25 per cent on tuber crops, 0.93 per cent on aromatic and medicinal plants and organizations, 0.62 per cent on fodder grass, legumes, nuts, geographic information system, schemes and tribal and only 0.31 per cent were on ornamental plants and integrated farming system.

Division wise analysis revealed that more than 40 per cent of crop production, crop protection and crop improvement researches were focus on vegetables followed by only 22.99 per cent from social science division. 20.00 per cent of agricultural statistics theses were focus on fruits followed by 13.85 per cent of crop protection theses. Likewise, 16.52 per cent, 16.09 per cent, 14.28 per cent of the researches on crop production, social science and crop improvement division were focused on both fruits and flowers respectively. 20 per cent of agricultural statistics followed by 18.26 per cent from production division, 12.24 per cent from crop improvement and social science theses and 6.15 per cent from crop protection division. Regarding the theses that focus on plantation crops and spices, 18.37 per cent were from crop improvement division followed by 16.93 per cent, 12.18 per cent and 5.75 per cent from crop protection, crop production and social science division. 3.08 per cent and 1.15 per cent of the study from crop protection and social science division were on aromatic and medicinal plants. 0.87 per cent of crop production theses were on ornamental plants followed 1.74 per cent on fodder grass and geographic information system respectively. When 40 per cent of the work belonging to agricultural statistics was associated with the tuber crops, only 1.54 per cent and 0.87 per cent crop protection and crop production theses were addressing problems related to tuber crops. But 9.23 per cent and 7.69 per cent of the researches from crop protection division were on honeybees and mushrooms respectively. Also, 11.49 per cent of social science

work was on information and communication technology followed by 3.45 per cent on organizations, 2.30 per cent on legumes, nuts, schemes and tribal and only 1.15 per cent on integrated farming system. It was interesting to note that 20 per cent and 8.05 per cent of agricultural statistics and social science work were on homestead gardens.

Hence, from the above results it can be summarized that almost all the study irrespective of the division were on vegetables, fruits, flowers, plantation crops and spices, aromatic and medicinal plants and other kind of crops. Crop protection division also takes up study on honey bees and mushrooms. Regarding social science division though most of the researches were on information communication and technology, schemes, tribal study, homesteads and alike the researchers also find a way to conduct study on various kinds on crops.

The list of the crops under vegetables, fruits, flowers, cereals, plantation crops and spices, aromatic and medicinal plants, ornamental plants, tuber crops, fodder grass, legumes and nuts that were taken up for study were capsicum, cowpea, cauliflower, cabbage, amaranths, winged bean, chilli, tomato, bitter gourd beans, carrot, okra, moringa, cluster bean, ivy gourd, cucumber, culinary melon, mushrooms, papaya, banana, mango, pineapple, pomegranate, rambutan, bilimbi, jackfruit, annona, koovalam, heliconia, gerbera, African marigold, orchids, anthurium, dahlia, rice, baby corn, finger millet, coconut, arecanut, black pepper, turmeric, ginger, cardamom, pepper mint, nutmeg, herbs, aloe vera, coleus, elephant foot yam, hybrid napier, chickpea, cashew and alike. The areas other than crops that were focused upon were Geographic information System (GIS), agricultural land use system, honey bees, nutrition, homesteads, integrated farming system, information communication and technology (ICT), precision farming, tribal, schemes, non-governmental organizations and others.

Table 55: Distribution of PG theses based on the crops/ areas focused (N=287)

Sl. No.	Crop/ areas focused	Crop production (n=109)		Crop protection (n=60)		Crop improvement (n=47)		Social science (n=66)		Agricultural Statistics (n=5)		Total (N=287)	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Vegetables	50	43.48	27	41.54	22	44.90	20	22.99	0	0.00	119	37.07
2	Fruits	14	12.17	9	13.85	3	6.12	13	14.94	1	20.00	40	12.46
3	Flowers	5	4.35	0	0.00	4	8.16	1	1.15	0	0.00	10	3.12
4	cereals	21	18.26	4	6.15	6	12.24	11	12.64	1	20.00	43	13.40
5	Plantation crops	7	6.09	2	3.08	2	4.08	1	1.15	0	0.00	12	3.74
6	Spices	7	6.09	9	13.85	7	14.29	4	4.60	0	0.00	27	8.41
7	Aromatic and medicinal plants	0	0.00	2	3.08	0	0.00	1	1.15	0	0.00	3	0.93
8	Ornamental plants	1	0.87	0	0.00	0	0.00	0	0.00	0	0.00	1	0.31
9	Fodder grass	2	1.74	0	0.00	0	0.00	0	0.00	0	0.00	2	0.62
10	Tuber crops	1	0.87	1	1.54	0	0.00	0	0.00	2	40.00	4	1.25
11	Legumes	0	0.00	0	0.00	0	0.00	2	2.30	0	0.00	2	0.62
12	Nuts	0	0.00	0	0.00	0	0.00	2	2.30	0	0.00	2	0.62
13	Mushrooms	0	0.00	5	7.69	0	0.00	3	3.45	0	0.00	8	2.49
14	Honey bees	0	0.00	6	9.23	0	0.00	1	1.15	0	0.00	7	2.18
15	Homesteads	0	0.00	0	0.00	0	0.00	7	8.05	1	20.00	8	2.49
16	Information communication technology	0	0.00	0	0.00	0	0.00	10	11.49	0	0.00	10	3.12
17	Geographic information system	2	1.74	0	0.00	0	0.00	0	0.00	0	0.00	2	0.62
18	Integrated farming system	0	0.00	0	0.00	0	0.00	1	1.15	0	0.00	1	0.31
19	Organizations	0	0.00	0	0.00	0	0.00	3	3.45	0	0.00	3	0.93
20	Schemes	0	0.00	0	0.00	0	0.00	2	2.30	0	0.00	2	0.62
21	Tribal	0	0.00	0	0.00	0	0.00	2	2.30	0	0.00	2	0.62
22	Others	5	4.35	0	0.00	5	10.20	3	3.45	0	0.00	13	4.05
	Total	115	100	65	100	49	100	87	100	5	100	321	100

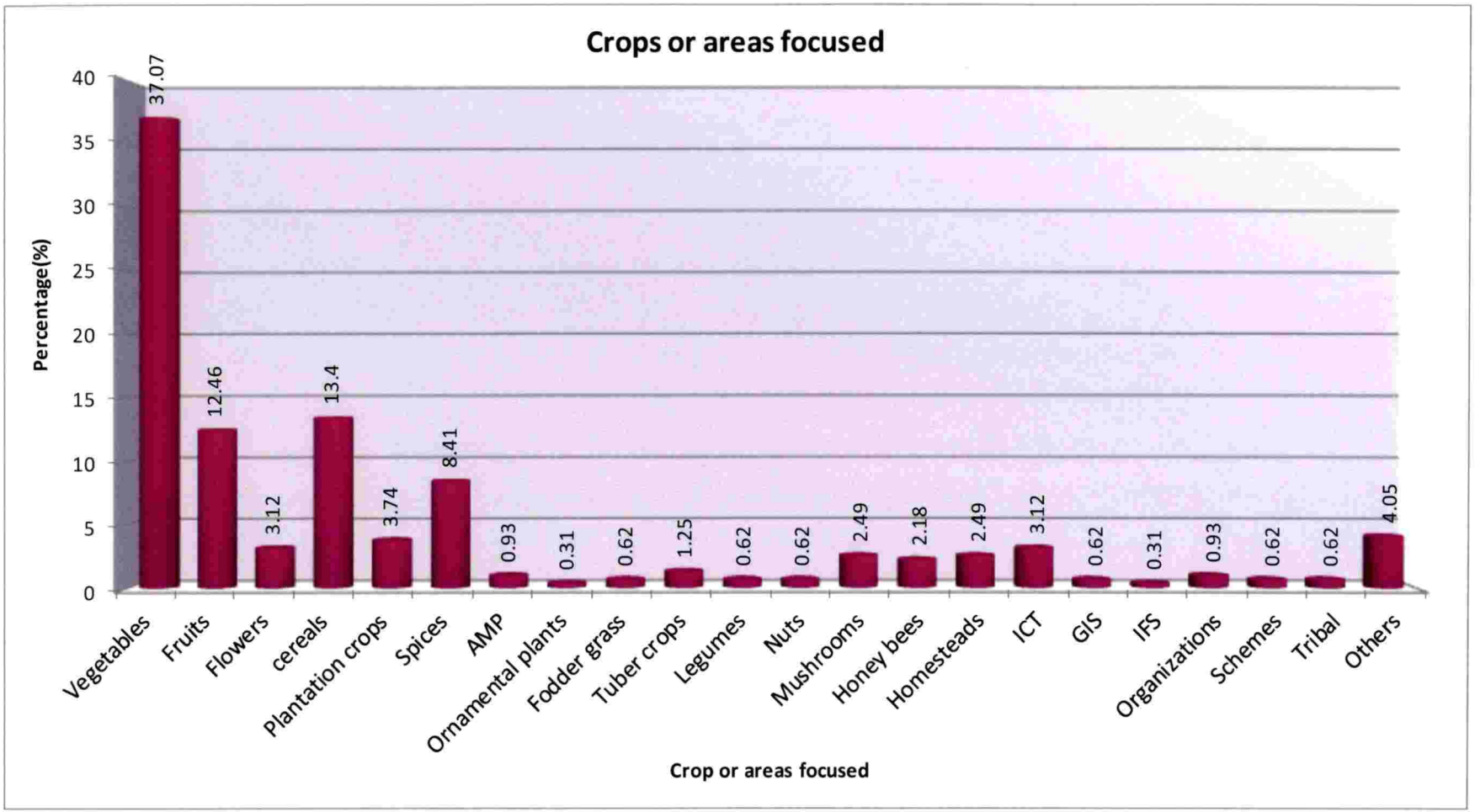

Fig.29: Percentage distribution of theses based on the crops/areas focused

4.2.15 Sample size

Sample size in this study refers to the number of respondents selected for the study that was presented in the theses under Agricultural Extension department. The results regarding the sample size taken for the study is illustrated table 56.

Table 56: Categorization of Agricultural Extension theses based on sample size

N=34

Category	Class limits	f	%
High (M+SD)	>143	6	17.64
Medium (M±SD)	90-142	26	76.47
Low (M-SD)	<89	2	5.88
Nil	0	0	0
Total		34	100
Mean =116.47; SD=27.27; SE=4.68; Min-Max=60-200			

A cursory look at table 56 and fig.30 revealed that 76.47 per cent of the theses under Agricultural Extension department have medium number of respondents (90-142) followed by 17.64 per cent that have more than 143 respondents and 5.88 per cent have less than 89 respondents. The number of respondents chosen for the study differs with the change in research work and also the availability of the respondents. The minimum and maximum numbers of respondents were 60-200.

The plausible reason behind majority of theses opting medium number sample size was due shortage of time due to the fact that PG research gets an effective time for less than a year. Also a manageable sample size is essential to enable the student for a comprehensive data gathering, data entry and master table preparation and also to make data analysis more convenient and easy. The findings were also on tune with results of the study by Sujan (1986), which reported that majority of the theses covered 51-100 respondents.

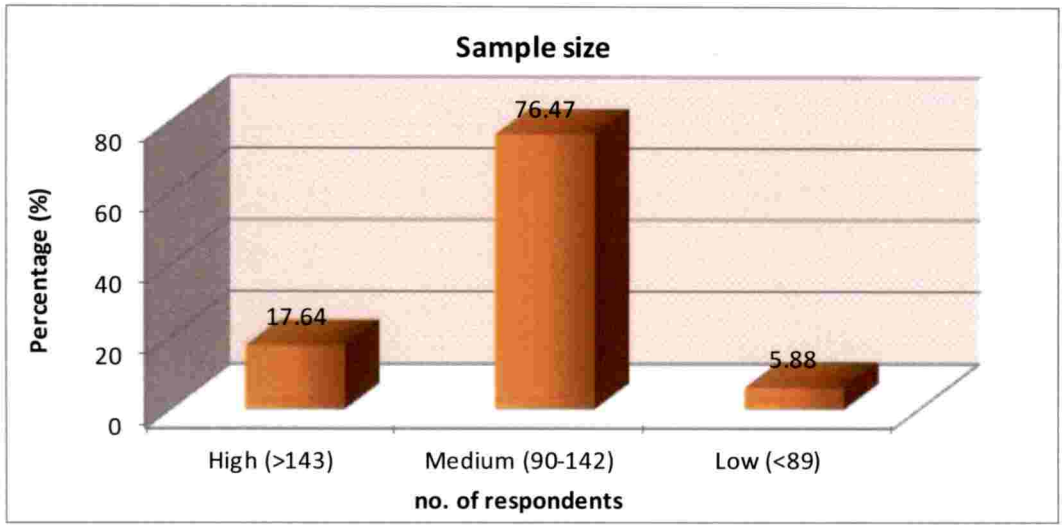

Fig.30: Percentage distribution of Agricultural Extension theses based on sample size

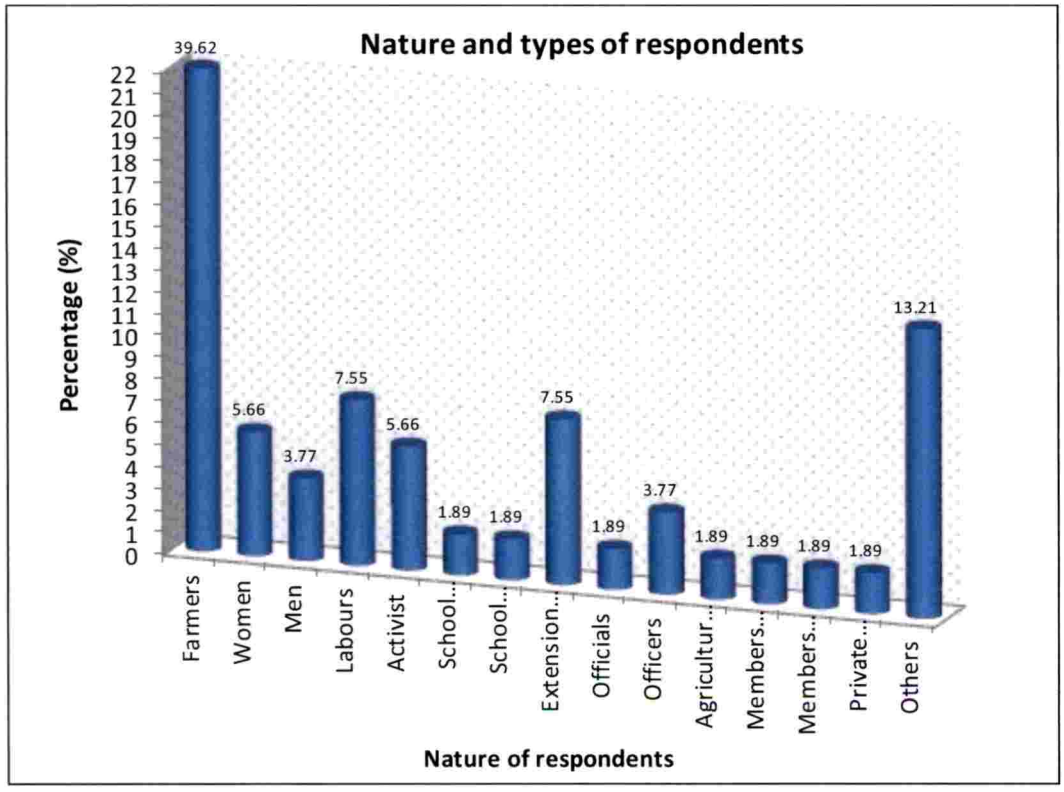

Fig.31: Percentage distribution of Agricultural Extension theses based on the nature/ types of respondents selected for study

4.2.16 Nature or types of respondents

Nature of respondents refers to the types of respondents considered for any kind of research undertaken for PG research in Agricultural Extension. The results presenting the nature or types of respondents selected for the study was categorized into 15 categories after analyses of the theses and is enlisted in table 57.

Table 57: Distribution of Agricultural Extension theses according to the types of respondents

N=34

Sl. No.	Types of respondents	Sub- types	f	%
1	Farmers	Home garden	4	7.55
		Marginal and small	1	1.89
		Lead farmers	2	3.77
		Satellite farmers	2	3.77
		Vegetables	4	7.55
		Others	8	15.09
2	Women	Tribal	2	3.77
		Rural	1	1.89
3	Men	Tribal	2	3.77
4	Laborers	Women	1	1.89
		Men	1	1.89
		Tribal	1	1.89
		Non- tribal	1	1.89
5	Activist	Tribal	1	1.89
		Non- tribal	1	1.89
		Social	1	1.89
6	School teachers		1	1.89
7	School students		1	1.89
8	Extension personnel		4	7.55
9	Officials		1	1.89
10	Officer		2	3.77
11	Agricultural scientist		1	1.88
12	Members of ATMA		1	1.88
13	Members of NGOs		1	1.88
14	Private partners		1	1.88
15	Others		7	13.21
	Total		53	100

Table 57 and fig.31 revealed the distribution of theses based on the nature or types of respondents taken for the study under social science division. It was noticed that 39.62 per cent of the respondents were farmers; of which 7.55 per cent were homesteads and vegetables farmers, 3.77 per cent were lead and satellite farmers, 1.89 per cent were small and marginal farmers and the rest 15.09 per cent were farmers from various aspect. The table also revealed that 7.55 per cent of the respondents were labourers (include both men, women, tribal and non-tribal men and women with 1.89 per cent each) and extension personnel respectively. Also, it was noted that 5.66 per cent of the respondents were women (tribal and rural women) and activist (tribal, non-tribal and social activist) respectively. Similarly, 3.77 per cent were tribal men and officer, and 1.88 per cent of the respondents were school teachers, school students, officials, Agricultural scientist, members of ATMA and NGOs and private partners separately and about 13.21 per cent of the respondents were not categorized.

The results are in agreement with the findings of Sujan (1986), Biswas (2009) and Verma (2017).

4.2.17 Sampling Methods

Sampling methods refers to the procedure of selecting a representative group (sample) from the population under the study that was observed in Agricultural Extension PG theses. Table 58 demonstrated the categorization of social science theses based on sampling methods for the selection of respondents.

Table 58: Categorization of Agricultural Extension theses based on sampling methods for the selection of respondents

N=34

Sl. No.	Sampling methods	f	%
1	Random sampling	34	82.93
2	Purposive sampling	7	17.07
	Total	41	100

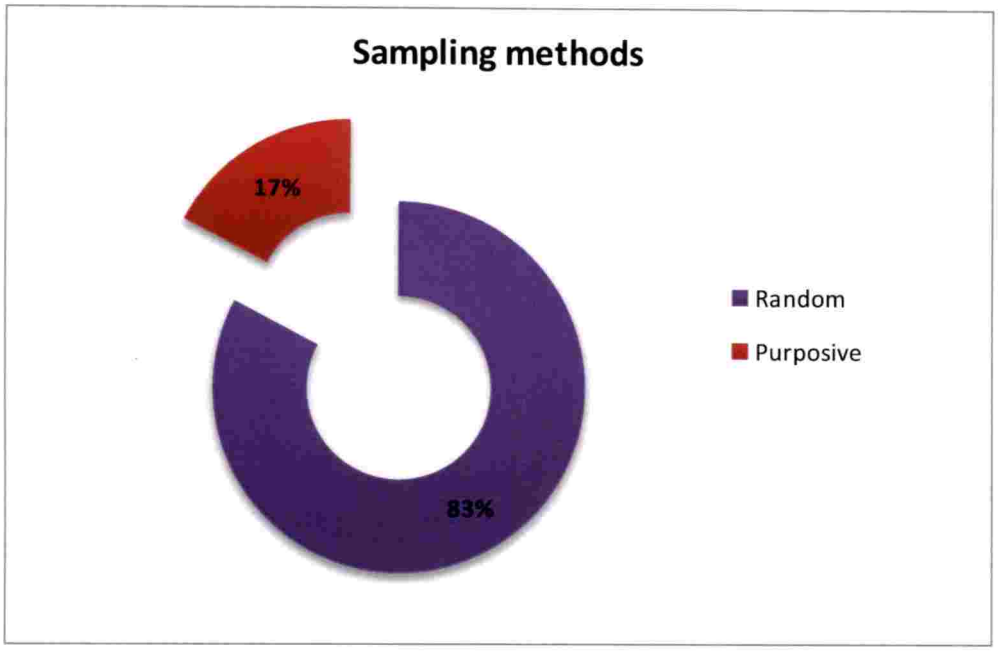

Fig.32: Representation of the sampling methods used in Agricultural Extension theses

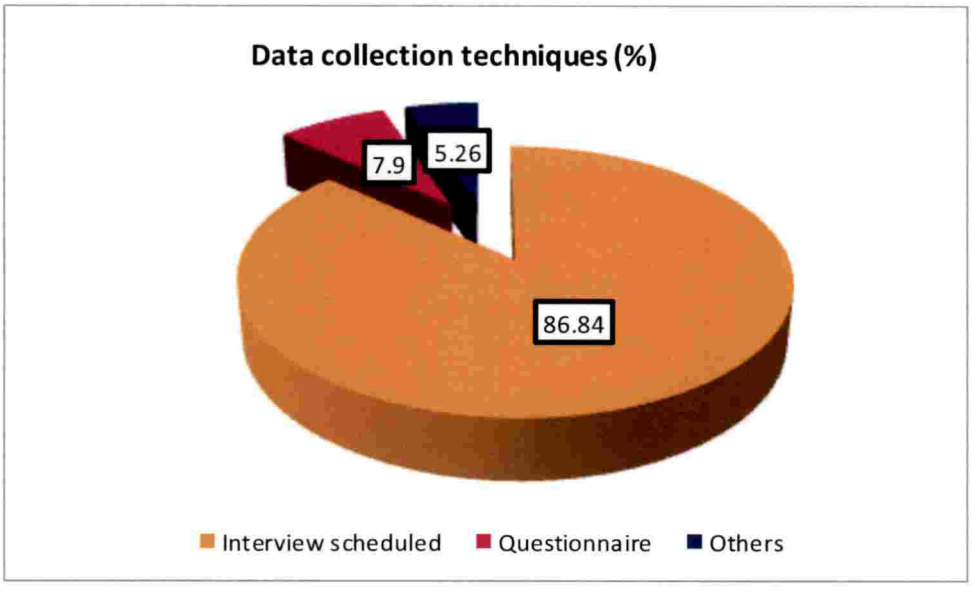

Fig.33: Representation of the data collection techniques used in Agricultural Extension theses

The results revealed that majority (82.93%) of the theses used random sampling method in Agricultural Extension department followed by 17.07 per cent that used purposive sampling methods.

The probable reason backing the results that most of the theses used random sampling methods might be due to the fact that it was an easy procedure, it minimized the biasness in data collection and also it gave a precise representation of the larger population. The findings were also in line with Sujan (1986) and Thakur and Trikha (2002).

Generally, as witnessed from the above results, it give the impression that the significance of research isn't seen appropriately by the post-graduate students due to the fact that they wishes to submit their theses as early as possible (timely) which makes them to choose simple sampling procedure for their study. Also, random sampling facilitates easy identification of respondents. However, it would be worthy to make use of higher order sampling techniques like stratified or cluster sampling because it will enhance the quality of data for meaningful interpretation of results.

4.2.18 Data collection techniques

Data collection techniques refer to the techniques that were used in the process of gathering and measuring variables of interest such as interviews. The results regarding the categorization of Agricultural Extension based on the interview techniques are illustrated in table 59.

It can be inferred that 86.84 per cent of Agricultural Extension theses used interview scheduled followed by 7.90 per cent theses that used questionnaire for data collection and 5.26 per cent used other kinds of techniques.

Table 59: Categorization of Agricultural Extension theses based on interview techniques

N=34

Sl. No.	Techniques	f	%
1	Interview scheduled	33	86.84
2	Questionnaire	3	7.90
3	Others	2	5.26
	Total	38	100

Since more than 80 per cent of the theses used interview scheduled for data collection it means that most of the research work were related to either literate or illiterate farmers or respondents and to acquire more reliable data the researchers have to use interview schedule and only few study were seen too used questionnaire which means only few researches were related to professionals.

The study is on par with Sujan (1986), Mehra and Trikha (1993), Singh and Gill (1993), Prolima and Kaushik (2000), Singh *et al.,* (2001), Thakur and Trikha (2002), Biswas (2009) and Verma (2017).

4.2.19 Types of data used for study

It refers to the two types of data i.e. primary and secondary data. The result on distribution of Agricultural Extension theses based on types of data is presented in table 60.

Table 60: Distribution of Agricultural Extension theses based on the types of data

N=34

Sl. No.	Types of data	f	%
1	Primary data	34	91.89
2	Secondary data	3	8.11
3	Total	37	100

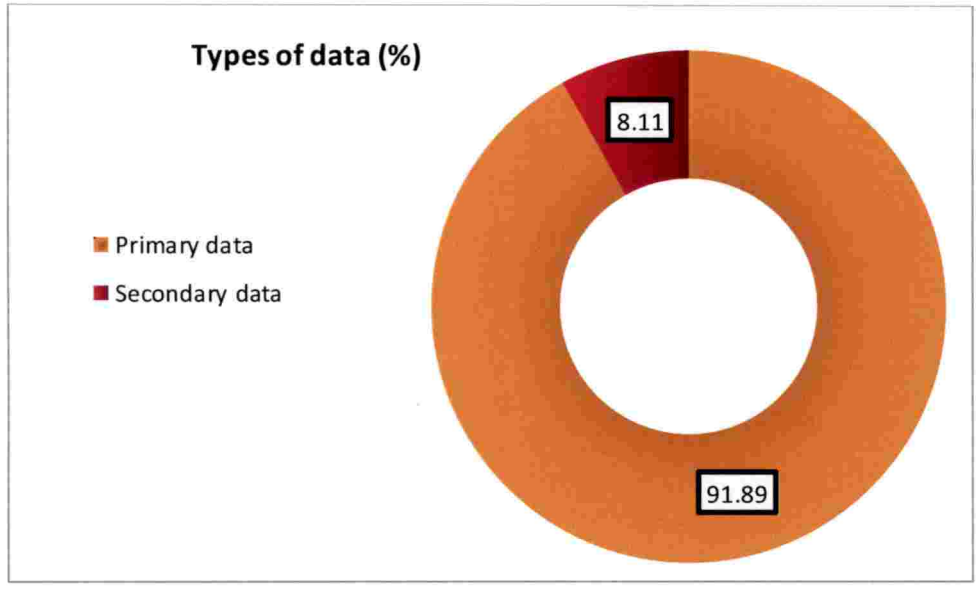

Fig.34: Representation of the types of data used in Agricultural Extension theses

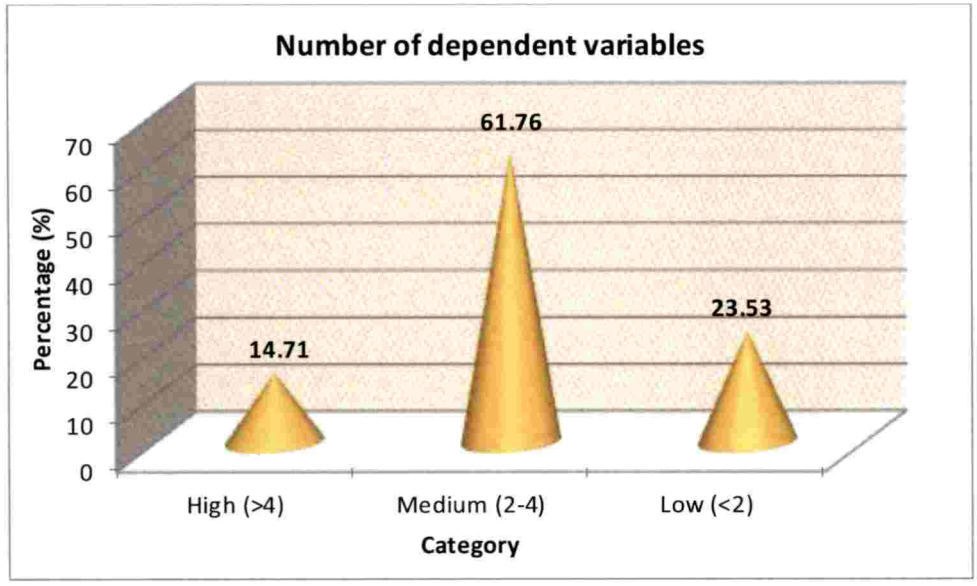

Fig.35: Percentage distribution of theses based on number of dependent variables

It was indicated from the above table that 91.89 per cent of the theses belonging to Agricultural Extension theses used primary data followed by 8.11 per cent that used secondary data for their study. Therefore, it can be concluded that majority of the work in Agricultural Extension were collected by the researchers himself or herself and only few that were collected from secondary sources like reports, newspaper, magazines, official documents or other sources.

4.2.20 Number of dependent variables

Dependent variables are the variables that depend on other factors that are measured. The outcomes regarding the number of dependent variables used in Agricultural Extension theses were presented in table 61.

Table 61: Categorization of Agricultural Extension theses based on number of dependent variables

N=34

Category	Class limits	f	%
High (M+SD)	>4	5	14.71
Medium (M±SD)	2 to 4	21	61.76
Low (M-SD)	<2	8	23.53
Total		34	100
Mean=2.41;SD=1.08; SE-0.18; Min-Max=2-5			

It was noticeable from the above table and fig.35 that 61.76 per cent of the theses belonging to Agricultural Extension departments have medium (2-4) number of dependent variables followed by 23.53 per cent and 14.71 per cent that have less than 2 and more than 4 dependent variables respectively. The minimum and maximum number of dependent variables was 2-5.

The types of dependent variables that have been used in most of the theses were selected, categorized and presented in table 62.

Table 62: Distribution of Agricultural Extension theses according to dependent variables used

N=34

Sl. No.	Dependent variables	f	%
1.	Adoption	8	10.96
2.	Attitude	5	6.85
3.	Awareness	2	2.74
4.	Benefit cost ratio	1	1.37
5.	Crop diversification	1	1.37
6.	Deprivation	4	5.48
7.	Diffusion	1	1.37
8.	Entrepreneurial behaviour	1	1.37
9.	Gender analysis	1	1.37
10.	Group efficiency	1	1.37
11.	Health consciousness	1	1.37
12.	Impact profile	1	1.37
13.	Information documentation	1	1.37
14.	Information seeking behaviour	1	1.37
15.	Information utilization	1	1.37
16.	Knowledge	5	6.85
17.	Leads implementation effectiveness	1	1.37
18.	Livelihood capital	2	2.74
19.	Managerial efficiency	1	1.37
20.	Participation	2	2.74
21.	Perception	13	17.81
22.	Relevancy and efficiency	1	1.37
23.	Social capital formation	1	1.37
24.	Social discrimination	1	1.37
25.	Social exclusion	2	2.74
26.	Social participation	2	2.74
27.	Sustainability	2	2.74
28.	Technology assessment	1	1.37
29.	Technology effectiveness	1	1.37
30.	Utility of message	2	2.74
31.	Viewing behaviour	1	1.37
32.	Work participation	1	1.37
33.	Others	2	2.74
34.	Not mentioned	2	2.74
	Total	**73**	**100**

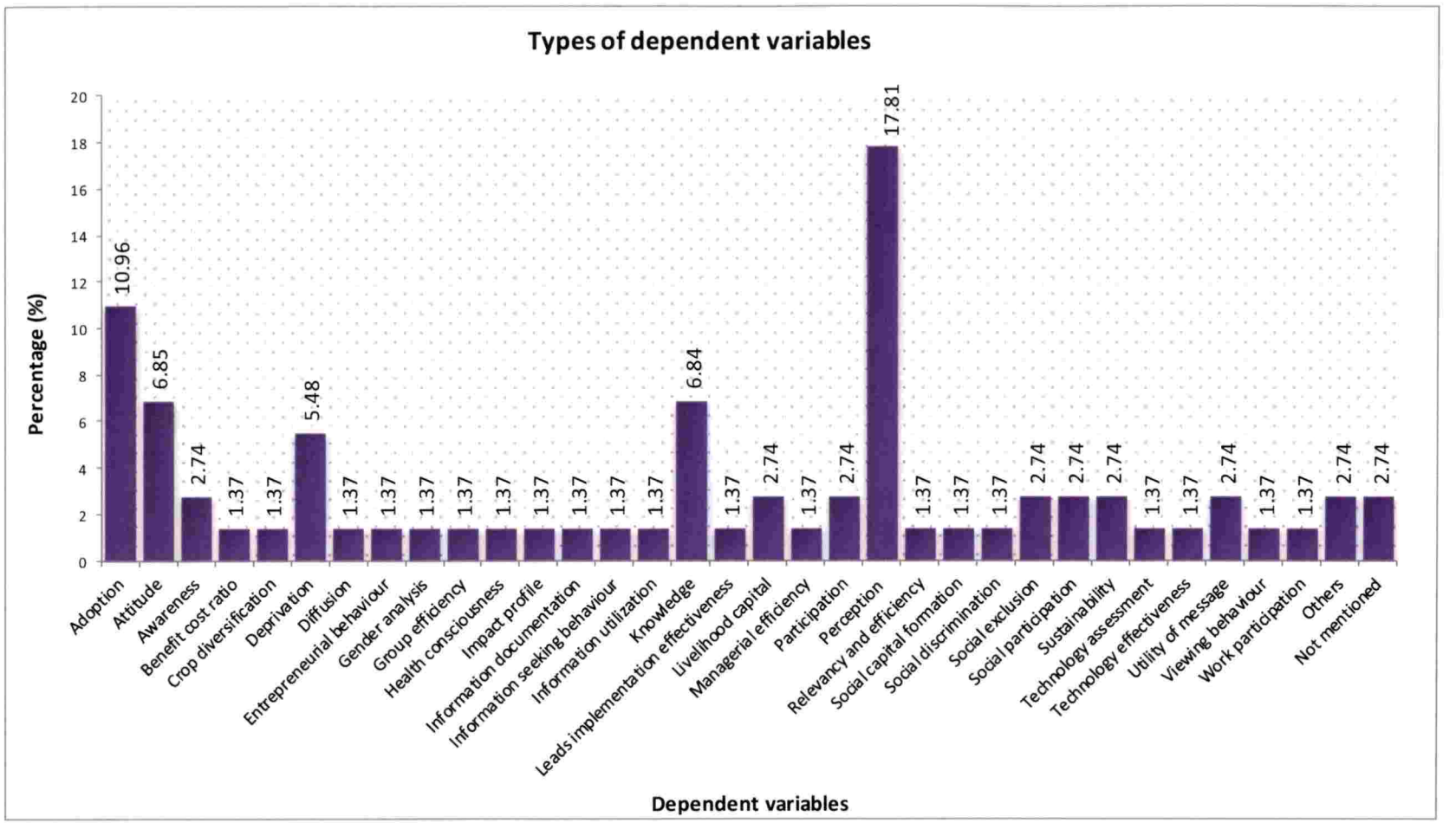

Fig.36: Percentage distribution based on the nature/ types of respondents selected for study under Agricultural Extension theses

From table 62 and fig.36 it can be noted that 17.81 per cent of the dependent variables were on perception. It included perception of farmers or students or any kind of respondents followed by 10.96 per cent on adoption, 6.85 per cent on attitude and knowledge, 5.48 per cent on deprivation, 2.74 per cent on awareness, livelihood capital, participation, social exclusion, social participation, and technology effectiveness and 1.37 per cent on benefit cost ratio, crop diversification, diffusion, entrepreneurial behaviour, gender analysis, group efficiency, health consciousness, impact profile, information documentation, information seeking behaviour, information utilization, leads implementation effectiveness, managerial efficiency, relevancy and efficiency, social capital formation, social discrimination, technology assessment, technology effectiveness, viewing behaviour, work participation and also 2.74 per cent used other dependent variables and 2.74 did not mention the variable as dependent variables.

Hence, it can be concluded that majority of the Agricultural Extension theses satisfied 2 to 4 number of dependent variables while perception and adoption is the types of dependent variables that were mostly used.

4.2.21 Independent variables

Independent variables are the variable that is stable and unaffected by the other variables. The categorizations of theses based on the number of independent variables are presented in table 63.

A cursory look at table 63 revealed that 61.67 per cent of the theses have medium (10 to 15) number of independent variables followed by 26.47 per cent that have high (more than 15) independent variables and 11.77 per cent that have low (less than 10) number of independent variables.

Table 63: Categorization of theses based on the number of independent variables

N=34

Category	Class limits	f	%
High (M+SD)	>15	9	26.47
Medium (M±SD)	10-15	21	61.76
Low (M-SD)	<10	4	11.77
Total		34	100
M=12.21; SD=2.41; SE=0.41; Max-Min=16-8			

Hence, it can be concluded that majority of the Agricultural Extension PG theses included 10 to 15 number of independent variables for the studies and some of the commonly used independent variables were age, educational status, social capital, annul income, farm size, farming experience, economic motivation, land ownership, indebtedness, alcoholism, political orientation, occupation, family size, environmental concern, market perception, extension orientation, information source utilization, awareness and alike.

4.3 MAIN VARIABLES

4.3.1 Perceived usefulness of PG research

Perceived usefulness in this study can be operationalized as the degree to which students or teachers believes that the research work done influence them personally, the farming community and the institutions as a whole. The results regarding the distribution of respondents based on extent of usefulness as perceived by students is presented in table 64.

Table 64: Distribution based on extent of usefulness of postgraduate research as perceived by students

N=60

Category	Score	Personal benefits		Farming community		Institutions		Total	
		f	%	f	%	f	%	f	%
Very useful	3	18	30.00	20	33.33	27	45.00	65	36.11
Useful	2	34	56.67	31	51.67	26	43.33	91	50.55
Less useful	1	6	10.00	7	11.67	2	3.33	15	8.33
Not useful	0	2	3.33	2	3.33	5	8.33	9	5.00
Total		60	100	60	100	60	100	180	100
Score obtained		128		129		135			
Maximum score= 180; Minimum score=60; Median=90									

On perusal of the above overall table, it can be inferred that 56.67 per cent of the respondents perceived the research work to be useful for personal benefits, 51.67 per cent for the farming community and 45.00 per cent for the institutions. Also, 30.00 per cent and 33.33 per cent of the respondents perceived it to be very useful individually as well as for the farming community and 45.00 perceived it to be useful for the institutions. Ten per cent, 11.67 per cent and 3.33 per cent perceived it to be less useful for all the three components and 8.33 per cent found it not useful for the institutions and only 3.33 per cent found it not useful for personal benefits and the farming community respectively.

From fig.38 it can be concluded that minimum and maximum score that can be achieved by the students were 'zero' and 'hundred and eighty' respectively. The scores obtained were found to be 128, 129 and 135 for personal benefits, farming community and institutions and from the graph it can be clearly seen that all the score obtained were above the mid-point of the scale or median.

Table 65 revealed the distribution based on extent of usefulness of postgraduate research as perceived by teachers.

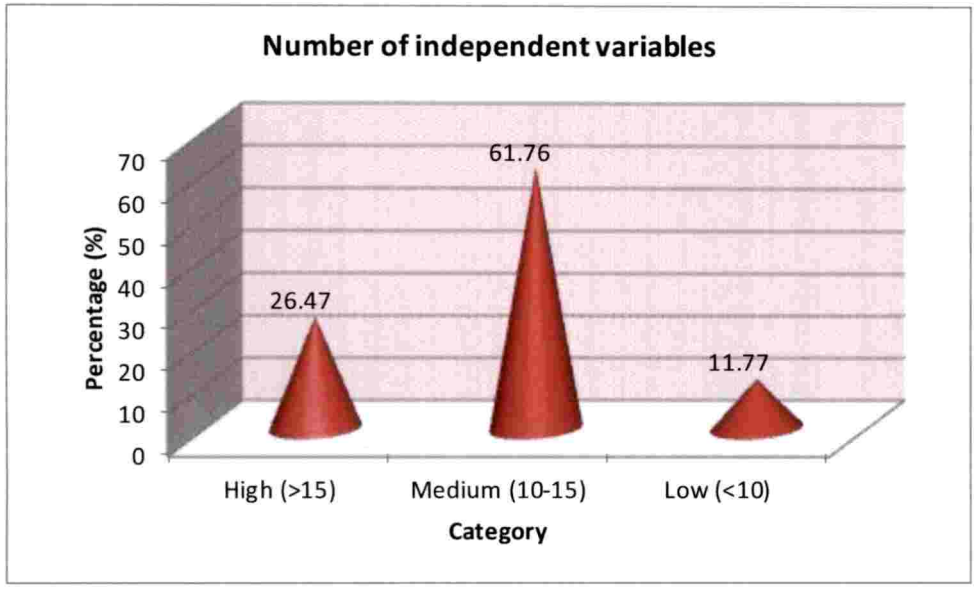

Fig.37: Percentage distribution of theses based on number of independent variables

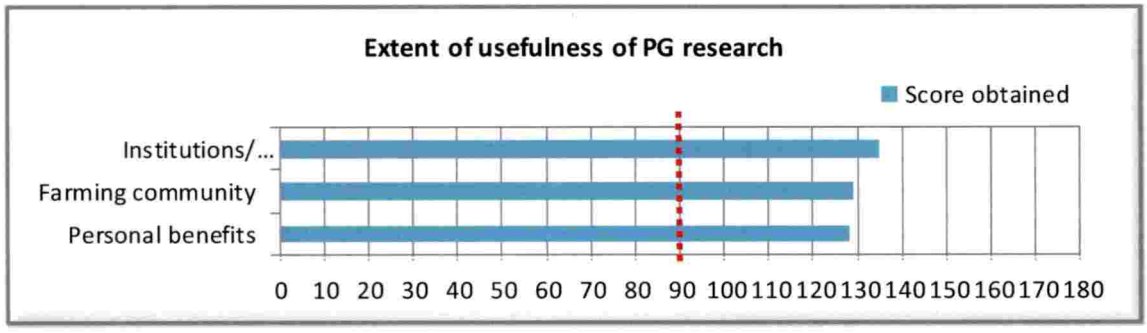

Fig.38: Representation of the extent of usefulness of PG research as perceived by students

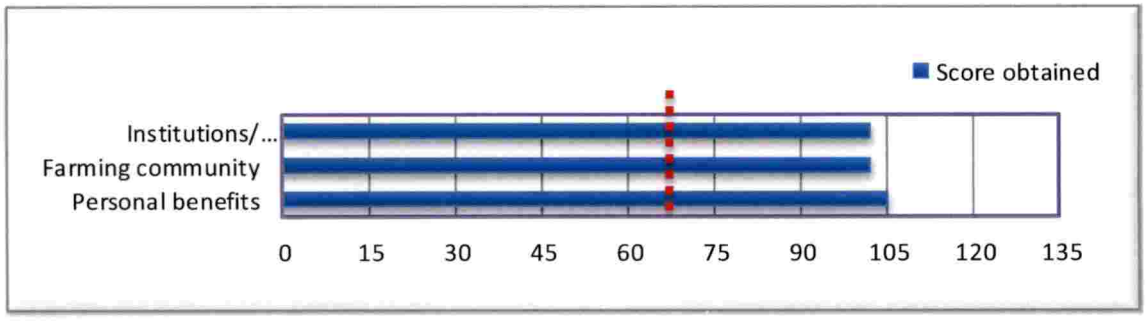

Fig.39: Representation of the extent of usefulness of PG research as perceived by teachers

Table 65: Distribution based on extent of usefulness of postgraduate research as perceived by teachers

N=60 *n=15(no response)

Category	Score	Personal benefits		Farming community		Institutions		Total	
		f	%	f	%	f	%	f	%
Very useful	3	16	35.56	13	28.89	13	28.89	42	31.11
Useful	2	28	62.22	31	68.89	31	68.89	90	66.67
Less useful	1	1	2.22	1	2.22	1	2.22	3	2.22
Not useful	0	0	0	0	0	0	0	0	0
Total		45	100	45	100	45	100	135	100
Score obtained		105		102		102			
Maximum Score=135; Minimum Score= 45; Mean Score=90									

On analysis of the above table it was observed that more than 60 per cent of the teachers perceived that PG research is useful which is on par with 62.22 per cent that found it useful for individual benefits, 68.89 per cent for farming community and for the institutions. Almost forty per cent *i.e.* 35.56 per cent found it useful personally, 28.89 per cent found it useful farming community as well as for institutions. Only 2.22 per cent of the respondents perceived it to be less useful for the research work.

From fig.39 it can be seen that the minimum and maximum score that could be achieved were 'zero' and 'hundred and thirty five' respectively. The median were 67.5 and it was observed from the graph that the entire score obtained were above the median score.

Hence it can be also be inferred that 97.78 per cent of the teachers and 86.66 per cent students perceived the PG research to be useful to very useful. This can be attributed to the fact that the M.Sc. research undertaken by students will provide students with ideal skills and applied perspectives fundamentally aiming at the welfare of farming community. It will also enhance the knowledge, skills, attitude and understanding of the graduates thereby raising the employability. A

post graduate degree with research component in agriculture gives the PG students the necessary knowledge and skills to either manage agricultural businesses, or work in the areas of agricultural research and development, sales, food production and farming journalism.

4.3.2 Attitude towards PG research

Attitude in this study refers to the mental predisposition of the students towards PG research. The results showing the distribution based on the overall attitude of students towards research was illustrated in table 66 and the average score obtained in the five-sub component was presented in table 67. Furthermore, the correlation between the sub components and the overall attitude was presented in table 68 and the general attitude of students as perceived by the teachers was illustrated in table 69.

Table 66: Distribution based on overall attitude of students towards research

N=60

Category	Class limits	f	%
High(M+SD)	>75	8	13.33
Medium(M±SD)	62-75	41	68.33
Low(M-SD)	<62	11	18.33
Total		60	100
Mean score=68.53; SD=6.47; SE=0.33; Min-Max=20-100			

On analysis of table 66 it was observed that 68.33 per cent of the respondents have a moderate attitude towards research followed by 18.33 per cent and 13.33 per cent that have low and high attitude respectively. The mean score achieved was 68.53 and it was above the median score (fig.40), which indicates majority students had favourable attitude.

Table 67 signified the mean score achieved under each sub components of attitude. The average score attained by the first component 'research

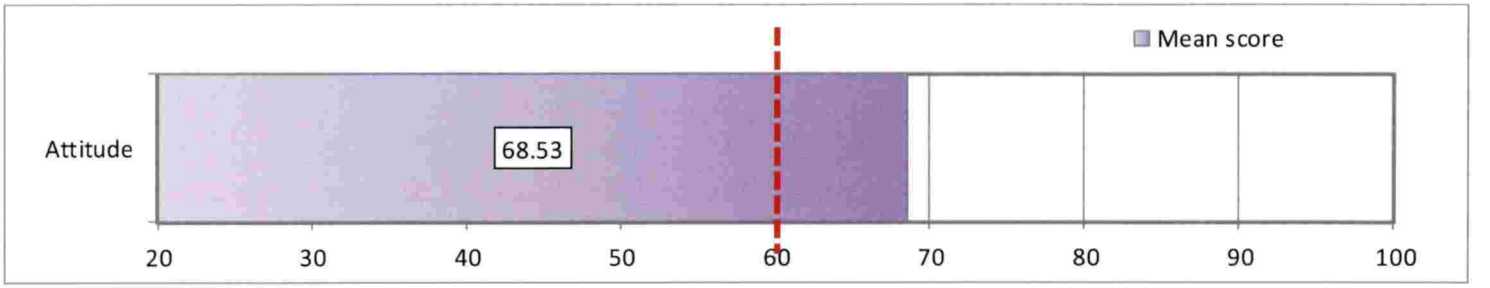

Fig.40: Representation of the attitude towards research as perceived by students

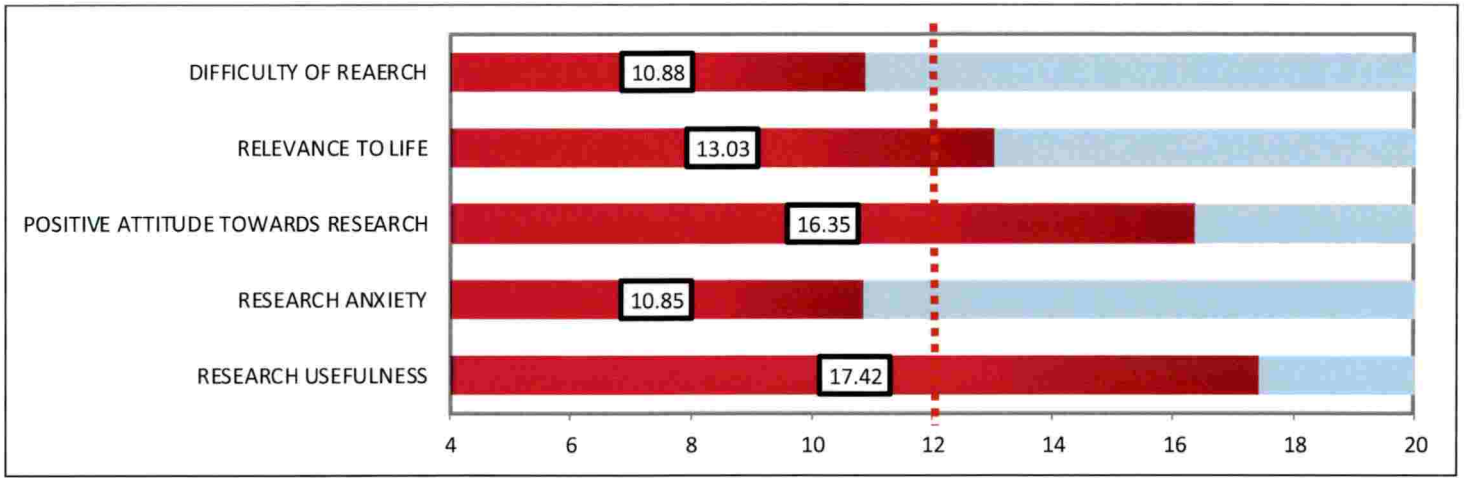

Fig.41: Representation of the sub-components of attitude as perceived by students

usefulness' was 17.42 followed by 'positive outlook towards research' (16.35), 'relevance to life' (13.03), 'difficulty of research' (10.88) and 'research anxiety'(10.85).

Table 67: Mean score achieved under each sub components of attitude towards research as perceived by students

N=60

Sl. No.	Components in attitude	Mean score
1	Research usefulness	17.42
2	Research anxiety	10.85
3	Positive attitude towards research	16.35
4	Relevance to life	13.03
5	Difficulty of research	10.88
	Min-max=4-20	

From fig.41 it was noticed that the mean score of 'relevance to life', 'positive attitude towards research' and 'research usefulness' was above the median score, whereas, 'difficulty of research' and 'research anxiety' were found to be below the mean score. Since, two of the five sub-components of attitude were below the median a correlation was considered between the five sub-components and the overall attitude of students to find if there is any significant difference. The correlation analysis was presented in table 68.

Table 68: Correlation of sub components of attitude as perceived by students with the overall attitude

N=60

Sl. No.	Sub-components of students attitude	r values
1	Research usefulness	0.342**
2	Research anxiety	0.697**
3	Positives attitude towards research	0.373**
4	Relevance to life	0.358**
5	Difficulty of research	0.690**

**1 per cent level of significance

The correlation between the sub-components of attitude and the overall attitude of students are depicted in table 68. On perusal it was observed that all the five sub-components were positive and significant at 1 per cent level of significance. This indicates that 'difficulty of research' and 'research anxiety' does not have any negative influence on the overall attitude of students. This usefulness could be interpreted as the perception of how research will be useful and help PG research students in their professional lives.

These results indicate that on one hand students tend to form some affective views towards research, which may or may not be influenced by the significance of its results but rather the methodology approach that could be a useful theme or not. However the positive attitude factor may not be the case with the factors of research difficulty and anxiety. This signifies that students who can realize the usefulness of PG research can also manage to have more positive attitude toward PG research. The question of attitude is always subjective and a psychological construct. And hence it would be further useful to examine the process of attitude change of students at various points in the period of doing PG research so as to draw meaningful conclusions. This study agrees on the findings of Elena (2005) on student's attitude towards research.

The result regarding the general attitude of students as perceived by the teachers was presented in table 69.

Table 69: Distribution based on the attitude of students towards research as perceived by teachers

N=60 *n=15(no response)

Category	Score	f	%
Very good	3	6	13.33
Good	2	38	84.44
Poor	1	1	2.22
Total		45	100
Maximum score=135; Minimum Score=45; Score obtained=95			

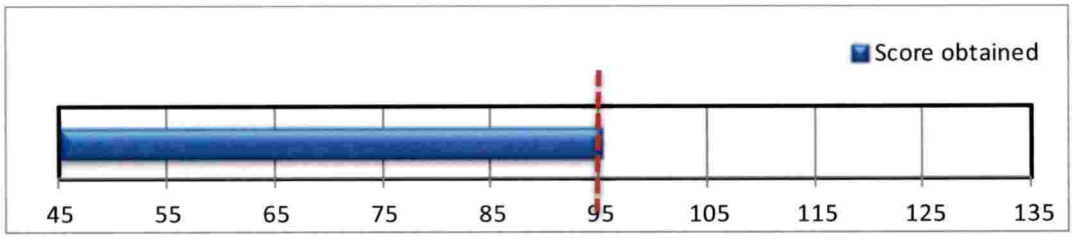

Fig.42: Representation of the student's attitude towards research as perceived by teachers

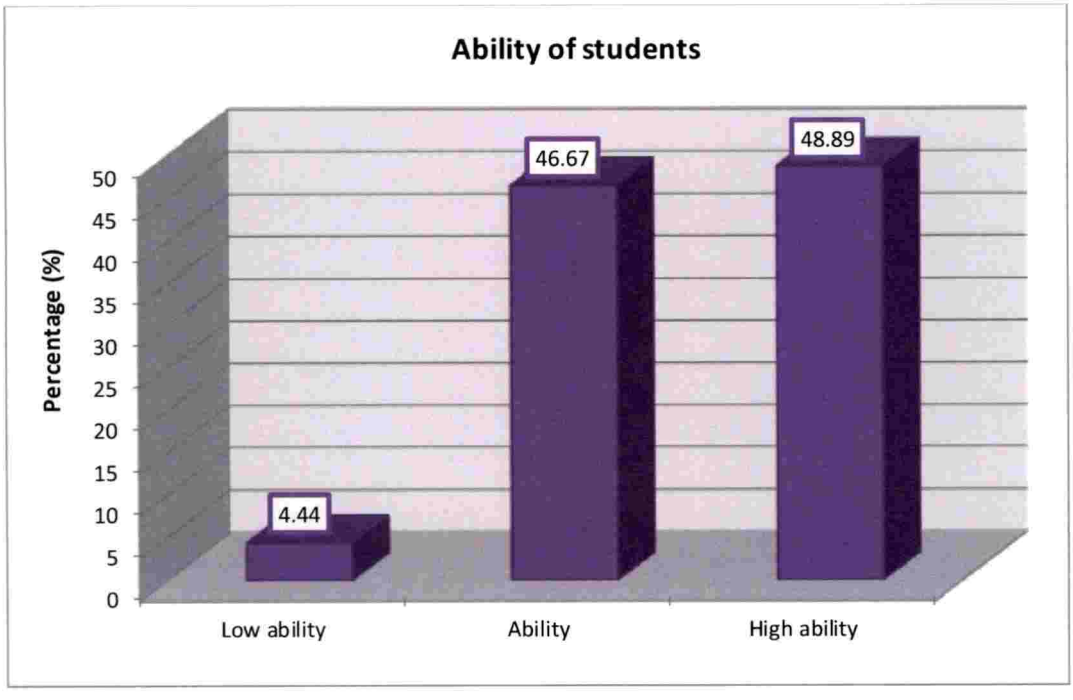

Fig.43: Percentage distribution based on ability of the students to do research as perceived by teachers

A cursory look at table 69 revealed that majority *i.e.* 84.44 per cent of the teachers perceived the attitude of students in general to be good followed by 13.33 per cent that found it to be very good and 2.22 perceived that the students have poor attitude towards research. Hence, it can be inferred that 97.77 per cent of the student have good to very good attitude towards research, which was a positive aspect. The teacher's perception on student's attitude towards the conduct of PG research assumes significance, as it is they who guide the student to its fruitful completion.

4.3.3 Ability of students to do research

Ability here refers to the skills the students attained for doing research. The results showing the ability of students to do research as perceived by teachers is illustrated in table 70.

Table 70: Distribution based on the ability of the students to do research as perceived by teachers

N=60 *n=15(no response)

Category	Interval	f	%
Low	13-30	2	4.44
Medium	31-48	21	46.67
High	49-66	22	48.89
Total		45	100
Range=18; Min=13, Max=65			

From the table it was noticeable that 48.89 per cent of the students have high ability to do research followed by 46.67 per cent that have moderate ability and 4.44 per cent have low ability. Henceforth, 95.56 per cent of the students have moderate ability to high ability to do research as perceived by teachers.

Students are to meet the challenges and requirement of global market and their teacher's dedication, commitment and persistent behavior alone can change the attitude of students' towards PG research. It is important for the academic as well as professional career of teacher to be equipped through Faculty

Improvement Programmes with effective approaches and pedagogies for developing positive attitudes toward the research conducted by their students (Waters *et al.*, 1988). This strength of teachers in KAU may have a positive reflection that the students when guided properly will perform research effectively. In addition, through concurrent evaluation of students' attitudes towards the PG research, the teacher may be able to recognize the gaps and needs in terms of modifications to behaviors, attitudes and skills that are required to assist the conduct of research. Thereafter teachers could have perceived that the students responded positively and hence, perceived that the students have a good ability and favourable attitude towards PG research. The results are in agreement to the findings made by Shekdi (1998) in the study on teacher's attitude towards research.

4.4 PERSONAL AND SOCIAL CHARACTERISTICS OF STUDENTS AND TEACHERS

This section contains the distribution of respondents based on the various personal and social characteristics.

4.4.1 Personal and social characteristics of students

The results based on personal and social characteristics of the students are presented based on the following sub-heads:

4.4.1.1 Age
4.4.1.2 Gender
4.4.1.3 Caste
4.4.1.4 Marital status
4.4.1.5 Native places
4.4.1.6 Educational Background
4.4.1.7 Parental annual income
4.4.1.8 Research skills

4.4.1.1 Age

Age in this study is operationally defined as the number of years completed by the respondent at the time of investigation. The age of students were classified into three category based on range and the results are presented in table 71.

Table 71: Distribution of respondents based on age

N=60

Category in years	f	%
22-23	13	21.67
24-25	38	63.33
26-27	9	15.00
Range=2; Min=22; Max=27		

From the table it is clear that 63.33 per cent of the students fall under 24 to 25 years of age, 21.67 per cent were between 22 to 23 years and 15.00 per cent were between 26 to 27 years. The minimum and maximum age was 22 and 27 years respectively.

The reasons behind the age gap might be because some of the students take a year or two year gap for coaching or in search for job after bachelor degree. The other probable reason is the inability of students to complete the work on time.

4.4.1.2 Gender

Gender in this study is operationalized as the distinction between male and female. The results are presented in table 72.

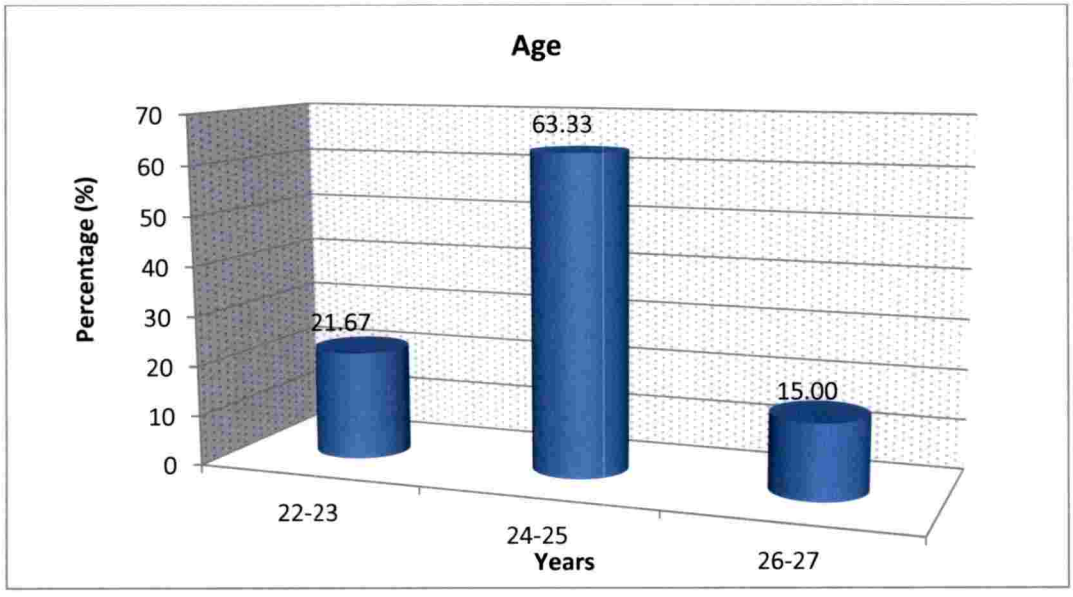

Fig.44: Percentage distribution of student respondents based on age

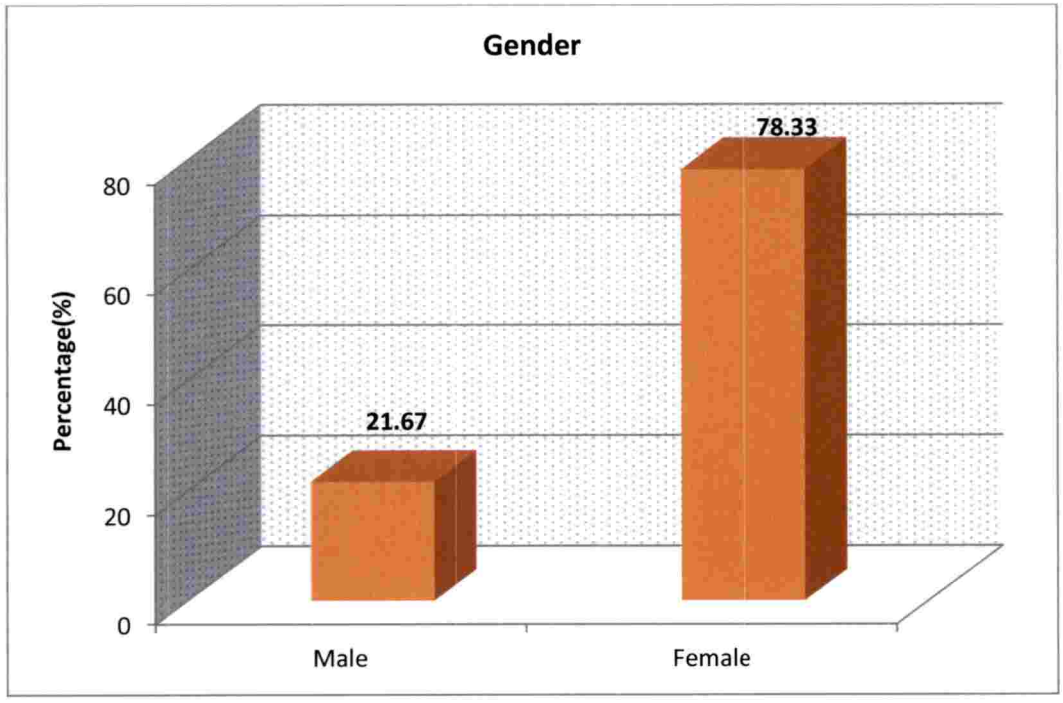

Fig.45: Percentage distribution of student respondents based on gender

Table 72: Distribution of respondents based on gender

N=60

Sex	f	%
Male	13	21.67
Female	47	78.33
Total	60	100

On analysis it was understood that majority (78.33 per cent) of the students were female and only 21.67 per cent male. This indicated that female usually go for higher studies after bachelor degree compared to male that are more oriented to job and also the reason that females are getting qualified in more numbers than male for higher education in agriculture.

4.4.1.3 Caste

Caste in this study is operationalized as a social category to which a person belongs involuntarily *viz.,* Schedule Caste (ST), Schedule Tribes (ST), Other Backward Classes (OBC), General (Gen) and others. The results are presented in table 73.

Table 73: Distribution of respondents based on caste

N=60

Caste	f	%
Schedule Caste (SC)	6	10.00
Schedule Tribes (ST)	1	1.67
Other Backward Classes (OBC)	24	40.00
General (Gen.)	29	48.33
Total	60	100

A cursory look at the table revealed that 48.33 per cent of the students belonged to General category, 40.00 per cent belonged to Other backward classes (OBC), 10.00 per cent belonged to Schedule Caste (SC) and only 1.67 per cent

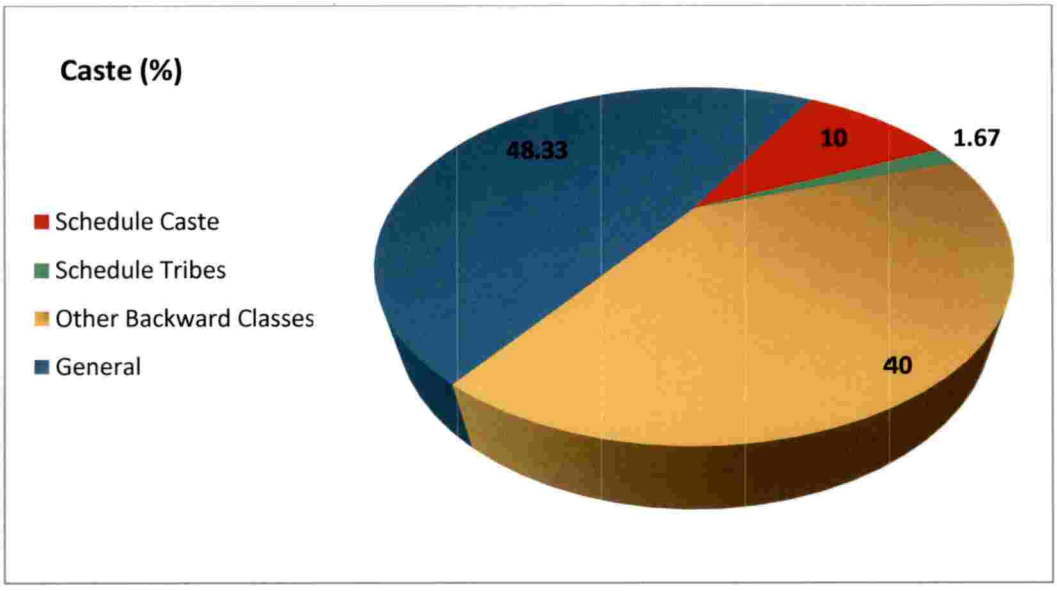

Fig.46: Percentage distribution of respondents based on caste

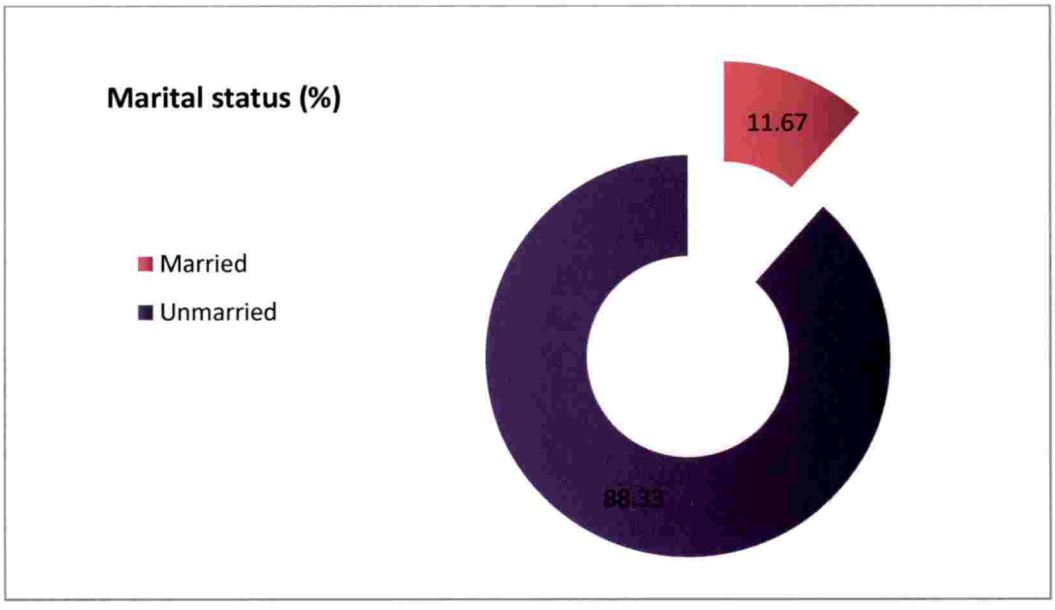

Fig.47: Percentage distribution of respondents based on marital status

belonged to Schedule Tribe (ST) which showed that more students from ST and SC category have opportunity to qualify and pursue higher studies in agriculture.

4.4.1.4 Marital status

Marital status in this study refers to the respondent state of being married or not married at the time of investigation. The outcome of the study is illustrated in table 74.

Table 74: Distribution of respondents based on marital status

N=60

Category	f	%
Married	7	11.67
Unmarried	53	88.33
Total	60	100

The above table showed that 11.67 per cent was married and about 88.33 per cent of the students were unmarried. It is understandable since most of the students pursuing Master's degree were below 25 years of age.

4.4.1.5 Native places

Native places refer to the village, town or city that the respondents are innate. The results are presented in table 75.

Table 75: Distribution of respondents based on native places

N=60

Items	f	%
Village	27	45.00
Town	21	35.00
City	12	20.00
Total	60	100

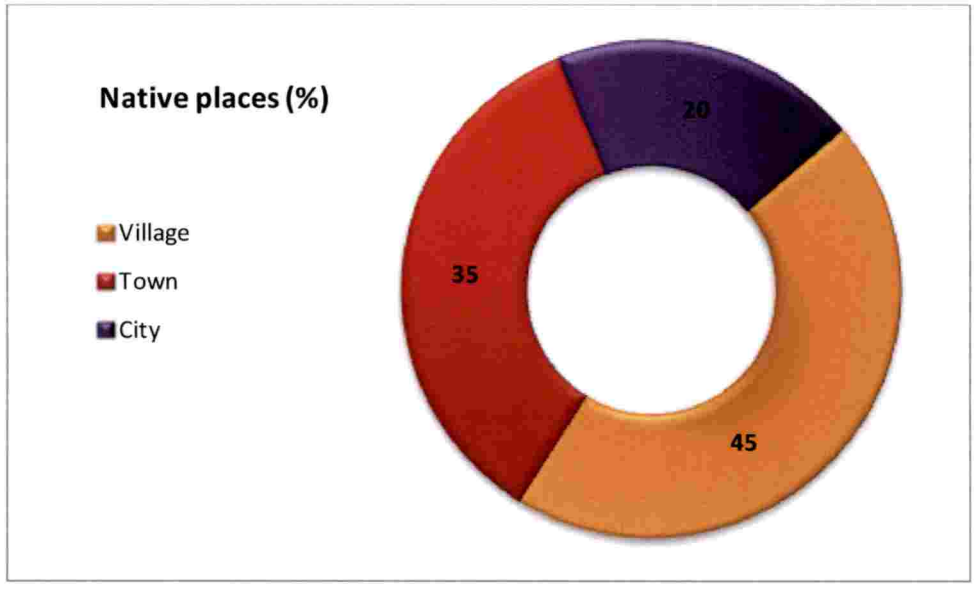

Fig.48: Percentage distribution of respondents based on native places

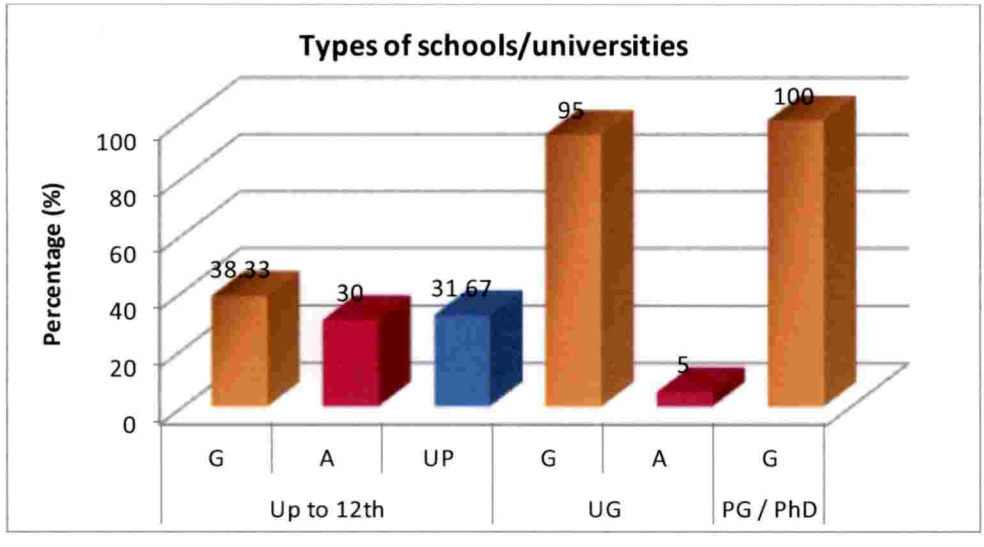

Fig.49: Percentage distribution of respondents based on the types of schools/ universities

From the above table it can be inferred that that 45.00 per cent of the student respondents belonged to village followed by 35.00 per cent from town and only 20.00 per cent from city. It shows that nearly 50 per cent of students come from agricultural backgrounds which indirectly contribute a positive attitude and likeness towards PG research.

4.4.1.6 Educational Background

Educational background in this study refers to the education the respondents have undergone. The outcome of the study is presented in table 76.

Table 76: Distribution of respondents based on types of schools or universities

N=60

Category	Types of Schools/ Universities	f	%
Up to 12th	G	23	38.33
	A	18	30.00
	UP	19	31.67
	Total	60	100.00
UG	G	57	95.00
	A	3	5.00
	Total	60	100.00
PG / PhD	G	60	100.00
	Total	60	100.00

On analysis of table 76, it was understood that 38.33 per cent of the students studied in government school up to twelfth class followed by 31.67 per cent in unaided private and 30.00 per cent in aided private. It was heartening to note that vast majority (95.00 %) of the students completed their undergraduate from government colleges and only 5.00 per cent from aided or private colleges. All the respondents did their PG/PhD in government colleges itself.

Table 77: Distribution of respondents based on medium of instructions during schooling

N=60

Types of medium	f	%
English	47	78.33
Vernacular	13	21.66
Total	60	100

Regarding the medium of instructions during schooling it was observed from the above table that 78.33 per cent of the students come from English medium and only 21.66 per cent from their vernacular medium. This shows that Private English medium schools are gaining popularity throughout India as English is the global language and many poor families too are sending their children to English medium schools due the poor quality of education in Government run vernacular medium schools.

4.4.1.7 Parental annual income

Parental annual income in this study can be operationalized as the income in rupees per annum earned by student's parents. The results as perceived by students are presented in table 78.

Table 78: Distribution of respondents based on parental annual income

N=60

Category (in lakhs)	f	%
Above mean (>3.7)	27	45.00
Below mean (<3.7)	33	55.00
Mean=3.7 lakh	60	100

The above results revealed that 55.00 per cent of the students perceived their parental annual income to be less than 3.7 lakhs with mean as check and

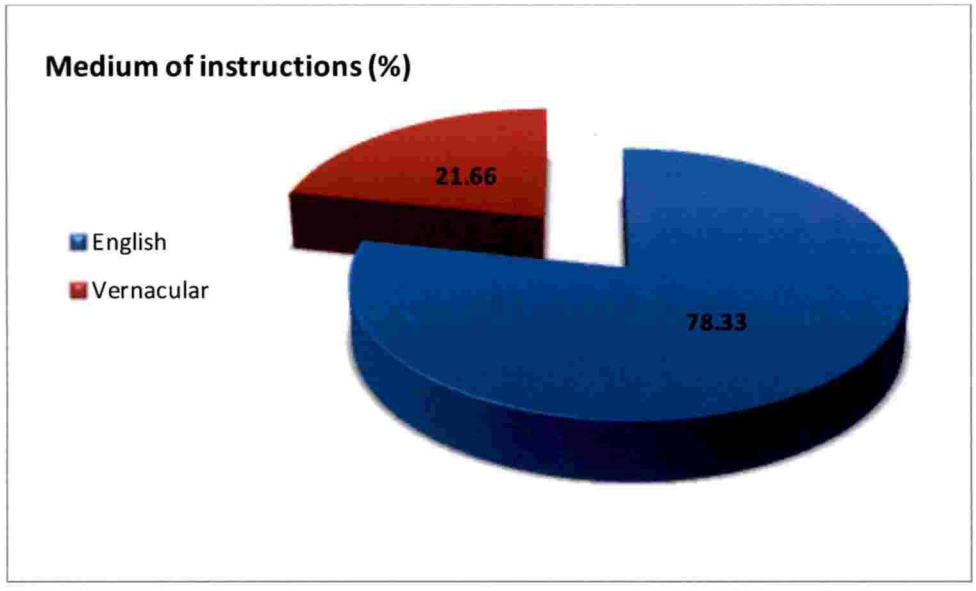

Fig.50: Percentage distribution of respondents based on medium of instructions during schooling

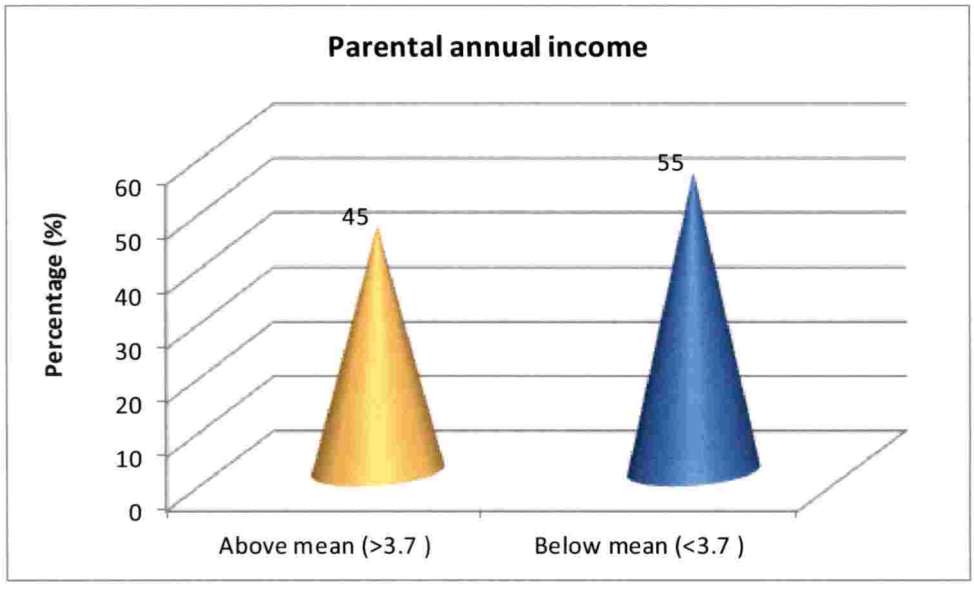

Fig.51: Percentage representation of parental annual income as perceived by students

45.00 per cent perceived it to be above 3.7 lakh. This indicates that majority of the students come from a low economic background considering the living conditions that exist in Kerala.

4.4.1.8 Research skills

Research skills in this study refer to the ability to search for, locate, extract, establish, evaluate and use of present information that is relevant to a particular topic. The results are illustrated in table 79.

Table 79: Distribution on research skills as perceived by students

N=60

Category	Class limits	f	%
Information seeking skills			
High (M + SD)	>55	7	11.67
Medium (M± SD)	45-55	45	75.00
Low (M-SD)	<45	8	13.33
Total		60	100
M=49.87; SD=4.89; SE=0.63			
Methodology skills			
High (M + SD)	>55	6	10.00
Medium (M± SD)	42-55	45	75.00
Low (M-SD)	<42	9	15.00
Total		60	100
M=48.10; SD=6.58; SE=0.85			

On perusal of the above table it was found that the research skills were categorized into two parts *viz.* information seeking skills and methodology skill. The table revealed that 75.00 per cent of the students have an average information seeking skills followed by 13.33 per cent and 11.67 per cent that have both low and high information seeking skills respectively. Likewise, 75.00 per cent of the students had moderate methodology skills followed by 15.00 per cent and 10.00

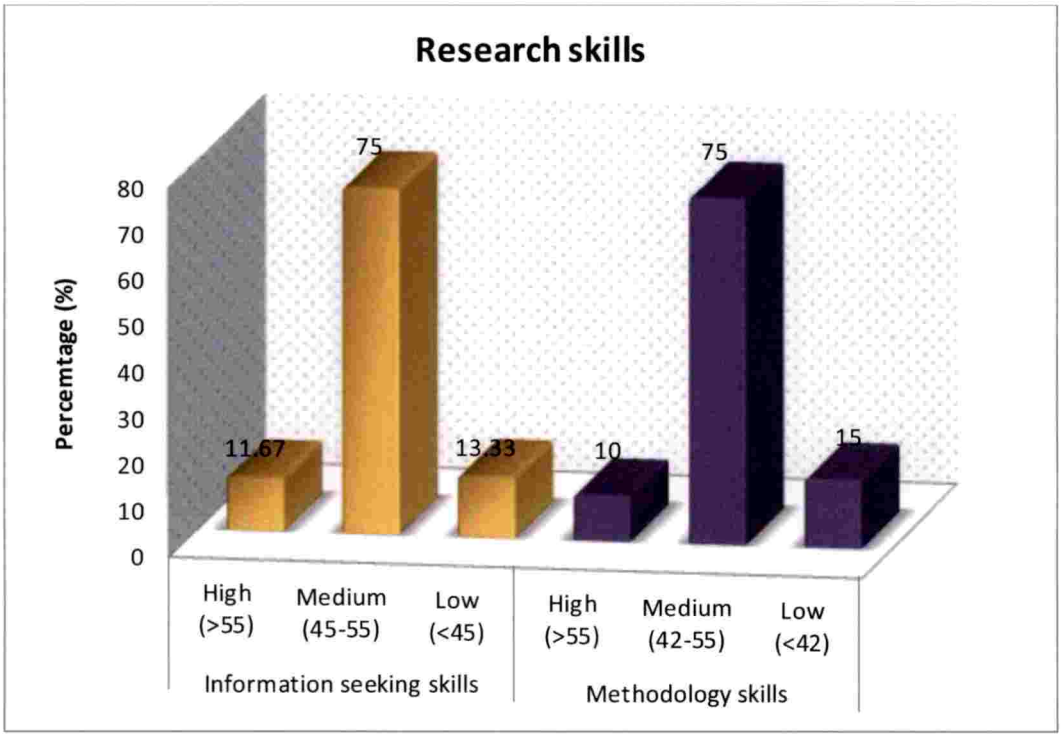

Fig.52: Percentage distribution on research skills as perceived by students

per cent that have low and high methodology skills respectively. The moderate to high methodology skills of the students might be due to the existing system of three level preparations and presentation of research problem through DP, CLC and FRC system of KAU.

4.4.2 Personal and social characteristics of teachers

The results regarding the personal and social characteristics of the teachers are presented under the following sub-heads:

4.4.2.1 Age
4.4.2.2 Gender
4.4.2.3 Educational qualifications
4.4.2.4 Guideship commencement
4.4.2.5 Number of students guided
4.4.2.6 Number of students currently guiding
4.4.2.7 Externally aided project

4.4.2.1 Age

Age in this study is operationally defined as the number of years completed by the respondent at the time of investigation. The results are presented in table 80.

Table 80: Distribution of respondents based on age

N=60 *n=15(no response)

Category	f	%
42-47	19	42.22
48-53	16	35.56
54-59	10	22.22
Total	45	100

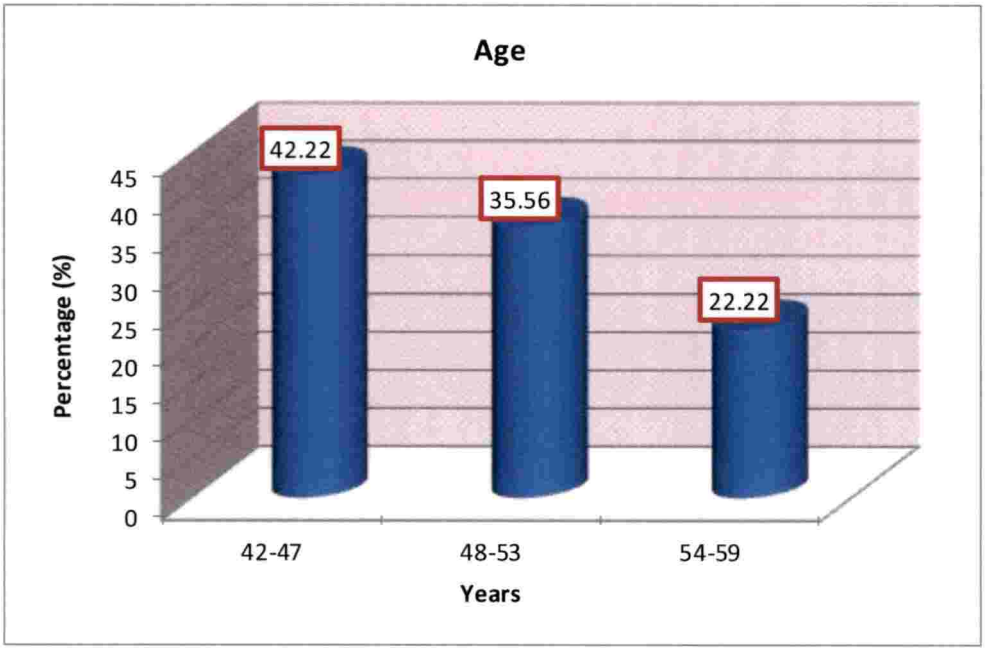

Fig.53: Percentage distribution of teacher respondents based on age

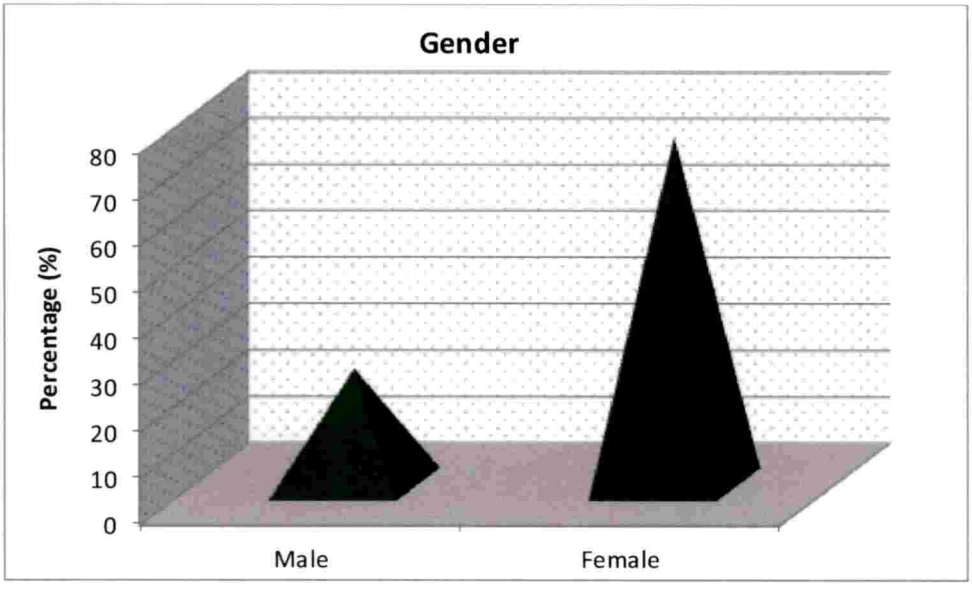

Fig.54: Percentage distribution of teacher respondents based on gender

From the table it was understood that 42.22 per cent of the teacher respondents fall under the age group 42 to 47 years, 35.56 per cent were between 48 to 53 years of age and 22.22 per cent were found to be 54 to 59 years.

Hence, it can be concluded that majority of the teachers were more than forty years of age where in around 80 per cent of teachers in the age category 42 to 53 with a lot more years of service. The result of the study was in line with that of Jand (1975).

4.4.2.2 Gender

Gender in this study is operationalized as the distinction between male and female. The result is designated in table 81.

Table 81: Distribution of respondents based on gender

N=60

Gender	f	%
Male	15	25.00
Female	45	75.00

From the table it was understood that 75.00 per cent of the teachers were female and only 25.00 per cent were male. This indicated that female tends to opt for teaching profession rather than male. More over the newly enrolled teachers to the university system is in tandem and proportion to the higher percentage of girls pursuing higher education in agriculture.

4.4.2.3 Educational qualifications

Education in this study refers to the extent of formal education possessed by the respondent at the time of survey. The results are presented in table 82.

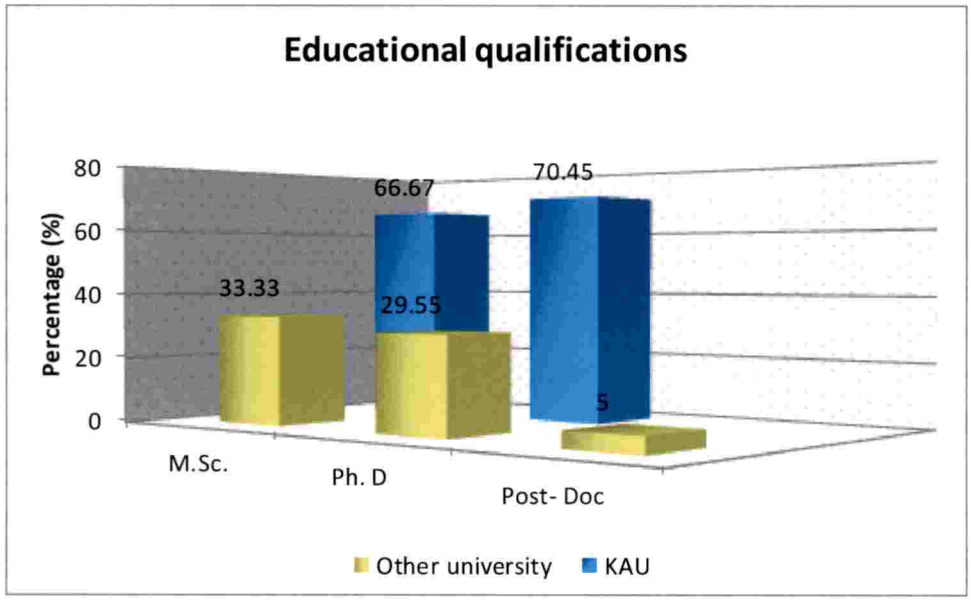

Fig.55: Percentage distribution of teacher respondents based on educational qualifications

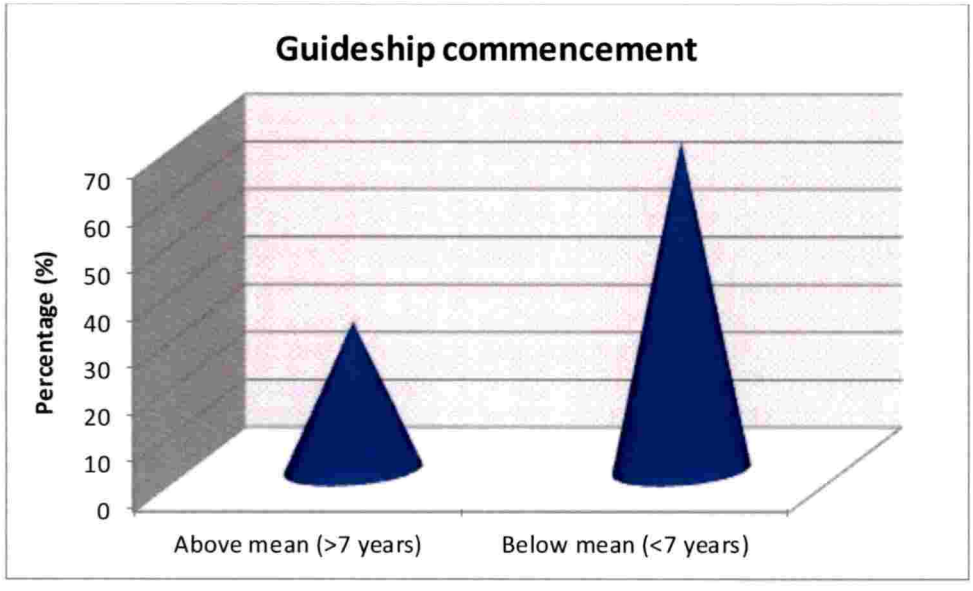

Fig.56: Percentage distribution of teacher respondents based on guide ship commencement

Table 82: Distribution of respondents based on educational qualifications

N=60 *n=15(no response)

Sl. No.	Category	Sub -Category	f	%
1	Master of science (M.Sc.)	KAU	30	66.67
		Other	15	33.33
		Total	45	100
2	Doctor of Philosophy (Ph. D)	KAU	31	70.45
		Other	13	29.55
		Total	44	100
3	Post- Doctorate		3	5.00

The above table showed that 66.67 per cent of the teachers did their master degree in KAU and 33.33 per cent in other university. 70.45 per cent did their PhD in KAU itself and 29.55 per cent in other university. It was also observed that only three of the respondents have done their Post-doc. Since, almost all of the teachers have completed their Ph.D, this might have helped the students to develop a positive outlook on research and higher education as well. The results are on line with studies of Munshi (1989) and Ardeshana (1990).

4.4.2.4 Guideship commencement

Guideship commencement in this study can be operationalized as the number of years of experience completed by the teachers at the time of starting the guideship. The result is presented in table 83.

Table 83: Distribution of respondents based on guideship commencement

N=60 *n=15(no response)

Category	Guideship commencement (Years)	f	%
Above mean	>7 years	14	31.11
Below mean	<7 years	31	68.88
Total		45	100

A cursory look at the table revealed that 68.88 per cent of the teachers started guiding within seven years of their entry into service and 31.11 per cent start guiding after seven years with mean values of their results as check.

4.4.2.5 Number of students guided

It refers to the total number of PG and Ph.D. students the teachers have been guiding. The results are presented in table 84.

Table 84: Distribution of respondents based on number of students guided

N=60 *n=15(no response)

Category	Number of students guided	f	%
Above mean	>6 students	16	35.55
Below mean	<6 students	29	64.45
Total		45	100

On perusal of table 84 it was observed that 64.45 per cent of the teachers have guided more than six PG and PhD students and 35.55 per cent have guided less than six students. The results were formulated based on the mean number of students guided as a checked.

4.4.2.6 Number of students currently guiding

It refers to the total number of PG and Ph.D. students the teachers were currently guiding. The outcome of the study is presented in table 85.

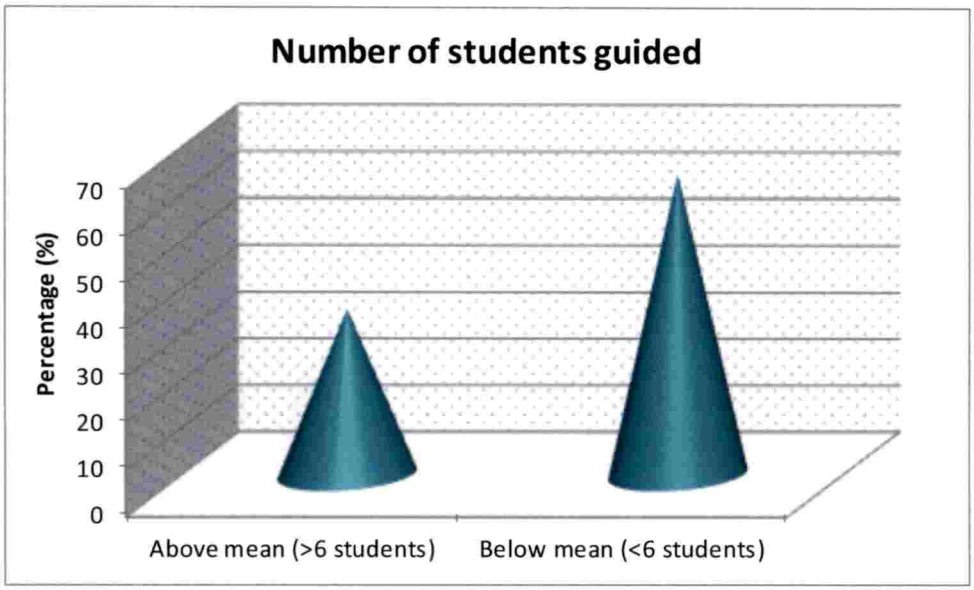

Fig.57: Percentage distribution based on number of students guided

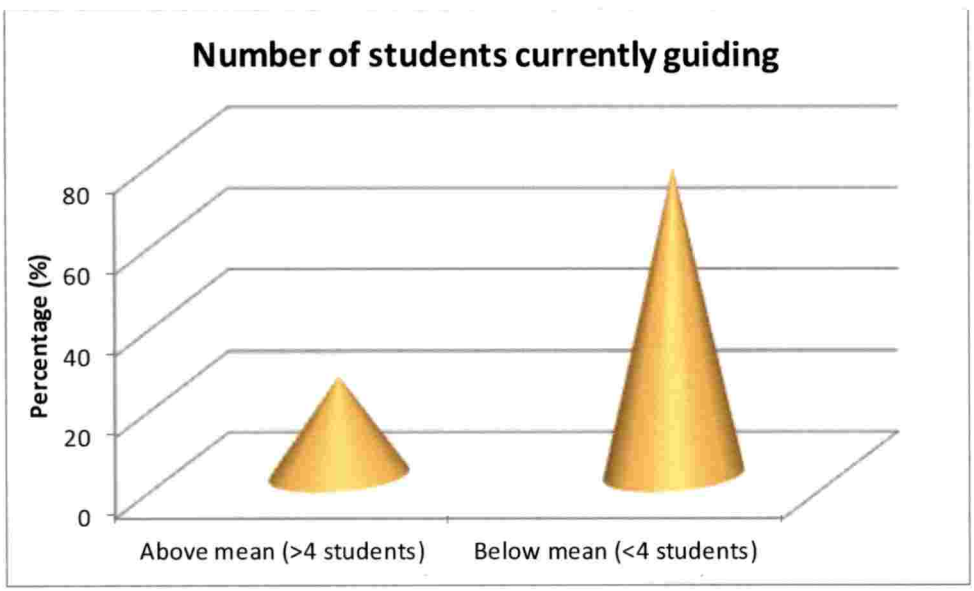

Fig.58: Percentage distribution based on number of students currently guiding

Table 85: Distribution of respondents based on number of students currently guiding

N=60 *n=15(no response)

Category	Number of students currently guiding	f	%
Above mean	>4 students	11	24.44
Below mean	<4 students	34	75.56
Total		45	100

Table 85 revealed that less than four ongoing PG/PhD students have been allotted to 75.56 per cent of the teachers and 24.44 per cent of the teacher's guide more than four students respectively. This shows that due to limited staff some of the teachers may have to guide more students, which can affect the quality of research work. Moreover, it signals to the need of recruiting more qualified candidates in agricultural university and also probe qualified hands from research station to get involved in PG research guidance.

4.4.2.7 Externally aided project

Externally aided projects refer to the projects that were finance by the State government or any other agencies in the states for augmenting the States' resources and play an important role in the development process. The result was illustrated in table 86.

Table 86: Distribution of respondents based on number of externally aided project as PI

N=60 *n=15(no response)

Externally aided project (in numbers)		Projects per teachers
PI	123	2.73

The above table uncovered that a total of 123 externally aided projects were undertaken by the teachers as Principal Investigators (PI). This also indicated that on an average approximately three projects were undertaken per teachers, which indicated the research ability and experience of the PG guide.

4.5 OTHER IMPORTANT VARIABLES OF THE STUDY

The results of the variables as per the researcher's interest were presented under the following heads namely; resource availability as perceived by students and teachers; resource attainment difficulty as perceived by students and teachers research work environment; acquaintance support as perceived by students; researcher satisfaction; publishing difficulty; usefulness of conferences or seminars as perceived by students in table 87, 88 and 89.

Table 87: Distribution of respondents based on the resource availability, resource attainment difficulty, research work environment, acquaintance support, researcher satisfaction, publishing difficulty, usefulness of conference or seminars

Category	Score	Students (N=60)		Teachers N=60 *n=15(no response)	
		f	%	f	%
Resource availability Resource availability refers to the availability of fund, research material, raw materials and literature for the purpose of conducting research					
Yes	1	34	56.67	37	82.22
No	0	26	43.33	8	17.78
Total		60	100	45	100
Resource attainment difficulty Resource attainment difficulty refers to the difficulty in attaining the fund, research material, raw materials and literature for the purpose of conducting research					
Yes	1	47	78.33	16	35.56
No	0	13	21.67	29	64.44
Total		60	100	45	100.00

Research work environment Research work environment in this study refers to the surrounding conditions in which the researchers work.					
Yes	1	60	100	-	-
No	0	0	0	-	-
Total		60	100	-	-
Acquaintance support Acquaintance support in this study refers to the extent of help the students received from his/her chairman, advisory committee members, peers and non-members, own department and other departments.					
Yes	1	60	100	-	-
No	0	0	0	-	-
Total		60	100	-	-
Researcher satisfaction Researcher's satisfaction refers to a short-term attitude resulting from an evaluation of students' educational experience, services and facilities					
Yes	1	52	86.67	-	-
No	0	8	13.33	-	-
Total		60	100.00	-	-
Publishing difficulty as perceived by students It refers to the difficulty that the students encountered while giving the paper for publishing.					
Yes	1	42	86.67	-	-
No	0	18	13.33	-	-
Total		60	100.00	-	-
Usefulness of conferences or seminars It refers to the extent of usefulness the students perceived from attending conferences or seminars.					
Yes	1	22	36.67	-	-
No	0	38	63.33	-	-
Total		60	100	-	-

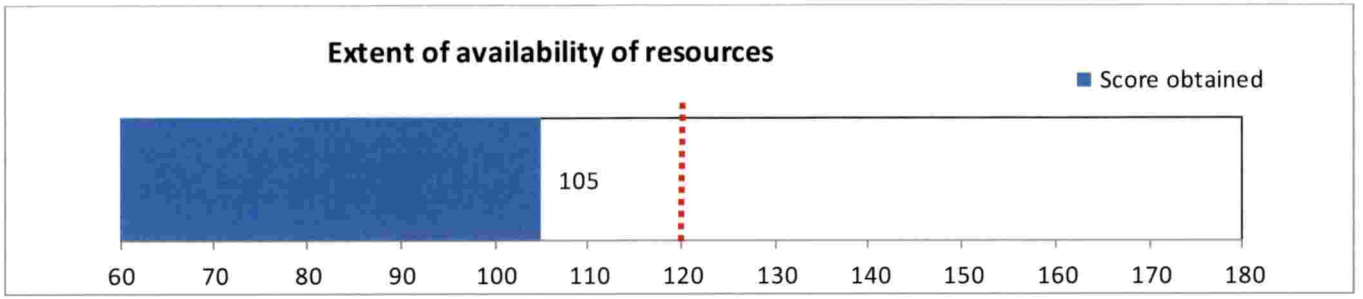

Fig.59: Representation of extent of availability of resources as perceived by students

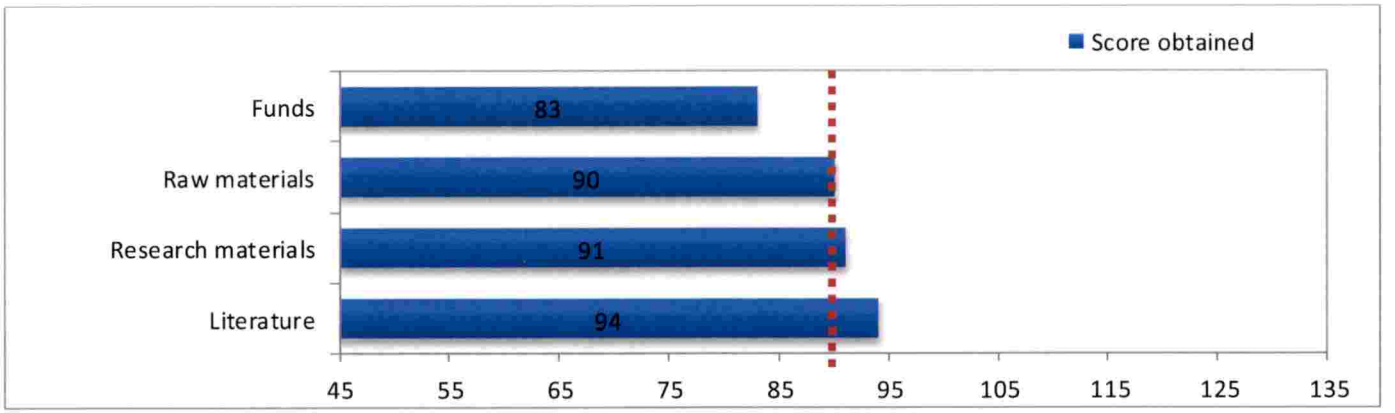

Fig.60: Representation of extent of availability of resources as perceived by teachers

A cursory look at table 87 revealed that regarding the question of 'whether the resources are available or not' 82.22 per cent of the teachers professed that resources were available followed by 56.67 per cent of the students whereas 43.33 per cent of the students said that resources were not available followed by 17.78 per cent that of teachers. Regarding the resource attainment difficulty, 78.33 per cent of the students faced difficulty in attaining the resources compared to 64.44 per cent teachers who believed that there is no difficulty in attaining the resources. All the students perceived that the research work environment was workable and also all have received help and support from their acquaintances. It was also found that 86.67 per cent of the researchers were satisfied with their research work whereas 13.33 per cent were not satisfied. Similarly, 86.67 per cent of the student found it difficult to publish their research work and only 36.67 per cent of the students have attended seminars, conferences and like and the rest 63.33 per cent have not attended.

Table 88: Distribution of respondents based on the extent of resource availability, resource attainment difficulty, research work environment, acquaintance support, researcher satisfaction, publishing difficulty, usefulness of conference or seminars

Students (N=60)			
Category	**Score**	**f**	**%**
Extent of availability of resources as perceived by students			
Very much available	3	4	6.67
Available	2	37	61.67
Less available	1	19	31.67
Total		60	100
Maximum score=180; Minimum score=60; Mean= 120; Score obtained=105			
Extent of difficulty in attaining the resources as perceived by students			
Very Difficult	1	8	13.33
Difficult	2	37	61.67
Less Difficult	3	15	25.00
Total		60	100.00
Maximum score=180; Minimum score=60; Mean=120; Score obtained=127			

Extent of research work environment			
Very Much	3	15	25.00
Much	2	28	46.67
Not much	1	17	28.33
Total		60	100
Maximum score=180; Minimum score=60; Mean=120; Score obtained=118			
Extent of support from acquaintances as perceived by students			
a) **Peers**			
Very Much	3	31	51.67
Much	2	22	36.67
Not Much	1	7	11.67
Total		60	100
Score obtained	144		
b) Chairman			
Very Much	3	49	81.67
Much	2	7	11.67
Not Much	1	4	6.67
Total		60	100
Score obtained	165		
c) Advisory members			
Very Much	3	23	38.33
Much	2	27	45.00
Not Much	1	10	16.67
Total		60	100
Score obtained	133		
d) Other non-members			
Very Much	3	11	18.33
Much	2	30	50.00
Not Much	1	19	31.67
Total		60	100
Score obtained	112		
Maximum score=180; Minimum score=60; Mean=120			
e) Own department			
Very much	3	47	78.33
Much	2	11	18.33
Not much	1	2	3.33

Total		60	100
Score obtained	165		
f) Other department			
Very much	3	9	15.00
Much	2	25	41.67
Not much	1	26	43.33
Total		60	100
Score obtained	103		
Maximum score=180; Minimum score=60; Mean=120			
Extent of satisfaction of researches as perceived by researchers			
Very much	3	22	36.67
Much	2	35	58.33
Not Much	1	3	5.00
Total		60	100
Maximum score=180; Minimum score=60; Median=120; Score obtained=139			
Extent of difficulty in publishing research paper as perceived by students			
Very difficult	1	9	15.00
Difficult	2	33	55.00
Less difficult	3	18	30.00
Total		60	100.00
Maximum score=180; Minimum score=60; Median=120; Score obtained=129			
Extent of usefulness of seminars or conferences as perceived by students			
Very Useful	3	15	25.00
Useful	2	6	10.00
less Useful	1	1	1.67
Not useful	0	38	63.33
Total		60	100
Maximum score=180; Minimum score=0; Mean score=90; Score obtained=58			

Regarding the extent of availability of resources the table revealed that 61.67 per cent of the students said that the resources were available followed by 31.67 per cent that believed it to be less available and only 6.67 per cent of the total respondents perceived it to be very much available. The perception by 31.67 percent of respondent on non or less availability of resources could be due to the

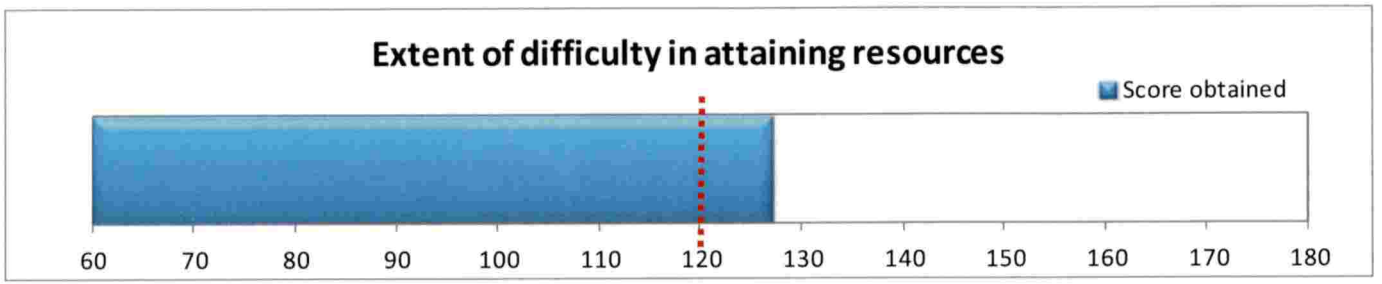

Fig.61: Representation of extent of difficulty in attaining the resources as perceived by students

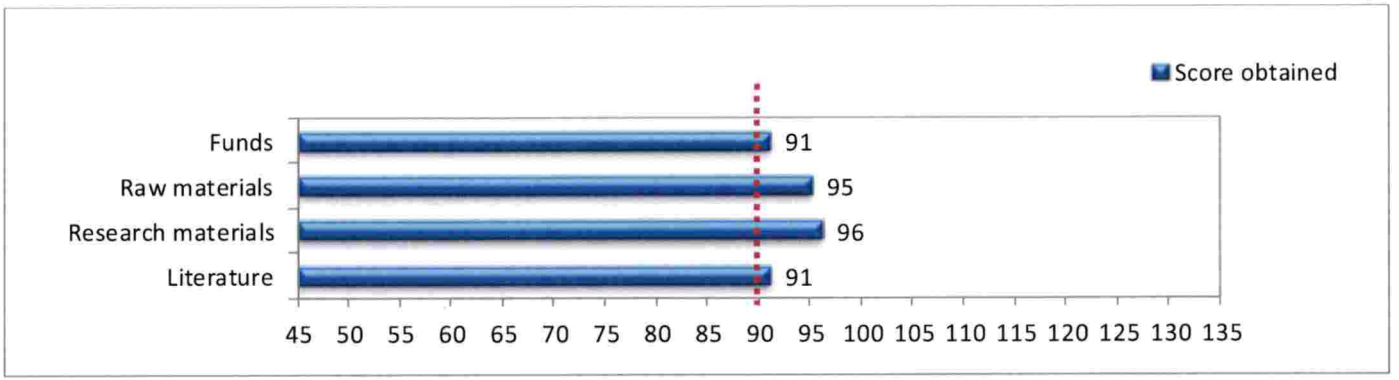

Fig.62: Representation of extent of difficulty in getting resources as perceived by teachers

contingent situations of resource availability for a particular component of research or some other barriers that makes delivery of resources untimely and impossible. The study supported the views of Hemminger *et al.* (2007) who opined that some of the researchers have different perception regarding the availability of resources because they feel that they do not find all the information and materials on the topic or resources they are searching.

Regarding the extent of difficulty in attaining the resources, more than half *i.e.* 61.67 per cent of the students faced difficulty in attaining the resources followed by 25.00 per cent that encountered less difficulty and 13.33 per cent responded that they found it very difficult. The overall score obtained is found to be above median score. The reasons could be due to untimely disbursement of fund and because most of the resources like raw materials and research materials were not made available on time.

Regarding the research work environment, almost fifty per cent i.e. 46.67 per cent and 25.00 per cent of the students found that research work environment to be much workable to very much workable followed by 28.33 per cent who found it to be not much workable. If the research work environment was not workable, it affects not only the behaviour of an individual researcher but also on how the officialdoms themselves interact (Gilmer, 1966). The work atmosphere is one of the factors that influence the researcher's performance (Prakasam, 1979). This study too supports their views.

Regarding the acquaintance support, majority of the students *i.e.* 93.34 per cent expressed that they got much to very much help and support from chairman which is on par with Natekar (2013) followed by 88.34 per cent from peers, 83.33 per cent from advisory members and 68.33 per cent from other non-members which indicated that there is a good relationship between the acquaintance. Only 31.67 per cent, 16.67 per cent, 11.67 per cent and 6.67 per cent perceived that they did not get that much support from other non-members, advisory members, peers and chairman respectively. Almost all *i.e.* 96.66 per cent perceived that contribution were from

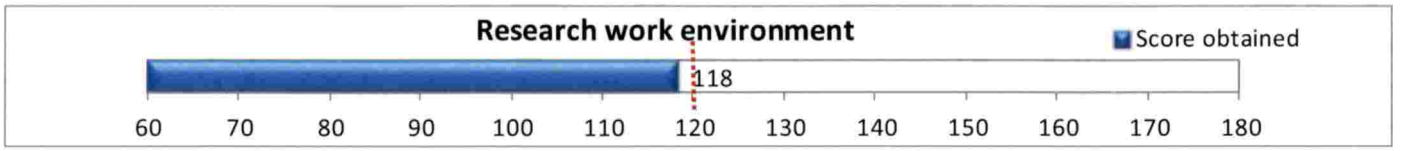

Fig.63: Representation of the workability of research work environment

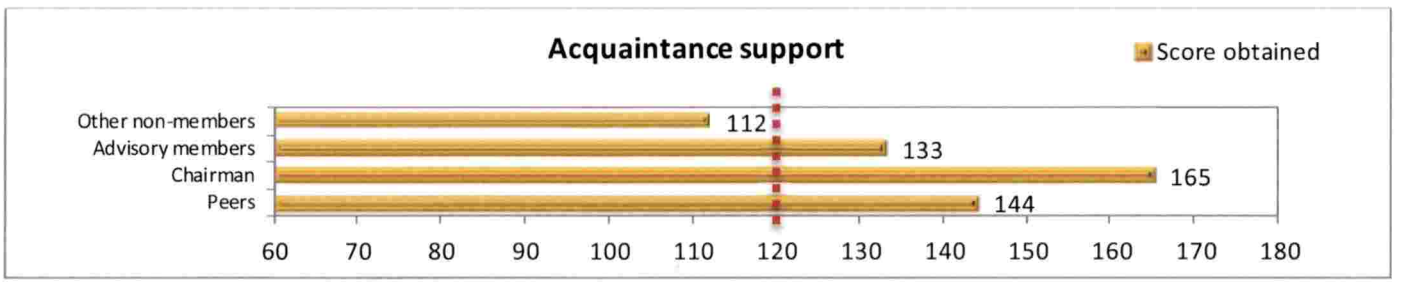

Fig.64: Representation of the acquaintance support as perceived by students

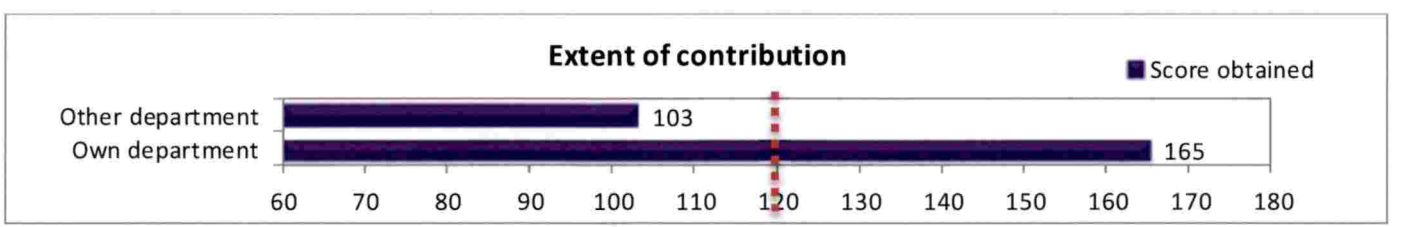

Fig.65: Representation of extent of contribution of department as perceived by students

own department were much to very much. More than fifty per cent *i.e.* 56.67 per cent said that they got much to very much help from other department which implies that some of the research works were not confined only to one department but other department also and the student's perception revealed that the staff and faculty of the other departments were helping them. The 43.33 per cent left might have perceived that they get support from their own department which was more than enough for the completion of their research work.

Regarding the researcher satisfaction, almost all *i.e.* 95.00 per cent of the researchers were satisfied to very much satisfy with their research work. This shows that one reason for researcher satisfaction could be because they are doing research in their area of choice and interest with adequate support from faculty and advisory body, which might have refined their mental state.

Regarding the publishing difficulty, it was found that 67.34 per cent of the students faced difficulty to very difficult situation to publish their research paper followed by 32.65 per cent that with less difficult. The score obtained was below the median score. The availability of paid journals in plenty and non-availability of unpaid journals might act as a barrier for students to publish their research work. In order to publish in high reputed journals with high impact factor like Elsevier, Springer, Wiley and like the paper submitted will have to undergo the peer review process where 3 to 4 experts will individually go through the paper and if they find it relevant and interesting only then it will be considered for further publication. The subject matter that the researchers are working also matters. Also this process is time consuming.

Regarding the extent of usefulness of seminar or conferences 63.33 per cent said that it was not useful, 35 per cent said it was useful to very useful. Lack of awareness about the benefits of attending seminar or conferences might be the reasons that more than sixty per cent of the students found it not useful. This is also an indication that students need to be conscientised about the benefits of these and be motivated to attend seminars/ conferences during their student

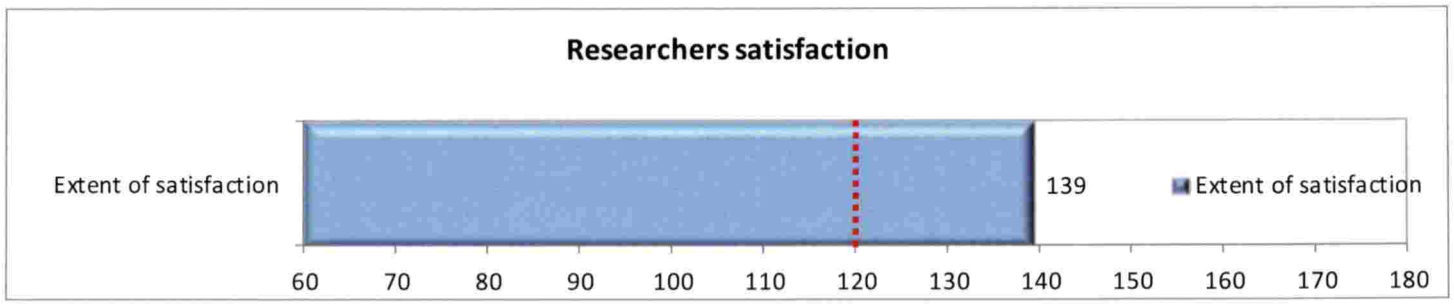

Fig.66: Representation of extent of satisfaction as perceived by the researchers

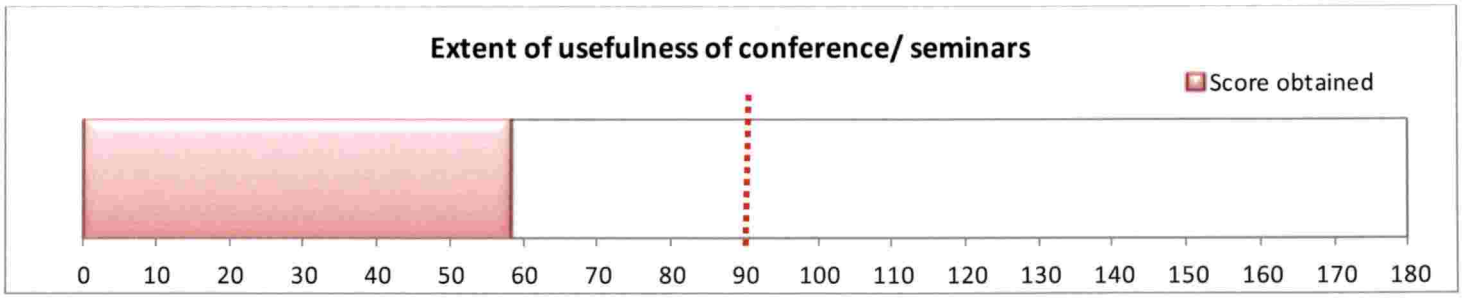

Fig.67: Representation of extent of usefulness of conference/ seminars as perceived by students

tenure. This was also on par with the above results which showed that more than sixty per cent *i.e.* 63.33 per cent of the students have not attended any seminars or conferences. Hence the study emphasized the need to aware the students on the numerous benefits from attending the seminars or conferences that could refine their communication skills, gaining proficient knowledge, networking with others and renovating enticement and confidence.

Table 89: Distribution on extent of availability of resources and extent of difficulty in attaining the resources as perceived by teacher

Teachers [N=60 *n=15(no response)]									
Category	**Score**	**Literature**		**Research materials**		**Raw materials**		**Funds**	
		f	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Extent of availability of resources as perceived by teacher									
Very much available	3	7	15.56	5	11.11	5	11.11	3	6.67
Available	2	35	77.78	36	80.00	35	77.78	32	71.11
Not much available	1	3	6.67	4	8.89	5	11.11	10	22.22
Total		45	100	45	100	45	100	45	100
Score obtained		94		91		90		83	
Maximum score=135; Minimum score=45; Mean=90									
Extent of difficulty in attaining the resources as perceived by teacher									
Very difficult	1	7	15.56	7	15.56	6	13.33	10	22.22
Difficult	2	30	66.67	25	55.56	28	62.22	24	53.33
Less difficult	3	8	17.78	13	28.89	11	24.44	11	24.44
Total		45	100	45	100	45	100	45	100
Score obtained		91		96		95		91	
Maximum Score=135; Minimum Score= 45; Median =90									

The above table revealed that more than 70 per cent of the teachers *i.e.* 77.78 per cent, 80.00 per cent, 77.78 per cent and 71.11 per cent stated that literature, research materials, raw materials as well as funds were available whereas 15.56 per cent said that literature were very much available followed by 11.11 per cent for both research materials and raw materials and only 6.67 per cent for fund. Only 22.22 per cent responded that funds were not that much

available followed by 11.11 per cent, 8.89 per cent and 6.67 per cent for raw materials, research materials and literature.

The results pertaining to the availability of research materials and funds were in partial agreement with the findings of Malik (1988) and Patel (1992). As majority of the students were in the opinion that the literatures were available to very much available, it shows that the students were aware of the online sources like e-journals, internet sources and e-books as indicated by Edem (2016).

It is inferred from the above table that more than fifty per cent (66.67, 55.56, 62.22 and 53.33 per cent) of the teachers perceived that there is difficulty in attaining the resources (literature, research materials, raw materials and funds). Also 24.44 per cent found it very difficult to get the funds followed by 15.56 per cent for literature and research materials and 13.33 per cent for raw materials. Almost thirty per cent *i.e.* 28.89 per cent said it was less difficult to get the research material followed by 24.44 per cent for funds and raw materials and 17.78 per cent for literature.

The challenges in attaining the literature could be due to the unavailability of internet connection, registration fees is needed to access to online journals and for difficulty in attaining the research materials the reasons could be due to costly lab equipment's, untimely disbursement and reimbursement of funds. Some raw materials like seeds and fertilizers are difficult to attain because it was not available in the university and the students have to acquire it from research stations or from other agricultural universities.

4.6 CONSTRAINTS OF PG RESEARCH

The constraints as perceived by both students and teachers were recorded and categorized based on commonality and the ranking were given for each constraint based on percentages. The results are presented in table 90 and 91 respectively.

A perusal of the table 90 revealed that the major constraints perceived by students were lack of proper infrastructure facilities with 68.33 per cent followed by scarcity of land, labour and capital with 53.33 per cent, privation of flexibility with approved technical programme with 51.67 per cent, lack of library facilities and access to the latest literature with 48.33 per cent, lack of freedom in choosing the research problems with 41.67 per cent, limited lab timing with 31.67 per cent, lack of knowledge on statistical analysis of data with 30.00 per cent, lack of need based research, interdisciplinary research, farmer affable research and field research with 28.33 per cent, difficult to get response from respondents during data collection with 11.67 per cent lack of training and pest incidence with 10.00 per cent each, lack of knowledge about methodology and too much emphasis on relevant academic formalities with 8.33 per cent, accurate data is not given by the farmers with 6.67 per cent, large sample size with 5.00 per cent, insufficiency of data, difficulty in understanding the psychology of farmers or any respondents and software for data analysis is very costly with 3.33 per cent each, uncertainty about the research during early stages, difficult to get secondary data from department officials and repetition of research work with 1.67 per cent each.

Table 90: Constraints as perceived by students

N=60

Sl. No	Constraints perceived by students	f	%	Rank
1	Lack of proper infrastructure	41	68.33	1
2	Scarcity of land, labour and capital	32	53.33	2
3	Privation of flexibility with approved technical programme	31	51.67	3
4	Lack of library facilities and access to the latest literature	29	48.33	4
5	Lack of need based research, interdisciplinary research, farmer affable research and field research	17	28.33	8
6	Lack of training	6	10.00	10.5
7	Limited lab timing	19	31.67	6
8	Lack of knowledge about methodology	5	8.33	12.5

9	Lack of knowledge on statistical analysis of data	18	30.00	7
10	Lack of freedom in choosing research problems	25	41.67	5
11	Insufficiency of data	2	3.33	17
12	Difficulty in understanding the psychology of farmers or any respondents	2	3.33	17
13	Difficult to get response from respondents during data collection	7	11.67	9
14	Large sample size	3	5.00	15
15	Uncertainty about the research during early stages	1	1.67	20
16	Too much emphasis on relevant academic formalities	5	8.33	12.5
17	Accurate data is not given by the farmers	4	6.67	14
18	Difficult to get secondary data from department officials	1	1.67	20
19	Pest incidence	6	10.00	10.5
20	Software for data analysis is very costly	2	3.33	17
21	Repetition of research work	1	1.67	20

Table 91 revealed the constraints as perceived by teachers. It can be noticed from the table that the major constraints as perceived by the teachers were lack of proper infrastructure (77.77%) ranked one, scarcity of land, labour and capital (60%), privation of flexibility with approved technical programme ranked two (57.77%) followed by poor writing skills of students (48.88%), lack of need based interdisciplinary research, farmers affable research and field oriented research (37.77%), lack of library facilities and access to the latest literature (26.66%), lack of follow up trials for recommendation of technology (15.55%), lack of adequate interest in students and lack of proper career guidance (11.11%), unavailability of facilities to analyse the micronutrient at COA, Vellayani or nearby Research Centre (8.88%) lack of cooperation between the faculty, lack of technical staff, urge to complete the work in the stipulated time forfeiting quality of the work and shortage of activities that give wide spread exposure to students like organizing or participating in national/international seminars/ symposia/ exhibitions and alike (6.67 %) and students are unable to focus diet therapy or

community based nutrition since priority was given to food processing and product development research only (2.22%).

Table 91: Constraints as perceived by teachers

N=60 *n=15(no response)

Sl. No.	Constraints perceived by teachers	f	%	Rank
1	Lack of proper infrastructure	35	77.77	1
2	Scarcity of land, labour and capital	27	60.00	2
3	Privation of flexibility with approved technical programme	26	57.77	3
4	Poor writing skills of students	22	48.88	4
5	Lack of need based interdisciplinary research, farmers affable research and field oriented research	17	37.77	5
6	Lack of library facilities and access to the latest literature	12	26.66	6
7	Lack of cooperation between the faculty	3	6.67	12.5
8	Lack of adequate interest in students	5	11.11	8.5
9	Lack of technical staff	3	6.67	12.5
10	Lack of follow up trials for recommendation of technology	7	15.55	7
11	Urge to complete the work in the stipulated time forfeiting quality of the work	3	6.67	12.5
12	Unavailability of facilities to analyse the micronutrient at COA, Vellayani or nearby Research Centres	4	8.88	10
13	Lack of proper career guidance	5	11.11	8.5
14	Shortage of activities that give wide spread exposure to students like organizing or participating in national/international seminars/ symposia/ exhibitions and alike	3	6.67	12.5
15	Students are unable to focus diet therapy or community based nutrition since priority was given to food processing and product development research	1	2.22	15

Hence, from the above results it can be inferred that the common three major constraints in doing PG research as perceived by both students and teachers were lack of proper infrastructure (Rank 1) followed by scarcity of land, labour and capital (Rank 2), privation of flexibility with approved technical programme (Rank 3). Poor writing skill of students (Rank 4) was considered to be an important constraint as discerned by teachers.

The increase in the number of student's intake for Master degree and limited lab equipment's to satiate all the students could be one the reasons that the respondents perceived that lack of infrastructure as the top main constraints. Another reason could be an untimely supply of input based infrastructure like seeds, fertilizers, pesticides and limited farm equipment's, machinery, electricity problem and like. From the previous results it was seen that many of the researches were conducted on field especially for crop production, crop protection and crop improvement division, which might be perceived as the probable reasons for scarcity of land and labour. Students from division of crop production, crop protection and crop improvement usually required more labour for field work and the contingency fund provided was not enough for the completion of the whole research since most of the funds were spent on labour cost and other inputs during the initial stage of the research itself. This prevents the students from doing a quality research and this could also be the reason for them to perceive the scarcity of capital as the top two constraints. Therefore fund can be increased for those particular divisions or should be fixed based on the type of research. Since there is limited flexibility in technical programme a synopsis can be the substitute. Most of the teachers also perceived that poor writing skills of students as the major constraints therefore proper training programme, workshop, research assignments should be encouraged among PG students.

4.7 SUGGESTIONS FOR IMPROVEMENT

The major strategies for improvement as suggested by the teachers were encouraging interdisciplinary need based research, farmer's friendly research and

field research by regular funding, by using land and water efficiently to reduce undesirable influence on the environment and also by ensuring resilience to climate change. Secondly the research process should be made flexible by using flexible design that would allow freedom during data collection. Thirdly, ICAR funds should be utilized appropriately for PG research through creation of a centralized multidisciplinary instrumentation lab. Fourthly, adequate land, labour and capital should be guaranteeing for departments that undertake field experiments. Fifthly, the research topic should be fixed based on data availability. Sixthly, synopsis can be used as an alternative of technical programme. Seventhly, staff with technical background should be recruited. Eighthly, career counselling should be given for students. Ninthly, the students should be motivated to participate in workshop, seminar, conferences or any related academic activities.

4.8 HYPOTHESIS SET UP FOR THE STUDY

A research hypothesis is a statement created by the researcher when they speculate upon the outcome of the experiment. It must be testable and realistic. Hypothesis must be unquestionable to permit a verification or falsification. In this study the hypothesis set and established were:

1. There exist no difference in the perception on usefulness of PG research as perceived by students and teachers.

The results from table 64 and 65 revealed that 97.78 per cent of the teachers and 86.66 per cent students perceived the post graduate research to be useful to very useful personally, for the farming community and institutions. This proves that there exist a difference in the perception of teachers and students towards PG research. Hence the hypothesis was falsified.

2. The content pattern attributes is not appropriate enough to explain the qualitative features of theses submitted by all departments

There were 21 attributes selected for the study, of which 14 attributes selected were similar for all departments whereas 7 attributes were fixed only for Agricultural Extension alone. This proves that the content pattern attributes was not appropriate to explain the qualitative features of the theses submitted for all departments. Hence the hypothesis is accepted. But the hypotheses were falsified in case of content pattern attributes of PG theses of different departments within divisions that were appropriate to explain the qualitative features of the theses.

3. There exists no gap for the future thrust area for PG research as perceived by KAU scientist in relation to ex-post-facto themes covered for the last 10 years.

The results from table 14 revealed that on an average the teachers were satisfied with 70 per cent of the research themes framed by the university which shows that 30 per cent were not satisfied. This proves that there exist gaps for the future thrust areas in relation to ex-post-facto themes covered for the last ten years. Thus the null hypothesis is rejected.

4. The thrust areas framed by the University for PG research is fully touched or covered.

The results from table 9 and table 10 revealed that out of the 22 PC groups identified for period from 2008-2014, 12 PC groups have more than 50 per cent untouched thrust areas and for a period from 2015-2017 there were 17 PC groups of which 11 PC groups were found to have 50 per cent or more untouched thrust areas. This proves that the thrust areas framed by the university under each PC group for PG research were not fully touched. Hence the hypothesis stands rejected.

5. All the sub component construct scores for measuring the attitude of students towards PG research are above the overall median.

The results from table 67 and fig.41 revealed that mean score for 'research anxiety' and 'difficulty of research' were 10.85 and 10.88 respectively which were below the median score 12. This proves that the entire sub components scores for measuring the attitude of students towards PG research were not above the median score. Thus the hypothesis was falsified.

6. All the sub-component constructs of students attitude towards PG research does not have a significant influence on the overall attitude of the students.

The results from table 68 revealed that all the five sub components of attitude namely, research usefulness, research anxiety, positive attitude towards research, relevance to life and difficulty of research were significant at 1 per cent level of significance when correlated with the overall attitude. This proves that all the sub components of attitude have significant relationship when correlated with the overall attitude of students. Thus the null hypothesis is rejected.

SUMMARY

CHAPTER V

SUMMARY

The agricultural research system in India includes some 27,500 scientists and more than one lakh supporting staff actively engaged in agricultural research. So there is a need to transform university agricultural education programs and also encouraged a different approach to research in agricultural education to include a defined program of inquiry. The research and education responsibilities at the state level rest with the State Agricultural Universities. Kerala Agricultural University mainly focuses its strategy on synergizing multi-disciplinary education and strengthening problem specific research, relevant to the state and aims at overall development of all agriculture related institutions. Such is the importance of research and one of its major components is post-graduation research. Therefore, a study is essential to comprehend the pattern of agricultural research that will enable to identify, scientifically document and publish the contribution of KAU made to the agrarian society through PG Research. Hence, this study on content analysis is of great importance and was under taken with the following objectives:

- To find out the perceived usefulness
- To analyze the pattern of Post Graduate research (PG) studies on its contents, related parameters and trend of the identified thrust area for PG research.
- To explore and analyze the constraints and opinions for future refinement as perceived by the teachers and students in the conduct of post-graduate research.

The study was conducted during the academic year 2018 to 2019 at College of Agriculture Vellayani. The entire thesis belonging to the sixteen departments namely, Department of Agronomy, Soil Science and Agricultural Chemistry (SSAC), Vegetables science, Pomology and Floriculture (PF), Plantation Crops and Spices (PCS), Post-Harvest Technology (PHT),

Agricultural Entomology, Plant Pathology, Plant Breeding and Genetics (PBG), Plant physiology, Microbiology, Plant Biotechnology (PBT), Agricultural Extension, Agricultural Economics, Community Science and Agricultural Statistics that have been submitted from 2012-2017 were enumerated, categorized under different divisions and was subjected to qualitative content analysis.

A total of 'fourteen' attributes namely, number of words in title of theses, title with scientific names, number of words in abstract, number of objectives, number of references in the theses, references based on years, types of sources in reference, types of errors in reference, number of pages, number of tables, figures, plates, appendices and abbreviations, types of research design, statistical methods used, locale of study and crops or areas have been selected in general for the desk study of content pattern of the theses in all departments and 'seven' attributes namely, sample size, nature or types of respondents, sampling methods, data collection techniques, types of data, dependent variables and independent variables were selected only for Department of Agricultural Extension.

The *ex-post facto* study of research themes for the study was covered for the period from 2008-2017. A total of 120 respondents comprising of 60 students and 60 teachers were selected for the study on perceived usefulness of PG research. The data were collected from both students and teacher's respondents using a well-structured pre tested questionnaire. Using the data, results were generated after appropriate statistical analysis.

The salient finding for the study were:

1. The number of theses published during 2012 to 2017 showed an increasing trend. However, a slight decline was observed for number of theses in the year 2015.
2. An increasing trend was observed in terms of number of theses submitted as year progressed from 2012-13 to 2016-2017 under crop production division. A slight decline in the percentage of theses submitted for the periods from

2014 to 2015 was observed in case of Agronomy and Horticulture respectively.

3. As year progressed from 2012-13 to 2016-2017 there was an increasing trend in terms of number of theses submitted under crop protection division. However, a slight decline in the percentage of theses submitted for the periods from 2013 to 2014 in Agricultural Entomology department and 2015-2016 in Plant Pathology department respectively.
4. Over the years an increasing trend was observed in the number of PG theses published under crop improvement division from 2012-2016 and decreasing trend from 2016-2017. A slight decline was observed from 2014-2015 and 2016-2017 in the percentage of Plant Breeding and Genetics theses published and a decline from 2016- 2017 and 2013-2014 was observed for Plant Physiology and Plant Biotechnology theses respectively.
5. As the year progressed from 2012-2017, there were an increasing number of theses published under social science division. However, a slight decline in the percentage of theses published was observed from 2012-2014 and 2015-2016 in department of Agricultural Economics and 2014-2015 and 2016-2017 in Community Science department.
6. An increasing trend was observed in the number of Agricultural Statistics theses published.
7. For the common category of PC groups *i.e.* 2008-2017, it was observed that an average of 6 PC groups were published per year in 'agricultural extension and development studies' (AEDS) and from the uncommon PC groups *i.e.* 2008 to 2014 an average of 7 theses was published per year under 'plant protection' (PP).
8. A total of 22 PC groups were observed during 2008 to 2014, of which 12 PC groups have more than 50.00 per cent untouched thrust areas whilst for the period from 2015 to 2017 a total of 17 PC was observed of which 11 PC groups were found to have 50.00 per cent or more number of untouched thrust area.

9. A comparison results showed that of the ten PC groups, the total number of thrust areas in six PC groups have reduced as the year progressed from 2008 to 2017. However, it was interesting to note that the untouched percentage of thrust areas in all those PC groups increased over the years except for 'agricultural extension and development studies' wherein all the thrust area were covered. In the case of 'sugarcane and tuber crops' and 'spices and plantation crops' the untouched thrust areas were the highest (90.00%) for a period from 2008 to 2014, but the trends showed an improvement in the later period (2015-2017) wherein the untouched thrust areas dropped to 70.00 per cent and 66.67 per cent respectively. But in the case of 'fruits' the untouched thrust areas increased from 66.67 per cent to 78.57 per cent.
10. Under similar PC groups, 27 similar thrust areas were identified from two categories of period 2008-2014 and 2015-2017 after comparison has been made, of which 15 thrust areas (R1, R8, R9, R10, SPC3, SPC7, SPC8, SPC10, FR5, FR9, FL3, FL 4, PHT11, FSN1 and FSN2) remain untouched during 2015-2017.
11. Based on the teacher's perception of adequacy regarding the research themes that was framed by the university the gap is more (80%) in Department of Microbiology and less (below 50%) in the other departments.
12. Overall in crop production division 77.98 per cent of the theses were medium worded. However, Agronomy theses topped the list for both medium and low worded theses and Soil Science and Agricultural Chemistry theses surpassed other departments in high worded category. The maximum and minimum number of words were 19 (SSAC and Horticulture) and 5 (Agronomy) respectively.
13. Overall in crop protection division 76.67 per cent of the theses were medium worded. However, Entomology theses topped the list for low worded theses with 11.43 per cent and Plant Pathology theses surpassed Entomology with 16.00 per cent of theses being high worded. The maximum and minimum number of words were 21(Agricultural Entomology) and 6 (Entomology and Plant Pathology) respectively.

14. Overall majority (76.60%) of theses under crop improvement division were medium worded. However, Plant Breeding and Genetics theses topped the list for low worded theses (17.40%) and Agricultural Microbiology theses surpassed Plant Biotechnology and Plant Breeding and Genetics with 16.67 per cent of theses being high worded. The minimum and maximum number of words was 7 and 22 respectively.
15. Overall 66.60 per cent of theses under social science division were medium worded. However, Agricultural Extension theses topped the list for low worded theses (23.53%) and economic theses exceeded extension and community science with 22.22 per cent of theses being high worded. The minimum and maximum number of words was observed in Community Science with 5 and 25 respectively.
16. It was observed that (60.00%) of the theses in Agricultural Statistics were medium worded and 20.00 per cent of theses were both high and low worded. The range for medium worded theses was 10-16 words.
17. Overall 76.99 per cent of the post graduate theses published their research work with 6 to 15 words in the title.
18. All the theses belonging to the Department of Vegetable Science, Pomology and Floriculture and Plant Physiology include scientific name in the title.
19. More than 60 per cent (68.81%) of the theses under crop production division have medium number of words in abstract. However, Horticultural theses topped the list with 13.95 per cent of the theses being low worded and Agronomy theses surpassed SSAC and Horticulture with 29.26 per cent of the theses being highly worded. The minimum (252) and maximum (1976) number of words were from SSAC and Agronomy respectively.
20. Majority (61.67%) of theses under crop protection division were medium worded. Though, Agricultural Entomology theses surpassed Plant pathology with 20.00 per cent of theses being highly worded. The minimum (302) and maximum (793) number of words were from Plant pathology and Entomology respectively.

21. Majority (68.09%) of theses under crop improvement were medium worded. However, Plant Biotechnology theses topped the list for low worded theses (18.18%) and also surpassed Plant Breeding and Genetics, Agricultural Microbiology and Crop Physiology with 18.18 per cent of theses being high worded. The minimum (363) and maximum (1265) number of words were from PBG and Plant Physiology respectively.
22. Majority (72.73%) of the theses under social science division were medium worded. However, Agricultural Extension theses topped the list for low worded theses (23.53%) and Agricultural Economic theses surpassed Agricultural Extension and Community Science with 22.22 per cent of theses being high worded. The minimum (282) and maximum (984) number of words were from Community Science and Agricultural Extension respectively.
23. Majority (80%) of the theses under Agricultural Statistics were medium worded followed by 20.00 per cent which were of low worded. The range for medium worded theses was 467-712 words.
24. Overall the mean minimum number of words is 581 and mean maximum number of words is 610 but while considering the overall results independently it can be seen that the minimum and maximum number is 252 and 1976 words and was witnessed in thesis from department of SSAC and Agronomy separately. Using quartile, it revealed that theses from crop production, crop protection and Agricultural Statistics division have medium number of words (584-601) in an abstract followed by social science and crop improvement theses that have low (<584) and high (>601) number of words respectively.
25. Majority (80.63%) of theses under crop production division were having an average number of objectives. The minimum and maximum number of objectives was 1 and 7 respectively. However, SSAC theses topped the list for both high and low category.

26. Majority (88.33%) of theses belonging to crop protection division have medium number of objectives with minimum of 2 and maximum of 9 objectives. However, Plant Pathology topped the list in high category.
27. Majority (89.36%) of the theses under crop improvement division have medium number of objectives with minimum of one and maximum of 7 objectives respectively. However, Plant Breeding and Genetics theses topped the list for low number of objectives and Plant Biotechnology surpassed Plant Breeding and Genetics with 9.09 per cent being in the high category.
28. Majority (75.75%) of the theses under social science division were having medium number of objectives with minimum of 2 and maximum of 7 objectives respectively. Though, Agricultural Economics theses topped the list for having low number of objectives with 33.33 per cent it also surpassed Community Science and Agricultural Extension department with 22.22 per cent of theses having high number of objectives.
29. Hundred per cent of theses belonging to Agricultural Statistics department have medium number of objectives with a range from 2-3.
30. Overall 64.81 per cent of the post graduate theses satisfied 2 to 4 numbers of objectives.
31. Majority (71.56%) of the theses under crop production division irrespective of the different departments were having medium number of references in the thesis. However, Horticulture theses topped the list for low category with 13.95 per cent and SSAC surpassed other department with 20.00 per cent of the theses having high number of references. The minimum (53) and maximum (370) of number of references were observed in Agronomy and SSAC respectively.
32. Majority (65.00%) of theses under crop protection division were having medium number of references regardless of the variation in departments. However, Plant pathology theses topped the list for both high and low category and surpassed Entomology theses with 20.00 per cent in each category. The minimum (72) and maximum (325) of number of references were observed in Agricultural Entomology.

33. Majority (68.09%) of the theses under Crop production division were having medium number of references regardless of the change in departments. Nonetheless, Plant biotechnology theses topped the list for low category with 18.18 per cent and Plant breeding and genetics theses surpassed Agricultural Microbiology, Plant Physiology and Plant Biotechnology theses with 26.08 per cent being in high category. The minimum (46) and maximum (380) of number of references were observed in PBG and Plant Physiology respectively.
34. Majority (77.27%) of the theses under social science division were having medium number of references. However, Agricultural Extension theses topped the list for both high and low category and surpassed Agricultural Economics and Community Science theses with 14.71 per cent in each category. The minimum (51) and maximum (477) of number of references were observed in Agricultural Extension and Community Science respectively.
35. Majority (60%) of the theses in Agricultural Statistics department was having medium number of references and 20.00 per cent of the theses have both of high and low number of references respectively. The range for medium number of reviews is 60-74 references.
36. Overall the mean minimum and mean maximum number of references was 67 and 161 references respectively but looking into the entire theses it was seen that the minimum and maximum number of references was 46 and 477 which was witnessed in Plant Breeding and Genetics and Community Science theses respectively. Theses from crop protection and crop improvement division have medium (103-148) number of references.
37. More than half (55.93%) of the references were from publications made after the year 2001.
38. More than two-thirds (71.35%) of the references were taken from journals alone which is on par with crop production, crop protection, crop improvement and agricultural statistics theses except for the references in social science theses with 55.64 per cent.

39. Almost eighty per cent *i.e.* 71.43 per cent of the references from Agricultural Statistics theses have not included the page numbers, followed by 47.37 per cent from crop improvement division. Regarding the mistakes in writing the abbreviations, 38.17 per cent of the references were from social science theses. Also, 32.93 per cent of the references from crop production theses have errors in titling the journals or books. More than 20 per cent of the in-text citation from agricultural statistics theses and crop improvement theses were not aligned in chronological orders and only 2.65 per cent of the references were not arranged in alphabetical orders
40. Overall, 50.00 per cent of the theses have medium number of pages (107-122). The mean minimum and mean maximum number of pages was 94 and 145 respectively.
41. The average number of tables, figures and appendices (56, 21 and 4) were more for theses from department of Agricultural Statistics followed by 32 tables for Social science, 16 figures for theses from departments under crop production and 3 appendices each for crop protection and social science. In case of average number of plates per theses, crop protection theses had maximum number (16) of plates and crop production was found to have more (39) number of abbreviations.
42. Under crop production division more than 70 per cent of the research in Agronomy department used RBD, Factorial- RBD and Split plot design followed by 60.81 per cent from Department of Soil Science and Agricultural Chemistry. Almost fifty per cent *i.e.* 46.66 per cent of the researches in Horticulture department used CRD and factorial-CRD and about 44.45 per cent used RBD and split plot design.
43. Under crop protection division 57.69 per cent and 50.00 per cent of the Plant Pathology and Agricultural Entomology theses used CRD. Likewise, 26.32 per cent of Agricultural Entomology theses and 19.23 per cent of Plant pathology theses used RBD.
44. Under crop improvement division 75 per cent of the research in plant breeding and genetics used RBD, compact family block and split plot design whereas

all of the theses in Agricultural Microbiology followed by 85.71 per cent and 54.55 per cent of Plant Physiology and Plant Biotechnology theses used CRD.

45. Under social science division almost fifty per cent (49.28%) of the theses in Agricultural Extension department used ex post facto designs and 4.35 per cent used exploratory design. Only, 1.45 per cent of Community Science theses used CRD and factorial CRD respectively.
46. ANOVA (37.65%, 63.08% and 21.48%) is the commonly used statistical tools for analysis of theses belonging to crop production, crop protection and crop improvement. Percentage (20.41%), correlation (16.74%) and frequency (11.22%) computation followed by categorization based on mean (16.84%) or quartile (7.4%) were the major statistical tools used in social science division.
47. Majority (81.15%) of the research work was conducted in Trivandrum district either in farmer's field, campus, non-governmental organizations and institutions, schools and alike.
48. Majority of the study irrespective of the division were on vegetables (37.07%), cereals (13.4%), fruits (12.46%), flowers (3.12%), plantation crops and spices (3.74%), aromatic and medicinal plants and other kind of crops. Crop protection division also takes up study on honey bees (2.18%) and mushrooms (2.49%). Regarding social science division though most of the researches were on information communication and technology (3.12%), schemes, tribal study, homesteads and alike the researchers also find a way to conduct study on various kinds on crops.
49. More than 70 per cent (76.47%) of the theses under Agricultural extension departments have medium number of respondents (90-142).
50. Almost forty per cent (39.62%) of the respondents were farmers.
51. Majority (82.93%) of the theses used random sampling method in Agricultural Extension department followed by 17.07 per cent that used purposive sampling methods.
52. Majority (91.89%) of the Agricultural Extension theses used primary data followed by 8.11 per cent that used secondary data for their study.

53. Majority (61.76%) of the theses belonging to Agricultural Extension departments has medium (2-4) number of dependent variables and 17.81 per cent and 10.96 per cent of the dependent variables were on perception and adoption.
54. More than 60 per cent (61.67%) of the theses have medium (10 to 15) number of independent variables.
55. Almost all (97.78%) of the teachers perceived that post graduate research are useful to very useful followed 86.66 per cent as perceived by students.
56. More than two third (68.33%) of the student respondents have a moderate attitude towards research and 84.44 per cent of the teachers perceived the attitude of students in general to be good.
57. All the five sub-components of attitude namely, Research usefulness, Research anxiety, Positive attitude towards research, Relevance to life, Difficulty of research were positively significant at 1 per cent level of significance.
58. Almost all (95.56%) of the students have ability to high ability to do research as perceived by teachers.
59. More than sixty per cent (63.33%) of the students fall under 24 to 25 years of age and majority (78.33%) of the students were female and only 21.67 per cent male.
60. Almost 50 per cent (48.33%) of the students belonged to General category, 40.00 per cent belonged to Other Backward Classes (OBC), 10.00 per cent belonged to Schedule Caste (SC) and only 1.67 per cent belonged to Schedule Tribe (ST).
61. Only 11.67 per cent of the students were married and about 88.33 per cent of the students were unmarried.
62. Almost fifty per cent (45%) of the student respondents belonged to village, 35 per cent from town and 20 per cent from city.
63. Majority (38.33%) of the students studied in government school up to twelfth class followed by 31.67 per cent unaided private and 30 per cent aided private, 95.00 per cent of the students completed their undergrad from government

colleges and all the respondents did their PG/PhD in government colleges itself.

64. More than 50 per cent (55%) of the students perceived their parental annual income to be less than 3.7 lakhs with mean as checked.
65. Majority (75%) of the students have average information seeking skills as well as methodology skills respectively.
66. Almost 50 per cent (42.22%) of the teacher respondents fall under the age group 42 to 47 years.
67. Majority (75%) of the teachers was female and only 25.00 per cent were male.
68. More than 60 per cent (66.67%) of the teachers did their master degree in KAU follow by 70.45 per cent Ph.D and only three of the respondents have done their Post-doc.
69. More than two-thirds (68.88%) of the teachers started guiding within seven years of their entry into service.
70. More than sixty per cent (64.45%) of the teachers have guided more than six PG and Ph.D students.
71. Less than four ongoing PG/PhD students have been allotted to 75.56 per cent of the teachers
72. A total of 123 externally aided projects were undertaken by the teachers as Principal Investigators (PI).
73. More than sixty per cent (61.67%) of the students said that the resources were available. More than 70 per cent of the teachers found that literatures, research materials, raw materials as well as funds were available.
74. More than half (61.67%) of the students face difficulty in attaining the resources and more than fifty per cent (66.67%, 55.56%, 62.22% and 53.33%) of the teachers perceived that there is difficulty in attaining the resources (literature, research materials, raw materials and funds).
75. Almost fifty per cent i.e. 46.67 per cent of the students found the research work environment is workable.
76. Majority i.e. 93.34 per cent expressed that they got much to very much help and support from chairman 88.34 per cent from peers, 83.33 per cent from

advisory members, 68.33 per cent from other non-members and 96.66 per cent of the contribution comes from own department.

77. Almost all (95%) of the researchers were satisfied to very much satisfy with their research work followed by five per cent who were not satisfied.
78. More than sixty per cent *i.e.* 67.34 per cent of the students faced difficulty to very difficult to publish their research paper.
79. The extent of usefulness of seminar or conferences 63.33 per cent as perceived by students is not useful, 35 per cent said it was useful to very useful and 1.67 per cent said that it was less useful.
80. The common three major constraints in doing PG research as perceived by both students and teachers were lack of proper infrastructure (Rank 1) followed by scarcity of land, labour and capital (Rank 2), privation of flexibility with approved technical programme (Rank 3). Poor writing skill of students (Rank 4) was considered to be an important constraint as discerned by teachers.
81. Encouraging interdisciplinary need based research, farmer's friendly research and field research, making the research process flexible, utilization of ICAR funds for PG research through creation of a centralized multidisciplinary instrumentation lab, ensure adequate land, labour and capital for departments undertaking field experiments.

Suggestions for future research

The suggestions for future study are:

1. Study on content analysis should be conducted in other colleges in order to get a clear picture of postgraduate research at different Agricultural Colleges present in Kerala so as to comprehensively assess the PG research systems of KAU in relation to thrust area and content pattern.
2. Study can be conducted only for all theses of individual department so that instead on 5 years the researcher can cover theses for 15 years or more, in order to make a comprehensive assessment of department wise research. This

will help the policy makers to ensue refinement in the research process and systems.

3. Similar study can be conducted for Ph.D theses.
4. Similar study can be conducted on other types of documents like agricultural magazines, journals or reports and like. The study can be repeated 5 or 10 years from now so as to assess the differential change, if any. A quantitative study of some content parameters can also be conducted using quantitative content analysis so as to draw out a critical understanding of PG research work undertaken in KAU.

REFERENCES

REFERENCES

Abbasi, M., Malik, A., Chaudhry, I. and Ullah, M. I. 2011. A study on student satisfaction in Pakistani Universities: the case of Bahauddin Zakariya University, Pakistan. *Asian Social Sci.* 7(7): 209-219.

Abou-Elhamd, K., Al Wadaani, H. A. and Al Mulhim, S. A. 2014. Does marriage affect the academic performance of the female medical undergraduate in a Saudi University?. *Professional Med. J.* 21: 566-569.

Ajith, C. 2004. Determination of attitude, occupational aspiration and preference for placement of B.Sc. Agriculture students of Gujarat state. M.Sc. (Ag) thesis, Gujarat Agriculture University, Anand, 118p.

Akareem, H. S. and Hossain, S. S. 2016. Determinants of education quality: what makes students' perception different?. *Open Rev. Educational Res.* 3(1): 52-67.

Ali, A. and Ahmad, I. 2011. Key factors for determining students satisfaction in distance learning courses: a study of Allama Iqbal Open University. *Contemporary Educ. Technol.* 2(2):118-134.

Ardeshana, V. R. 1990. Teachers attitude towards teaching at the college of agriculture, Junagadh. M.Sc. (Ag) thesis, Gujurat Agricultural University. Anand, 109p.

Berelson, B. 1952. *Content analysis in communication research.* Free Press. New York, 220p.

Bhosale, R. S. 2011. Occupational aspiration of post graduate students of Anand Agricultural University. M.Sc. (Ag) thesis, Anand Agricultural University, Anand, 115p.

Biswas, N. 2009. Researches in extension education B. H. U- a content analysis. M.Sc. (Ag) thesis, Banaras Hindu University, Varanasi, 102p.

Borthakur, A. and Singh, P. 2012. Agricultural research in India: an exploratory study. *Int. J. Social Sci. Interdisciplinary Res.* 1(9): 59-74.

Brown, S. 2016. Measures of Shape: Skewness and Kurtosis [on-line]. Available: https://brownmath.com/stat/shape.htm [29 May 2019].

Chai, R. T. 1978. A content analysis of the obituary notices on Mao Tse-tung, *Public Opinion Q.* 41: 475-487.

Cherry, K. 2019. How to write an APA abstract: tips for creating an abstract in APA style [on-line]. Available: https://www.verywellmind.com/how-to-write-an-abstract-2794845#citation-1 [22 March 2019].

Chilman, C. S. and Meyer, D. L. 1966. Single and married undergraduates measured personality needs and self-rated happiness. *J. Marriage Family.* 28(1): 67-76.

Cramer, C. 2011. Social media uses by students in an agricultural student orientation course. M.Sc. (Ag) thesis, Oklahoma State University, Oklahoma. 80p.

Datt, S. 2016. 8 step procedure to conduct qualitative content analysis in research [on-line]. Available: https://www.projectguru.in/publications/qualitative-content-analysis-research/ [09 March 2019].

Dooley, M. D. and Sweeny, K. 2017. The stress of academic publishing. *Chronicles of higher education* [on-line]. Available: https://www.chronicle.com/article/The-Stress-of-Academic/241156 [24 March 2019].

Drisko, J. W. and Maschi, T. 2016. *Content analysis.* Oxford University Press, New York, 208p.

Duriau, V. J., Reger, R. K. and Pfarrer, M. D. 2007. A content analysis of the content analysis literature in organization studies: research themes, data

sources, and methodological refinements. *Organizational Res. Methods*. 10(1): 5- 32.

Edem, N. B. 2016. Availability and utilization of electronic resources by postgraduate students in a Nigerian university library: a case study of University of Calabar, Nigeria. *Information Knowledge Manage*. 6(2): 60-69.

Edgar, L. D. 2007. A 10- year content analysis to assess research theme areas in agricultural education: gap analysis of future research priorities in the discipline. Ph.D dissertation, Texas A & M University, USA, 324p.

Edzan, N. N. 2008. Analysing the references of final year project reports. *J. Educ. Media Library Sci.* 46(2): 211-231.

Erlingsson, C. and Brysiewicz, P. 2017. A hands-on guide to doing content analysis. *Afr. J. Emergency Med.* 7(3): 93-99.

Evan, W. M. 1976. Organization theory and organizational effectiveness: An exploratory analysis. *Org. Administrative Sci. 7*: 15–28.

Feliciano, G. D. and Lozare, B. V. 1974. Doing research in rural Asia: problems of method. *Media Asia*. 1 (1): 15-20.

Gadhvi, B. G. 2012. Study on Agribusiness Anxiety of Postgraduate students of state agricultural Universities of Gujarat. M.Sc. (Ag) thesis, Anand Agricultural University, Anand, 110p.

GAO [General Accounting Office]. 1989. Content Analysis: a methodology for structuring and analyzing written material [on line]. Available: http://archive.gao.gov/d48t13/138426.pdf [01 May 2019].

Gilmer, B. V. 1966. *Industrial psychology*. McGraw Hill, New York, 513p.

Gilmore, J. and Feldon, D. 2010. Measuring graduate students teaching and research skills through self-report: Descriptive findings and validity evidence. *Paper presented at the Annual Meeting of the American*

Educational Research Association; 30 April-4 May, 2010; Denver, Colorado, pp. 4-32.

Gruszczynska, A. 2016. 10 common challenges faced by early career researchers. *Wiley* [on-line]. Available: https://www.wiley.com/network/researchers/writing-and-conductingresearch/10-common-challenges-faced-by-early-career-researchers [24 June 2019].

Hemminger, B. M., Lu, D., Vaughan, K. T. L. and Adams, S. J. 2007. Information seeking behavior of academic scientists. *J. Am. Society Information Sci. Technol.* 58(14): 2205–2225

Holsti, O. R. 1968. Content analysis. In: Lindzey, G. and Aronson, E. (eds.), *The Handbook of Social Psychology* Vol.2 (2nd Ed.), Amerind Publishing Co. New Delhi, pp. 596-692.

Holsti, O. R. 1969. *Content Analysis for the Social Sciences and Humanities.* Addison-Wesley, Reading, Massachusetts, 256p.

Husemann, M., Rogers, R., Meyer, S. and Habel, J. C. 2017. "Publicationism" and scientists satisfaction depend on gender, career stage and the wider academic system. *Palgrave Commun.* 3(1): 1-10.

Hussain, T., Qayyum C. A., Akhter, M., Abid, N. and Sabir, S. A study on attitude towards research among technology education students in Pakistan. *Bull. Educ. Res.*38 (2): 113-122.

Irani, T. 2000. Prior experience, perceived usefulness and the web: factors influencing agricultural audiences adoption of internet communication tools. *J. Appl. Commun.* 84(2): 49-63.

Jain, N. C. and Babu, A. R. 1987. Classified bibliography of the papers of Indian Journal of Extension Education (1965-1987). *Indian J. Ext. Educ*. 23(3-4): 93-140.

Jalihal, K. A. 1970. A study of the concept and role of agricultural universities in India. *J. Educ. Res. Ext.* 12 (2):83-87.

Jand, G. S. 1975. A study of the attitude of staff and students of Gujarat Agricultural University towards semester-system of education. M.Sc. (Ag) thesis, Gujurat Agricultural University, Anand, 98p.

Jhamtani, A. and Singh, Y. P. 1980. *Directory of Degree Research in Extension from the period of 1972-1978.* Division of Agricultural Extension, Indian Agricultural Research Institute, New Delhi.

Kalbande, D. T., Syed, F. M. and Sonwane, S. 2012. Use of consortium for e-resources in agriculture (CERA): a case study. *Int. J. Library Inf. Stud.* 2(1): 33-41.

Kale, B. P. and Khuspe, T. S. 1982. The perception behaviour of rural televiewers about the usefulness of telecast programmes. *Maharashtra J. Extn. Edu.* 1(1) : 33-36.

Kamarulzaman, N., Saleh, A. A., Hashim, S. Z., Hashim, H. and Abdul-Ghani, A. A. 2011. An overview of the influence of physical office environments towards employee. *Procedia Engng.* 20: 262-268.

Kerlinger, F. N. 1973. *Foundation of Behavioural Research.* Holt, Rinehart and Winston. New York, 741p.

Kerlinger, F. N. 1986. *Foundations of behavioural research* (3rd Ed), Holt, Rinehart and Winston, New York, 667p.

Khodadoost, M., Heidarinejad, S., Ebadi, G., Mehdipoor, A. and Bashbarat, Z. D. 2011. A survey of content analysis of MS's thesis: descriptive characteristics and norms of ISO 9002 for writing. *Procedia Social Behavioral Sci.*15: 2400–2405.

Kirpal, V., Swamidasan, N., Gupta, A. and Gupta, R. K. 1985. Scheduled Caste and Tribe students in Higher Education: a study of an IIT. *Econ. Political Wkly.* 20(29):1238-1248.

Kolbe, R. H. and Burnett, M. S. 1991. Content analysis research: an examination of applications with directives for improving research reliability and objectivity. *J. Consumer Res.* 18: 243-250.

Kondracki, N. L., Wellman, N. S. and Amundson, D. R. 2002. Content analysis: review of methods and their applications in nutrition education. *J. Nutr. Educ. Behaviour.* 34(4): 224-230.

Krippendorf, K. 1980. *Content analysis: an introduction to its methodology*. Sage Publications, Beverly Hills, California, 441p.

Krippendorff, K. 2004. *Content Analysis: an introduction to its methodology* (2nd Ed.), Sage Publications, Thousand Oaks, California, 413p.

Kumar, P., Reena, Singh, N. and Meena. 2010. Rural Urban Background and academic performance of agricultural students. *Agri. Sci. Digest.* 30(1):75-76.

Lapidos, A., Jester, J., Ortquist, M., Werner, P., Ruffolo, M. C. and Smith, M. 2018. Survey of peer support specialists: professional activities, self-rated skills, job satisfaction and financial well-being. *Psychiatric Serv.* 69(12): 1264-1267

Liebano, R. E., Dias, S. L. and Ferreira, L. M. Number of objectives and conclusions in dissertations and thesis. *Acta Cir Bras* [on-line] 20(4): 272-274. Available: http://www.scielo.br/acb [27 June 2019].

Loy, P. 1979. Content analysis of journal articles as a technique for historical research. *J. Hist. Sociol.* 1(2): 93-101.

Lundberg, G. A. 1942. *Social Research: A Study in Methods of Gathering Data* (2nd Ed.), Longmans, Green, New York, 380p.

Lyons, J., Fisher, S., and Thompson, S. 2005. Effects of participating in a GK-12 program on the graduate students programs of study. *Paper presented at the Annual Conference and Exposition*; 12-15, June, 2005; Portland, Oregon. American Society for Engineering Education, Portland, Oregon, pp. 1-5.

Malik, C. P. 1988. A study on job satisfaction of teachers of Gujarat Agricultural University, Anand. M.Sc. (Ag) thesis, Gujarat Agricultural University, Anand, 109p.

Malone, D. and Videon, C. 1997. Assessing undergraduate use of electronic resources: a quantitative analysis of works cited. *Res. Strategies. 15*(3): 151-158.

Meeran, S., Osman, K., Zakaria, E. and Ikhsan, E.2012. Measuring graduate students research skills. *Procedia Social Behavioral Sci.* [on-line] 60: 626–629: Available: https://www.researchgate.net/publication/ 257717132_Measuring_Graduate_Students_Research_Skills [05 May 2019].

Mehra, N. and Trikha, R. N. 1993. Content analysis of post-graduate theses of agricultural communication. *Indian J. Ext. Educ.* 29 (3&4): 56-58.

MHRD [Ministry of Human Resource Development]. 2016. All India Survey on Higher Education (2015-2017). Department of Higher Education. New Delhi [on-line]. Available: 281p.file:///C:/Users/user/Desktop/age,%20caste%20 etc.pdf [22 June 2019].

Mitchell, R. E. 1967. The use of content analysis for explanatory studies. *Public Opinion Q.* 31(2): 230-241.

Morgan, K. 2019. What Are the Benefits of Attending Seminars? [on-line]. Available: https://education.seattlepi.com/benefits-attending-seminars-1929.html [27 May 2019].

Munshi, M. A. 1989. A study to develop and standardize a teaching effectiveness scale and its application. Ph.D (Ag) thesis, Marathwada Agricultural University , Parbhani, 278p.

Murty, D. V. R. 2001. *Developmental Journalism.* Dominant Publishers and Distributors Pvt. Ltd., New Delhi, 136p.

Muthuswamy, P., Vanitha, R., Suganthan, C. and Ramesh, P. S. 2017. A study on attitude towards research among the doctoral students. *Int. J. Civil Engng. Technol.* 8(11):811-823.

Nachmias, D. and Nachmias, C. 1976. Content analysis. In: Arnold, E. (eds.), *Research methods in the social sciences*, Halstead Press, UK, pp.132-139

Narayan, P. A. 2004. A study on adoption of rose cultivation in Vadodara district of Gujarat state. M.Sc. (Ag) thesis, Gujarat Agricultural University, Anand, 84p.

Natekar, A. R. 2013.Problems encountered by researcher scholars while conducting research (a case study of research scholars of few selected universities of Karnataka). *Res. J. Phil. Social Sci.* 39(2):48-53.

Nazari, M. R. and Hassan, A. H. 2011. Farmers approach and access to information and communication technology in the efficient use of modern irrigation methods. *Eur. J. Sci. Res.* 21(1): 38-44.

NCES [National Center for Education Statistics]. 2018. Digest of Education Statistics, U. S. Department of Education [on-line]. Available: https://nces.ed.gov/fastfacts/display.asp?id=98 [23 May 2019].

Nertney, B. 2017. The benefits of attending professional development workshops [on-line]. Available: https://www.mycpid.com/benefits-attending-professional-development-workshops/.Community partnerships [22 May 2019].

Newcomb, L. H. 1993. Transforming university programs of agricultural education. *J. Agric. Educ.* 34(1): 1-10.

O'Leary, Z. 2014. *The essential guide to doing your research project.* Thousand Oaks, California, 239p.

Oppenheim, C and Smith, R. 2001. Student citation practices in an Information Science Department. *Educ. Inf.* 19: 299-323.

Papanastasiou, E. C. 2005. Factor structure of the 'Attitudes Toward Research' scale. *Statistics Educ. Res. J.* 4(1): 16-26.

Patel, D. J. 1992. A study on teaching effectiveness of teachers working in Gujarat Agricultural University with special reference to Faculty of Agriculture. Ph.D (Ag) thesis, Gujarat Agricultural University, Anand, 290p.

Patel, S. M. 1982. Content analysis of agricultural information published in Gujarat Samachar and extent utilized by the farmers. M.Sc. (Ag) thesis, Gujarat Agricultural University, Anand, 68p.

Pattar, S. 2011. Development of scale to measure of agricultural graduates towards agrotourism as an enterprise. M.Sc. (Ag) thesis, Anand Agricultural University, Anand, 128p.

Pausewang, S. 1973. *Methods and Concepts of Social Research in Rural Developing Society*. Weltforum Verlag, Munich, Germany. 214p.

Picincu, A. 2019. The Advantages of Seminars. [on-line]. Available: bizfluent.https://bizfluent.com/info-8322976-advantages-seminars.html [26 May 2019].

Potokri, O. C. 2011. The academic performance of married women students in Nigerian higher education. Ph.D (Mange. Policy Studies) thesis, University of Pretoria, South Africa, 275p.

Prakasam, R. 1979. Work atmosphere and implications the banking science. *Natl. Labour Inst. Bull.* 5(1-2): 23-29.

Prasad, B. D. 2008. *Content Analysis: a method in social science research*. Rawat, New Delhi, 193p.

Price, J. 2005. Marriage and graduate student outcomes [on-line]. CHERI Working Paper 75, Cornell University, ILR School site. Available: http://digitalcommons.ilr.cornell.edu/cheri/28/ [14 May 2019]

Prolima, T. and Kaushik, S. 2000. Content analysis of Home Science Extension research articles published in IJEE. *Indian J. Ext. Educ.* 36 (3-4): 160-163.

Qasem, F. A. A. and Zayid, E. I. M. 2019.The challenges and problems faced by students in the early stage of writing research projects in l2, University of Bisha, Saudi Arabia. *Eur. J. Spec. Educ. Res.* 4(1): 32-46.

Rameshrao, D. H. 2009. Attitude and aspiration of post graduate students towards agriculture entrepreneurship. M.Sc. (Ag) thesis, Anand Agricultural University, Anand, 92p.

Randhawa, M. S. 1963. *Agricultural research In India: Institutes and organizations*. Indian Council of Agricultural Research, New Delhi, 214p.

Randolph, J. J., Gaiek, L. S., White, T. A., Slappey, L. A., Chastain, A., Prejean-Harris, R. and Hansard, C. 2012. A quantitative content analysis of Mercer University theses. *Georgia Educ. Res.* [on-line] 9 (1). Available: https://digitalcommons.georgiasouthern.edu/gerjournal/vol9/iss1/6 [02 May 2019].

Rani, G. J. 1985. Scientific Productivity of Agricultural Scientist - An activity analysis approach. Ph.D (Ag) thesis, Andhra Pradesh Agricultural University, Rajendranagar, Hyderabad, 436p.

Rasmussen, C., Warnick, B. and Miller, R. 2008. Student Perceptions toward Agriculture in a General Education Life Science Course. *NACTA J.* 52(1): 44-48.

Rogers, E. and Stiff, C. 1983. Communication as academic discipline. *J. Commun.* 33 (3): 74-87.

Rone, E. C. 1998. Characteristics of higher education doctoral theses: Defrosting some frozen assets. Ph.D thesis, University of Toronto, Ontario, Canada. 393p.

Rostad, K. and Aksnes, D. W. 2015. Publication rate expressed by age, gender and academic position- a large-scale analysis of Norwegian academic staff. *J. Informatics*. 9(2):317-333.

Samantha, D. K. 1985. Perception of work environment by agricultural research service scientist of ICAR, Institute. *Indian J. Ext. Educ.* 21(3-4):53-61.

Sargeant, M. 2012. A guide to writing your masters dissertation school of management and languages [on-line]. Available: https://www2.hw.ac.uk/sml/postgraduate/downloads/dissertations/dissertationguide.pdf [22 July 2019].

Schreier, M. 2012. *Qualitative content analysis in practice.* Sage Publications, Thousand Oaks, California, 280p.

Shaukat, S., Siddiquah, A., Abiodullah, M. and Akbar, R. A. 2014. Postgraduate students attitudes towards research. *Bull.Educ.Res.*36 (1): 111-122.

Shingare, R. 2005. Study of attitude and occupational aspiration of undergraduate veterinary science and animal husbandry college students of Gujarat. M.Sc. (Ag) thesis, Gujarat Agricultural University, Anand, 90p.

Shkedi, A. 1998. Teachers attitudes towards research: a challenge for qualitative researchers. *Int. J. Qualitative Studies Educ.* 11(4): 559-577.

Shukul, M. 1981. Academic performance of rural and urban students. M.Sc. (Ag) thesis, CCS Haryana Agricultural University, Hisar, 88p.

Siamian, H., Mahmoudi, R., Fatemeh, H., Latifi, M. and Zare-Gavgani, V. 2016. Students attitudes towards research at Mazandaran University of Medical Sciences in 2015. *J. Acad. Med. Sci.* 28(6): 468-472.

Siddaramaiah, B. S. and Raghavendra. 1983. Content analysis of Indian Journal of Extension Education. *Indian J. Ext. Educ.* 19 (1-2): 92-94.

Singh, A. and Gill, S. S. 1993. Review of adoption research studies in Indian Journal of Extension Education from 1980 to 1987. *Indian J. Ext. Educ.* 29 (1-2): 89-92.

Singh, A. K. 2008. *Pioneer Research in Extension Education.* Scientific Publishers, Jodhpur. 354p.

Singh, H. L. 1975. Measurement of teacher's values and their relationship with teaching aptitude and job-satisfaction. *Indian Diss. Abstr.* 3(4):292-296.

Singh, R., Tyagi, L. K. and Shinha, B. P. 2001. Four decades of research in training: a critical analysis. *Indian Res. J. Ext. Educ.* 1(2): 75-81.

Singh, Y. P., Pareek, U. and Arora, D. R. 1972. *Diffusion of an Interdisciplinary Social Science in Agricultural Education*, New Heights, New Delhi, 123p.

Smith, J. and Naylor, R. 2001. Determinants of degree performance in UK universities: a statistical analysis of the 1993 student cohort. *Oxford Bull. Econ. Statistics.* 63: 29–60.

Soyizwapi, L. and Hoskins, R. 2009. Use of electronic databases by postgraduate students in a university based Faculty of Science and Agriculture. *Innovation* [on-line] 38 (1). Available: https://www.ajol.info/index.php/innovation/article/view/46976 [29 May 2019].

Stempel, G. H. 1989. Content analysis. In: Stempel, G. H. and Westley, B. H. (eds.), *Research methods in mass communications* (2nd Ed.), Prentice-Hall Englewood Cliffs, New Jersey, 418p.

Sujan, D. K. 1986. A report on Extension and Communication studies of G. B. Pant University of Agriculture and Technology. Pantnagar, Uttarakhand.

Taviss, I. 1969. Changes in the form of alienation: the 1900's vs. the 1950's. *Am. Sociol. Rev.* 34 (1): 45-57.

Thakur, M. K. and Trikha, R. N. 2004. Content analysis of post graduate theses in development communication. *Nepal Agric. Res. J.* 5:28-32.

Tripathy, S., Singh, R. K. and Sharma, T. N. 2000. Review of agricultural communication research studies. *Maharashtra J. Ext. Educ.* 19: 272-276.

Van den Besselaar, P. and Sandstorm, U. 2016. Gender differences in research performance and its impact on careers: a longitudinal case study. *Scientometrics* [on-line]. 106: 143-162. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4709377/#CR48 [14 May 2019].

Verma, S. 2017. Researches conducted on extension communication methods. B.H.U- a content analysis. M.Sc. (Ag) thesis, Banaras Hindu University, Varanasi, 60p.

Vijayalakshmi, B., Prasad, D. B. and Rao, V. K. 1996. Trends in social work literature: a content analysis of the Indian Journal of Social Work, 1971-90. *Indian J. Social Work*, 57(3): 442-460.

Weber, R. P. 1990. *Basic Content Analysis*. Sage University Paper Series on Quantitative Applications in the Social Sciences, Series no. 07-049. Sage Publications, California, 97p.

Weisskopf, T. E. 2004. Impact of reservation on admissions to higher education in India. *Econ. Political wkly.* 39(39): 4339-4349.

Wick, J. W. and Dirkes, C. 1973. Characteristics of current doctoral dissertations in education. *Educ. Res.* 2(7): 20-21.

Young, D. J. 1998. Rural and urban differences in student achievement in science and mathematics: a multilevel analysis. *Sch. Effectiveness Sch. Improv.* 9(4): 386-418.

Zavyalova, A., Pfarrer, M. D., Reger, R. K. and Shapiro, D. L. 2012. Managing the message: the effects of firm actions and industry spillovers on media coverage following wrong doing. *Acad. Manage. J.* 55(5): 1079-1101.

Zemmouchi-Ghomari, L. 2016. Difficulty to publish in journals [on line]. Available:https://www.researchgate.net/publication/293581107_Difficulty_to_publish_in_journals?enrichId=rgreqd2d909be8c8a589d140a99d0cf3b52d5XXX&enrichSource=Y292ZXJQYWdlOzI5MzU4MTEwNztBUzozMjcxMjg3ODU2NzAxNDVAMTQ1NTAwNDk4ODc4OQ%3D%3D&el=1_x_2&_esc=publicationCoverPdf [23 May 2019].

APPENDICES

APPENDIX I

Categorization of theses department wise and PC group wise based on years

1) Department of Agronomy

Sl. No.	Title	PC groups	Author
2012			
1	Agro techniques for growth promotion and increasing bark yield in ashoka (*Saraca asoca.* Roxb)		Jinsy V.S.
2	Nutrient management in yard long bean (*Vigna unguiculata subsp. sesquipedalis* L.)	Veg	Subitha P.R.
3	Development of an effective organic liquid manure for vegetable crops	OF	Asha V. Pillai
4	Management of water gabbage (*Limnocharis flava* (L.) Buchenau) in wetland rice ecosystem	SA	Nishan M.A.
5	Production potential of hybrid rice (*Oryza sativa* L.) in lowland ecosystem	RBC	Sneha S. Mohan
6	Production technology for organic coleus	STC	Atul Jayapad
2013			
7	Evaluation of new generation herbicides in transplanted rice (*Oryza sativa* L.)	SA	Raja Gopal K.
8	Standardization of organic nutrient schedule for chilli (*Capsicum annum*)	OF	Akshay
9	Integrated crop management of rice under system of rice intensification(SRI)	RBC	Asha Sasi
10	Productivity enhancement in medicinal rice (*Oryza sativa* L.) ev. Njavara	RBC	Jyolsna Bhaskaran
11	Standardization of nutrient and weed management techniques for organic rice	RBC	Muregesh M.S.
12	Organic nutrient scheduling in soil less vegetable cultivation	OF	Cuckoorani M.
13	Bio-efficacy of post-emergence micro herbicides in transplanted rice (*Oryza sativa* L.)	SA	Rathod Nilesh Dayaram
2014			
14	Evaluation of new generation herbicide penoxsulam in transplanted rice (*Oryza sativa* L.)	RBC	Sasna S.
15	Production technology of chilli (*Capsicum annum* L.) under protected cultivation	Veg	Pintu Roy Vattakunnel
16	Need based nitrogen management in rice (*Oryza sativa* L.) using diagnostic tools	RBC	Palle Pavan Kumar Reddy
17	Efficacy and economics of weed management strategies in aerobic rice (*Oryza sativa* L.)	RBC	Reshma R.S.
18	Strategies for off season production of coleus in the Southern Zone of Kerala	STC	Anju V.S.
2015			
19	Stress induced source-sink modulation in yard long bean (*Vigna unguiculata subsp. sesquipedalis* (L.) verdcourt)	Veg	Anjana Babu R.S
20	Herbicide based weed management for semi dry rice (*Oryza sativa* L.)	SA	Arya S.R.
21	Flag leaf nutrition for enhancing resource use efficiency in rice (*Oryza sativa* L.)	RBC	Surya M.S.

22	Performance evaluation of tomato in soil less culture	Veg	Soumya A.
2016			
23	Characterization and management of weedy rice (*Oryza sativa f. spontanea*)	RBC	Anjali K.
24	Varietal suitability and crop geometry of baby corn (*Zea mays* L.) in Coconut garden	SA	Dona Scaria
25	Studies on fertigation in bitter gourd (*Momordica charantia* L.)	Veg	Anjali A. Hari
26	Allelopathic effect of trees grown in homestead of Kerala on ginger (*Zingiber officinale* Roscoe)	NRM	Eldhose Abraham
27	Effect of different types of fertilizers as influenced by adjuvants on FUE and yield of upland rice	RBC	Sheeba S.S.
28	Studies on fertigation in yard long bean (*Vigna unguiculata subsp. Sesquipedalis* (L.) verdcourt)	Veg	Elsa Giles
29	Cutting intervals and additives for quality silage production	FGM	Ishrath P.K.
30	Fertigation for precision farming in tomato (*Solanum lycopersicum* L.)	SA	Amala J.
31	Productivity of spinach beet as influenced by varieties and nutrient doses.	Veg	Vinod Alur
2017			
32	Agronomic package for container grown elephant foot yam	STC	Limisha N. P.
33	Silicon nutrition for rice in Iron toxic laterite soils of Kollam District	Rice	Guntamukkala Babu Rao
34	Standardization of fertigation schedule and spacing for bell pepper (*Capsicum annum* L.var Grossum Sendt.) in poly house	Veg	Athira R.C.
35	Crop productivity and weed dynamics in Rice based farming systems.	FSRCS	Madan Kumar M
36	Magnesium nutrition is hybrid napier	SHOF	Akhila C. Thampi
37	Foliar Nutrition in nendran Banana using multi-nutrient water soluble fertilizers	FR	Bashma E.K.
38	Nutrient budgeting in rice based farming system.	FSRCS	Reshma M.R.
39	Organic preparation and biostimulants for moisture stress mitigation in container grown okra (*Abelmoschus esculentus*(L.)Moench)	FSRCS	Sethulakshmi V.S.
40	Agro techniques for container grown yard long bean (*Vigna unguiculata var. Sesquipedalis* (L.) verdcourt)	FSRCS	Anjana S.
41	Leaf litter recycling in homestead agro forestry	FSRCS	Harishma S. J.

2) Department of Soil Science and Agricultural Chemistry

2012			
1	Characterization of the soils of Kaliyoor micro watershed using Geographic Information Systems	NRM	Appu M.G.
2013			
2	Effect of integrated plant nutrient system (IPNS) on the soil biological regimes in red loam soil	OF	Neethu R. Sathyan
3	Biological indicators of soil health as influenced by plant nutrient sources	SA	Mekha M.G.
4	Iron and zinc fortification in Amaranthus (*Amaranthus tricolor*) through Bioaugmentation	SA	Amla Sakthidharan
2014			

5	Characterization , conversion and evaluation of selected lignocellulosic biomass	BO	Anushma S.
6	Biological profile of Ferralitic alluvial paddy soils under long term differential fertilizer application	SA	Nikhil K.
7	Zinc biofortication for enhancing yield and quality of yard long bean (*Vigna unguiculata subsp. sesquipedalis* (L.) Verdcourt) in Ferralitic soils	SA	Dhanya G.
2015			
8	Management of banana bract mosaic virus (BBrmv) symptoms in Banana with micronutrients	FR	Sangeetha S.S
9	Evaluation of mineral enriched composts for soil remineralization and crop nutrition	OF	Sreeja S.V.
10	Magnesium and bean nutrition for yard long bean *(Vigna unguiculata subsp. Sesquipedalis* (L.) verdcourt) in southern Laterites of Kerala	SA	Emil Jose
11	Biological characterization of Onattukara soils under coconut based cropping system	SA	Anil T. Sasi
2016			
12	Boron Nutrition of wetland Rice (*Oryza sativa* L.)	SA	Reshma Ramesh
13	Persistence and transformation of carbosulfan in Laterite and Coastal Alluvium soils of Kerala and its effect on soil organisms	SA	Dhanya M.S.
14	Nutrient Scheduling Baby corn (*Zea mays* L.) intercropped in coconut garden	SA	Vinod Mavarkar
15	Impact of agricultural land use system on soil carbon pools in soil series of Thiruvananthapuram district.	NRM	Dharmendra Naik E.
16	Evaluations of thermochemical digest of degradable waste for container cultivation of chilli.	SA	Jayakrishnan J.
17	Influence of nutrition and varieties on yield and quality of coconut inflorescence SAP	SA	Raghu R.S.
18	Enzyme characterization of the acid sulphate soils of Kuttanad	SA	Arya Nath V.
2017			
19	Land evaluation and land use planning in Eruthavoor watershed Western Ghats region using GIS and remote sensing	SHOF	Dathan C.S.
20	Assessment of soil carbon pools in acid sulphate soils of Kuttanad	SHOF	Dhanya K.R.
21	Mineralization of Soil Nitrogen, Carbon and Kinetics of Enzymes under Coconut based Cropping system.	SHOF	Usha rani K. V.
22	Impact of long term integrated nutrient management system on soil health and rice productivity.	SHOF	Rakhi R.
23	Evaluation of sewage sludge as a growth medium for ornamentals.	SHOF	Anjana Asokan
24	Evaluations of fortified humic acid from grow bag mixture as phytotonic in Okra (*Abelmoschus esculentus* (L.) Moesch)	SHOF	Dhaneesh Kumar
25	Response of tomato to calcium and boron into Onattukara tract of Alappuzha district	SHOF	Aswathy Mohan

3) Department of Vegetables Science

2012			
1	Identification of Paprika genotype for yield and quality characters	Veg	Lakshmi SL

2	Screening of vegetables cowpea (*Vigna unguiculata* (L.) Walp) germplasm for yield, quality and resistance to collar rot and web blight	Veg	Sivakumar Vavilapalli
2013			
3	Evaluation of cauliflower (*Brassica oleracea* L. var *botrytis*) for southern Kerala	Veg	Shruthy O.N.
4	Evaluation of cabbage (*Brassica oleracea* L. var *capitata*) for southern Kerala	Veg	Divya P.
2014			
5	Identification of non-bolting genotypes and planting time in amaranthus (*Amaranthus tricolor* L.)	Veg	Jacob Shemon
6	Identification of photo insensitive genotype(s) of winged bean (*Psophocarpus tetragonalobus* (L.)	Veg	Prasanth K.
2015			
7	Identification of yard long bean (*Vigna unguiculata* subsp. *sesquipedalis* (L.) verdcourt) Genotypes suitable for polyhouse cultivation	Veg	Litty Varghese
8	Development of F_1 hybrids in chilli (*capsicum annum* L.) for commercial cultivation	Veg	Mopidevi M.Nagaraju
2016			
9	Development of Hybrids in yard long bean (*Vigna unguiculata* subsp. *sesquipedalis* (L.) verdcourt)	Veg	Lakshmi K.M.
10	Evaluation of hybrids of in terminate tomato (*Solanum lycopersicum* L.) under protected cultivation	Veg	Jaffin J.S.
11	Evaluation of hybrids for yield and quality in Chilli (*Capsicum annum* L.)	Veg	Aishwarya C.S.
12	Development of Hybrids with Bacterial wilt Resistance in Tomato (*Solanum lycopersicum* L.)	Veg	Shalini K.R.
2017			
13	Evaluation of yard long bean (*Vigna unguiculata* Subsp. *sesquipedalis* (L.) verdcourt) hybrids under rain shelter and open conditions.	Veg	Feba Varghese
14	Evaluation of tomato (*Solanum lycopersicum* L.) Hybrids for yield and bacterial wilt resistance.	Veg	Shashidhar M. Sonnad

4) Department of Pomology and Floriculture

2012			
1	Variability and character association in Heliconia (*Heliconia spp.*)	FL	Narkar Nikhil Dileep
2	Development of protocol for tissue culture of papaya (*Carica papaya* L.) from mature explants	FR	Hutke Vikram Rajendra
2013			
3	Validation of tests for sex determination in papaya (*Carica papaya* L)	FR	Meera Mohan N.
4	Integrated nutrient management for Heliconia(*Heliconia angusta* cv. Christmas Red)	FL	Aryamba T.G.
2014			
5	Effect of organic sprays and bunch cover on yield and quality of Banana (*Musa* AAB) nendran	FL	Sreejith Kumar
2015			

6	Foliar nutrition in banana (*Musa* AAB) nendran for enhancement of growth, yield and quality	FR	Andhra Ann Paul
2016			
7	Evaluation of Gerbera(*Gerberg jamesonii* Bolus) varieties for rain shelter cultivation	FL	Irshana M.P.
8	Performance analysis of tissue culture plantlets of *Gerbera jamesonii* Bolus. As influenced by microbial inoculants.	FL	Shewthashri Mohanan
2017			
9	Performance evaluation of ecotypes of Banana (*Musa* AAP) plantain subgroup	FR	Annjoe V. Joseph

5) Department of Plantation Crops and Spices

2014			
1	Standardization of techniques for better rooting and growth of orthotropic shoots in Black pepper (*Piper nigrum* L.)	SPC	Nimisha Mathews
2	Growth and yield analysis of Aloe (*Aloe vera* L. Bur m.f) under different organic nutrient regimes.	AMP	Dipin M. N.
2015			
3	Rapid multiplication of kasthuri turmeric (*Curcuma aromatic* salisb) through minisett technique and nursery management	AMP	Aswathy T.S.
4	Cost effective technology for home scale and small scale production of virgin coconut oil.	COP	Thanuja T.T.
2016			
5	Characterization of Boron deficient Coconut Palms (*Cocos nucifera* L.)	COP	Athulya S.Nair
6	Refinement of Macro-propagation Technique for Mass-Multiplication of Aloe (*Aloe vera* Burm.f)	AMP	Saranya K.S.
2017			
7	Standardization of agro Techniques for transplants Ginger (*Zingiber offcinale* Rose)	SPC	Sandra Merin Mathew
8	Characterization of Coconut palms (Cocos nucfera L.) Showing General yellowing	SPC	Aparna K.

6) Department of Post-Harvest Technology

2012			
1	Protocol development for fresh cut fruits mix preparation	PHT	Amith P.K.
2	Effect of pre- treatment and curing methods on the quality characters of processed cardamom (*Elettaria Cardamomum*(L.) Maton)	PHT	Sonia V.
2013			
3	Post-harvest evaluation of bitter gourd as influenced by growing condition, harvest maturity, prepackaging and storage	PHT	Phuke Gajanan Baburao
4	Protocol development for fresh cut vegetables	PHT	Thushara T. Chandran
2014			
5	Development of nendran banana chips with enhanced shelf life and quality	PHT	Sonia N. S.
6	Post-harvest management practices in papaya (*Carica papaya* L.) for improving shelf life	PHT	Jayasheela D.S.

2015			
7	Post -harvest handling for extending shelf life of Amaranthus (*Amaranthus tricolor* L.)	PHT	Geogy Mariam George
8	Optimization of process variables for osmo-air dehydrated nendran banana (*Musa* spp.)	PHT	Keerthishree M.
2016			
9	Development of Aloevera gel supplemented ready to serve fruit beverages	PHT	Shymi Cherian
10	Standardization of minimal processing of Amaranthus (*Amaranthus tricolor* L.)	PHT	Ambareesha K.N.
2017			
11	Post-harvest handling studies for extending shelf life of Rambuttan (*Nephelium cappaceum* L.)	PHT	Manjunath J. Shetty
12	Development of osmo dehydrated bilimbi (*Averrhoa bilimbi* L.) and assessment of Bio active compounds	PHT	Aparna G.S.

7) Department of Agricultural Entomology

2013			
1	Monitoring and decontamination of pesticide residues in agricultural commodities	PP	Pallavi Nair K.
2	Management of the rhinoceros beetle (*Oryctes rhinoceros* L.) on coconut using new generation insecticides and botanicals	PP	Sudhakar S.
3	Management of nematodes associated with cardamom	PP	Angela Cyriac
4	Pests of cabbage (*Brassica oleracea* L. var botrytis) and their management	PP	G.B. Ravi
5	Safety of new generation insecticides to bee pollinators	BO	Ravi Boli
6	Melissopalynology of Indian honey bee (*Apis cerana indica* Fab.) apiaries in southern Kerala	BO	Aswini S.
2014			
7	Pests and diseases of stingless bees *Trigona iridipennis* Smith (Meliponinae: Apidae)	BO	Jayalekshmi C.R
8	Insecticide resistance in spotted pod borer, *Maruca vitrata* (Fabricus) on vegetable cowpea and its management	PP	Pattapu Sreelakshmi
9	Evaluation of entomopathogenic fungi against pest complex of chilli (*Capsicum annum* L.)	PP	Lokesh S.
10	Nematode association in cabbage, *Brassica oleracea* L. var.Capitata and its management using Botanicals.	PP	Annie P.Varghese
11	Management of sucking pest of Brinjal (*Solanum melongena* L.)	PP	Arya V.C.
2015			
12	Population dynamics and management of mango fruit fly, *Bactrocera dorsalis* (Hendel)(Diptera: Tephritidae)	PP	Akhila M.U
13	Managememnt of pest and pesticides residues in vegetable Amaranth (*Amaranthus tricolor* L.)	PP	Ppooru Muralikrishna
14	Improved formulation of *Lecanicillium lecanii* (Zimmermann) Zare and Gams and its evaluation against sucking pest	PP	Nithya P.R
15	Management of Epilachna beetle, *Henosepilachna vigintiotopunctata* (Fab.) with phylloplane and pathogenic microorganisms	PP	Aswathy Viswanathan
16	Biochemical and histopathological alterations due to root knot nematode, *Meloidogyne graminicola* in rice (*Oryza sativa* L.)	PP	Darsana V.S Lal

	and varietal reactions		
17	Morphometric variations of stingless bees in southern Kerala and assessment of honey quality	BO	Divya KK
18	Improved formulation of *Lecanicillium lecanii* (Zimmermann Zare and Gams) and its evaluation against sucking pest	PP	Nithya P. R.
2016			
19	Pathogenicity of indigenous entomopathogenic fungi against select Lepidopteran pests	PP	Praveena A
20	Population dynamics and management of shoot webber and hoppers infesting mango using safer molecules.	PP	Shivamurthy
21	Management of pest of cowpea and salad cucumber in poly house	PP	Thamilarasi N.
22	Biochemical changes due to Root Knot nematode, *Meloidogyne incognita* (Kofoid and White) Chitwood in ginger (*Zingiber officinale* Roscoe).	PP	Sunil Kumar B.C.
23	Pathogenicity and biochemical properties of entomopathogenic Fungus *Lecannicillium saksenae* (Kushwaha) Kurihara and Sukarno	PP	Jasmy Y.
24	Management of pesticide residue in select spices.	PP	Aaruni P.S.
25	Management of giant African snail *Acbatina fulica* (Bowdich)	PP	Mridul Vinod P.
26	Bio-efficacy of *Quisqualis indica* L. and *Samadera indica* Gaetin against tobacco caterpillar, *Spodoptera litura* Fabricius (Lepidoptera: Noctuidae) in poly house condition	PP	Anusree S.S.
2017			
27	Management of American serpentine leaf miner *Liriomyza trifolii* (Burgess) dieters in tomato	CPBI	Mithra Mohan
28	Efficacy of chitin enriched formulation of *Lecanicillium* spp. against sucking pest of rice (*Oryza sativa* L.)	CPBI	Harisankar S.S.
29	Entomopathogenic fungi for the management of banana rhizome weevil (*Cosmopolites sordidus* Germer.)	CPBI	Varsha Vijayan
30	Bio ecology of small hive beetles and assessment of their damage in stingless bee colonies	CPBI	Gayathri P Bose
31	Population dynamics and management of nematodes in banana using non- chemical methods	CPBI	Nimisha A. M.
32	Management of major chewing pests, *Henosephiachna septima* (Dieke) and *Diaphania Indica* (Saund.) infecting bitter gourd with bacterial bioagents	CPBI	Liz J. Mampallil
33	Morphological variations of root knot nematode in vegetables and banana	CPBI	Chinchu P. Babu
34	Potential of the natural bio polymers, chitin and chitosan in pest management	CPBI	Archana
35	Seasonal incidence of predatory wasp (*Vespa spp.*) in Indian bee apiaries and evaluation of bait traps.	CPBI	Ann Varghese Kokoly

8) Department of Plant Pathology

2012			
1	Serodiagnosis and standardization of techniques for production of virus free planting materials of cassava variety, Vellayani Hraswa	PP	Asha B. Nair
2013			

2	Standardization of techniques for cultivation of *Tricholoma giganteum* Massee in Kerala	BO	Pratibha P R
3	Biology and cultivation of *Ganoderma* spp	BO	Vineeth V. Varma
4	Management of leaf spot diseases of Arecanut (*Areca catechu* L.)	PP	Vijayaraj D.
5	Integrated management of Sigatoka leaf spot disease of banana (*Musa* spp.) using newer fungicides	PP	Dattatray L. Shinde
6	Immunological and molecular detection of banana viruses and production of disease free planting materials	PP	Aliya Ferzana
2014			
7	Etiology and management of Ginger yellow disease	SPC	Safeer M.M.
8	Integrated management of pythium stem rot of vegetable cowpea (*Vigna unguiculata* subsp. *sesquipedalis* (L.) Verdcourt)	PP	Mohamed Anees M.
9	Management of collar rot and web blight of cowpea with composts and compost teas	PP	Arathy Rajan
10	Integrated management of sigatoka leaf spot disease of Banana caused by *Mycosphaerella musicola* R. leach ex J. L. Mulder	PP	Nayana K.
11	Investigation on the mycoflora of Nutmeg in storage and the associated mycotoxin	SPC	Anjali Krishma
2015			
12	Standardization of techniques for cultivation of button mushroom (*Agaricus* spp.) in Kerala	BO	Lisma N.P.
13	Integrated management of anthracnose in Chilli (*Capsicum annum* L.)	PP	Shilpa Treasa Chacko
14	Chaenophora Pod rot of cowpea and its ecofriendly management	PP	Milsha George
15	Molecular detection and characterization of phytoplasma infecting brinjal (*Solanum melongena* L.)	PP	Saranya S.S
16	Immuno molecular detection and characterization of potyviruses infecting cowpea (*Vigna unguiculata* (L.) walp.) and papaya (*Carica papaya* L.)	PP	Krishna Priya P.J
2016			
17	Physiological and cultural studies on Blue oyster Mushroom (*Hypsizygus ulmarius* (Bull.:Fr) Redhead)	BO	Sumi I.
18	Integrated management of rhizoctonia leaf blight of amaranthus (*Amaranthus tricolor* L.)	BO	Gireesh
19	Exploration of natural products from botanicals and fungal root endophytes for the management of cowpea mosaic virus	PP	Theresa Alex
2017			
20	Organic strategy for the management of sheath blight disease of Rice.	PPBM	Karthika S.R.
21	Evaluation and improvement of production technology of paddy straw Mushroom.	PPBM	Brinda G.B.
22	Management of cercospora leaf spot of vegetable cowpea (*Vigna unguiculata subsp. sesquipedalis* (L.) Verdcourt)	PPBM	Chinnu Ravi
23	Etiology and management of mosaic disease in ginger (*Zingiber officinale* Roscoe.)	PPBM	Ananthu M.
24	Management of collar root of cowpea caused by *Rhizoctonia solani* Kuhn using biofumigants.	PPBM	Aparna K.P

9) Department of Plant Breeding and Genetics

2012			
1	Variability for yield and resistance to yellow vein mosaic virus disease in okra (*Abelmoschus esculentus* L. Moench)	Veg	Kishore D.S.
2	Evaluation of okra (*Abelmoschus esculentus* (L.) Moench) genotypes for yield and resistance to shoot and fruit borer	Veg	Shrishail Duggi B.
2013			
3	Evaluation of Sesame(*Sesamum indicum* L) genotypes to the shaded uplands of Southern Region	POS	Abhijatha A.
4	Genetic evaluation for yield and resistance to phomopsis blight in Brinjal (*Solanum melongena* L.)	Veg	Kuduka Madhukar
5	Genetic evaluation of yield and anthracnose resistance in the segregating generation of three way cross hybrids in Chilli (*Capsicum annum* L.)	Veg	Vineetha G.
2014			
6	Identification of the donors for blast resistance from traditional rice varieties of Kerala using functional markers	RBC	Henry Nicholas
7	Diallel Analysis in brinjal (Solanum *melongena* L.)	Veg	Palli Rajasekhar
8	Heterosis and combining ability analysis to leaf curl virus in Chilli	Veg	Darshan S.
2015			
9	Evaluation of Genotypes for yield and resistance to leaf curl in Bird Chilli (*Capsicum frutescens* L.)	Veg	Bandla Srinivas
10	Generation mean analysis in Brinjal (*Solanum melongena* L.) for yield and yield attributes	Veg	Soumya B. Niar
11	Genetic analysis of phenological variations for yield and quality in turmeric (*Curcuma longa* L.)	SPC	Anju Vijayan
2016			
12	Stability Analysis of selected mutants in Neelamari (*Indigofera tinctoria* L.)	AMP	Saranya V.S.
13	Varietal evaluation and genetic improvement of Anthurium (*Anthurium andreanum* Linden.) through Hybridization	FL	Reshma Gopi
14	Intra-varietal variability in Komadan coconut (*Cocos nucifera* L.) palms	POS	Satish Kumar S.
15	Evaluation of Sesame genotypes for tolerance to water logging	POS	Athul V.
16	Identifying Donors for gall midge resistance from traditional rice varieties by functional markers	RBC	Asha A. Nair
17	Physico-chemical and molecular characterization of grain quality of traditional rice varieties	RBC	Jeena George
18	Evaluation of superior cultures for yield and yellow vein mosaic resistance in Okra (*Abelmoschus esculentus* (L.)	Veg	Nikitha J.
2017			
19	Genetic divergence in Kiriyat (*Andrographis paniculata* Nees)	AMP	Prathibha S.S.
20	Genetic Improvement through induced mutation in Dahlia (*Dahlia variabilis* Derf.)	FL	Manu R.
21	Evaluation of cowpea (*Vigna unguiculata* (L.) Walp) genotypes for yield and resistance to Pulse Beetle (*Callosobnichus* spp.)	FC	Thouseem N.
22	Evaluation of Tomato (*Solanum tuberosum* L.) genotypes for yield under water stress condition.	Veg	Namitha Elizabeth

23	Genetic variability for yield and resistance to legume pod borer, *Maruca vitrata* (Fab.) in Yard long Bean *(Vigna unguiculata* subsp. Sesquipedalis (L.) verdcourt)	Veg	Asoontha

10) Department of Plant Physiology

2014			
1	Physiological, phytochemical and molecular studies on Abiotic stress mediated anti -oxidant accumulation in *Amaranthus spinosus* Linn.	AMP	Garggi G.
2015			
2	Evaluation of selectively fertilized coconut hybrids (*Cocos nucifera* L.) for water use efficiency through stable isotope discrimination	COP	Aisha Renju N.A.
3	Physiological and molecular analysis of growth responses in Black pepper (*Piper nigrum* L.) under elevated carbon dioxide environments	CPB	Minu M.
2016			
4	Carbon dioxide enrichment induced drought tolerance responses in tomato (*Solanum lycopersicum* L.) and amaranthus (*Amaranthus tricolo*r L.)	CPB	Dheeraj Chetti
5	Spectral management for improving photosynthetic efficiency in polyhouse cultivation of Vegetables.	CPB	Anjana J. Madhu
6	Carbon dioxide enrichment mediated plant microbe interaction in Cowpea (*Vigna unguiculata* L.) under water stress.	CPB	Athiba P.B.
7	Physiological characterization of Thermo-Sensitive genic male sterility in Rice (*Oryza sativa* L.)	CPB	Neethu Chandra C.
2017			
8	Identification of microsatellite markers associated with root traits for drought tolerance in Rice (*Oryza sativa* L.)	BBPP	Rejeth R.

11) Department of Agricultural Microbiology

2014			
1	Isolation, characterization and evaluation of soil microorganisms for bioremediation of chloropyrifos	BO	Karolin K.P.
2015			
2	Development of root endophytic plant growth-promoters as bio-inoculants for pro-tray seedlings	BO	Vyshakhi A.S.
2016			
3	Development of inoculant cultures of zinc solubilizing microorganisms	BO	Aathira S. Kumar
4	Plant growth –promotion on root knot nematode management in Tomato by *Piriformospora indica* and *Rhizobacteria*	BO	Shilpa Varkey
2017			
5	Biocontrol potential of Plant Associated bacteria from *Piper spp.* against *Phytophthera capsici* infecting black pepper.	PPBM	Nadiya Kottakkodon
6	Isolation and characterization of Pink Pigmented Facultative Methylotrophs (PPFMs) associated with paddy	PPBM	Nysanth N.S.

12) Department of Plant Biotechnology

2013			
1	Identification of molecular marker associated with spike branching trait in Black pepper (*Piper nigrum* L.)	BT	Asish Subha
2	Cryopreservation of chethikoduveli (*Plumbago rosea* L.) and assessment of genetic fidelity of regenerated plantlets using molecular markers	BT	Anand Vishnu Prakash
2014			
3	Molecular analysis of floral meristem identity genes in black pepper	BT	Hemanth
2016			
4	Synseed production, in vitro conservation and plant conservation in banana	BT	Nazrin Nizar
5	In vitro selection for drought tolerance in Black pepper (*Piper nigrum* L.)	BT	Lakshmi Krishna
6	In vitro conservation of Chethikoduveli (*Plumbago roseo* L.) using encapsulation and vitrification techniques	BT	Sowmya A.S
7	Evaluation of si RNA mediated banana bract mosaic virus (BBrMV) resistance in Banana Plants with ihp RNA construct for replicase gene	BBPP	Harshitha C.K.

13) Department of Agricultural Extension

2012			
1	Innovation in technical backstopping for the Thiruvanthapuram district Panchayat-A critical appraisal of the 'Samagra' project on banana cultivation	AEDS	Esakkimuthu M.
2013			
2	Analysis of constraints and strategies for scaling up of precision farming in Kerala	AEDS	Sadam Hanjabam
3	Farm telecast in Kerala-a critical analysis	AEDS	Sobha S.
4	Techno socio-economic characterization of specialized homegardens: A dominance diversity approach	AEDS	Rahul Krishnan
2014			
5	Innovations in e-agricultural Extension Technology(e-AET):Diffusion and adoption of agri expert systems among extension professionals in Kerala	AEDS	Modem Ravi Kishore
6	Farmer-to-farmer extension in Kerala Agriculture: A critical analysis of Leads (Lead farmer centered extension advisory and delivery service) project in Kollam district	AEDS	Priya Peter
7	Radio listening behavior of farm families in the digital age	AEDS	Haseena Beevi A.
8	Content development for an agricultural expert system on organic vegetable cultivation	AEDS	Anupama S.
9	Revitalization of Agricultural technology management agency (ATMA): A comparative study in Thiruvananthapuram and Kottayam districts of Kerala	AEDS	Rubeena A.
10	Innovations in e- Agricultural extension Technology (e-AET) :Diffusion and adoption of information KIOSKS and mobile initiatives among the farmers of Thiruvananthapuram district, Kerala	AEDS	Hinduja N. A.
2015			
11	Technology assessment on the production practices of	AEDS	Reeba Jacob

	economically dominant crops in home gardens		
12	Technology assessment of plant protection practices of economically dominant crops in homegardens	AEDS	Sujitha P.S.
13	Adoption of organic farming technologies in banana and vegetable crops in Kasaragod District	AEDS	Akshay Sasidharan
14	Technology need assessment on horizontal and vertical diversification for the economically dominant crops in homegardens	AEDS	Iby Sebastian
15	Technology utilization of bittergourd in Thiruvanthapuram District	AEDS	Noobiya Basheer
2016			
16	Indigenous agricultural practices in Rice farming by tribal and non-tribal agricultural labourers and farmers in Wayanad District: A comparative analysis.	AEDS	Vishnu Narayanan P.M.
17	Technology utilization of KAU practices of amaranthus and vegetable cowpea in Thiruvananthapuram District.	AEDS	Anju K.K.
18	Technology utilization of banana in Thiruvananthapuram District.	AEDS	Thasneem S.
19	Innovations in Technology Dissemination (ITD): In Kannur District	AEDS	Nomitha Raghunath
20	Technology utilization of organic plant protection practices of KAU	AEDS	Aparna K. V.
21	Constraint analysis of farming on house terrace and distribution of grow bags	AEDS	Binsa B.
2017			
22	Multidimensional analysis of farmers of Integrated Farming Systems in Kuttanal	AEDS	Mammatha G. Nair
23	Technology utilization of organic plant protection practices of KAU	AEDS	Abijith P.H.
24	Scenario analysis of Rice cultivation in Palakkad District.	AEDS	Athira H.
25	Impact assessment of LEADs in Kollam and Palakkad districts: A comparative analysis	AEDS	Preethu K. Paul
26	Gender analysis of 'Adiya Tribal Agricultural Labourers' of Wayanad District.	AEDS	Danusha Balakrishnan
27	Techno socio economic analysis of house terrace cultivation in Thiruvananthapuram Corporation	AEDS	Krishna Udayan
28	Sustainability of commercial vegetable cultivation in Thiruvananthapuram district: A multidimensional analysis	AEDS	Namitha K.
29	Influence of school vegetable gardens on the students and teachers of Thiruvananthapuram District: An Expository analysis.	AEDS	Dilip S.
30	Women plantation Labourers of Tea Gardens in Idukki District: A multidimensional Analysis	AEDS	Uthara R. Nath
31	Gender analysis of vegetable growers in the Homesteads of Kollam District	AEDS	Vani Chandran
32	Analysis of livelihood issues of tribal women: the case of Palakkad district	GS	Sachana P.C.
33	Social capital formation through farm women groups in vegetable production in Kollam District	GS	Revathy Chandran
34	Performance analysis of Self Help Groups and Swasraya Karshaka Samithis (SKSs) on farm entrepreneurship in Thiruvananthapuram District.	GS	Suma Rose Sundaran

14) Department of Agricultural Economics

2012			
1	A comparative performance appraisal of VFPCK and KUDUMBSHREE in Thiruvanthapuram district	AES	Shruthi K. Soman
2	Economics of organic and conventional pepper production in Idukki dist.	AES	Sneha Elizabeth Varghese
2014			
3	Economic analysis of production and marketing of organic vegetables in Wayanad district	AES	Gurram Jayanth Reddy
2015			
4	Pepper economy of Kerala in the pre and post WTO Regimes	AES	Anju Jacob
5	Economic analysis of orchid flower trade in Kerala	AES	Aiswarya Mohanan
6	Adequacy of procurement price for paddy farmers in Kerala	AES	Sukanya S. Dharan
2016			
7	Economic impact of microbial inoculants on vegetable production in Thiruvananthapuram District.	AESBM	Jitendra Ajagol
2017			
8	Economic impact of climate change and adaptation strategy in black pepper (*Piper nigrum* L.) cultivation in Kerala	AESBM	Amogh P. Kumar
9	Economic assessment of the use of microbial inoculants in Black Pepper (*Piper nigrum* L.) in Idukki district.		Salma Muslim

15) Department of Community Science

2012			
1	Development and quality evaluation of enriched moringa (*Moringa olerifera* Lam) based soup mixes(ESM)	FSN	Saranya S.
2013			
2	Quality analysis of organic rice	FSN	Robita Riamei
3	Development and quality evaluation of ready to cook (RTC) dehydrated banana blossom	FSN	Midhila Mahendran
4	Evaluation of nutritional quality and health benefits of milky mushroom (*Calocybe indica* P&C)	FSN	Anju R.P.
5	Quality evaluation of organic ripe banana	FSN	Sreedevi L.
2014			
6	Impact of an intervention programme on food safety among women food business operators in Trivandrum and Kollam	FSN	Anila H.L
7	Impact of drumstick(*Moringa oleifera* Lam.) supplement on the nutritional status of school children	FSN	Stephy das
8	Development of jackfruit based ready-to-cook (RTC) instant mixes	FSN	Liji A.J.
9	Capacity building of rural women on enhancement of Family nutrition and livelihood security through consumption and value addition of finger millet (*Eleusine coracana* (L.) Gaertn.)	FSN	Rashmi R.
10	Empowerment of mushroom growers through technology transfer of value added products	FSN	Saima Usman

2015			
11	Development of an extruded product from raw jackfruit	FSN	Veena Kumara
12	Development and quality evaluation of probiotic honey beverage	FSN	Aparna H. Nath
13	Development and quality evaluation of fibre enriched cookies	FSN	Suma K.
14	Development of value added products from banana peel	FSN	Megha S. Karthikeyan
2016			
15	Phytochemical analysis and antioxidant potential of banana (*Musa spp.*)	FSN	Siji S.
16	Quality assessment and development of product from annona (*Annona spp.*)	FSN	Aswati K.M.
17	Assessment of nutritional status and life style diseases among different income groups.	FSN	Priya P.
18	Value added baked products from raw jack fruit	FSN	Ambica Sahoo
19	Quality analysis and culinary utilization of cashew apple (*Anacardium occidentale* L.)	FSN	Neethu Mohan
2017			
20	Effect of cluster Bean (*Cyamopsis tetragonoloba* (L) Taub.) on the dietary management of lifestyle disorders	FSN	Anagha Rachel Joseph
21	Development and quality evaluation of granular fruit bars	FSN	Meghna K.
22	Development and quality evaluation of geriatric health mix	FSN	Thasleema Salam
23	Quality analysis and development of RTE and RTC products from Ivy gourd (*Coccinia indica* L.)	FSN	Subha S Nair

16) Department of Agricultural Statistics

2016			
1	Pre-harvest forecasting Models and trends in production of Banana (*Musa spp.*) in Kerala	AESBM	Sharath Kumar M.P.
2017			
2	Pre harvest forecasting model and instability in production of cassava *(Manihot esculenta* Crantz)	AESBM	Nethu S. Kumar
3	Statistical model for profit maximization of Homesteads in Kerala	AESBM	Muhammed Jaslam P.K.
4	Comparison of statistical methods for free control of error in long term experiments in rice (*Oryza sativa* L.)	AESBM	Vishnu B.R.
5	Modified statistical methods on estimation of optimum plot size in Cassava(*Manihot esculenta* Crantz)	AESBM	Rakhi T.

APPENDIX II

Thrust areas PG research under each PC groups for a period from 2008-2014

Code	Thrust areas	2008-2014
XXIII.	**Rice and Rice Based Cropping System (RBC)**	
RBC 1	Collection, conservation and cataloguing of rice germplasm- traditional rice varieties, improved rice varieties, exotic rice varieties	0
RBC 2	Breeding for-higher yield, quality, resistance to biotic stress, resistance to abiotic stress, millers choice	1
RBC 3	High tech innovations for crop production-Hybrid rice, transgenic rice and others	2
RBC 4	Integrated Nutrient Management- use of organics and inorganics, Nutrient use efficiency, use of ameliorants	3
RBC 5	Development of location specific agro techniques- specialized crop techniques, rice-fish culture and others	1
RBC 6	Integrated pest and management- insects, diseases, weeds and others	1
RBC 7	Water management- irrigation, drainage	0
RBC 8	Seed technology- seed production, storage and quality	0
RBC 9	Mechanization in rice cultivation- Improvisation of existing technology, development of new technology	0
RBC 10	Post -harvest technology –processing technologies, value addition, product diversification, byproduct utilization.	0
RBC 11	Socio-economic dimension- gender and social crisis, marketing and pricing, organizational concepts , policy perspectives	0
RBC 12	Ecofriendly and integrated plant nutrient management for sustainable rice production	3
RBC 13	Molecular markers for yield, quality and resistance to biotic and abiotic stresses	3
RBC 14	Site specific crop management strategies foliar application etc for targeted yields	2
RBC 15	Unraveling factors limiting productivity of rice in different soils and ecosystems and formulation of technologies	1
XXIV.	**Coconut and Other Palms** (COP)	

COP 1	Germplasm conservation and evaluation	0
COP 2	Breeding for higher production and quality	0
COP 3	Breeding coconut varieties for pest/disease resistance	0
COP 4	Nutrient management and irrigation requirement	2
COP 5	Breeding and management of crop under stress conditions	1
COP 6	Palm based farming system	0
COP 7	Management of pest and disease problems	0
COP 8	Management of root(wilt) affected coconut gardens	0
COP 9	Coconut product diversification	0
COP 10	Mechanization in palms	0
COP 11	Development of value added products	1
XXV.	**Vegetables (Veg)**	
Veg 1	Breeding in solanaceous vegetables for- yield, quality, biotic stress, resistance to biotic stress	5
veg 2	Breeding in cucurbits for- yield, quality, biotic stress, resistance to abiotic stress	1
Veg 3	Breeding in leafy vegetables, leguminous vegetables and bhindi for- yield, quality, resistance to biotic stress, resistance to abiotic stress	3
Veg 4	Improvement of underexploited vegetables	1
Veg 5	Standardization of agro-techniques in vegetable crops and protected cultivation	4
Veg 6	Vegetable seed production	1
Veg 7	Cool season vegetables	2
Veg 8	Developing database on land races of vegetables	0
Veg 9	Export oriented vegetables	0
Veg 10	Hybrid Vegetables	3
Veg 11	Development of non-bolting varieties in amaranthus	1
Veg 12	Hi-tech production package with special reference to protected cultivation and precision	1

Veg 13	Hybrid and high tech production	3
Veg 14	Breeding of leguminous vegetables	1
Veg 15	Development of varieties and technologies for protected cultivation	1
Veg 16	Site specific crop management strategies for targeted yields	1
Veg 17	Development of packages for protected cultivation/precision farming	1
Veg 18	Development of varieties with multiple resistance to major biotic and abiotic stresses	1
Veg 19	Vegetables: Breeding for yield, pest resistance of yard long bean	1
Veg 20	Developing F1 hybrids in major vegetables	2
XXVI.	**Sugar and Tuber Crops (STC)**	
STC 1	Survey ,collection, preservation, maintenance and evaluation of germplasm of tuber crops	0
STC 2	Standardization of agro-techniques for tuber crops and breeding for yield, quality, pest and disease resistance	3
STC 3	Integrated nutrient management for tuber crops	0
STC 4	Collection, identification, improvement, maintenance and standardization of agro techniques for underexploited tropical root and tuber crops	0
STC 5	Trade oriented production of tuber crops through diversification and development of value added products	0
STC 6	Exploration, conservation and evaluation of genetic resources of sugarcane and sugar yielding crops	0
STC 7	Standardization of management practices of sugarcane for different situations	0
STC 8	Sugarcane breeding for yield, quality, pest and disease resistance	0
STC 9	Cropping systems involving sugar and tuber crops	0
STC 10	Production economics, processing, product development and marketing	0
XXVII.	**Fruits (FR)**	
FR 1	Collection, conservation, characterization and utilization of germplasm of fruit crops	0
FR 2	Breeding for-yield, quality, resistance to biotic stress, resistance to abiotic stress	0

FR 3	Development of location/crop specific technologies for existing/new crops and varieties of fruit crops	0
FR 4	Field level management of pest, disease and weed incidence through-chemical, biological, integrated management methods	0
FR 5	Standardization of agro techniques for homestead and commercial cultivation of fruits	2
FR 6	Standardization of propagation techniques for rapid multiplication and production of elite planting materials	1
FR 7	High-tech innovative fruit culture(high density planting, fertigation, use of bio regulators, protected cultivation, roof top cultivation, canopy regulation and tree size control etc.)	0
FR 8	Development of technologies for organic farming	0
FR 9	Development of technologies for export-oriented cultivation of fruits	3
FR 10	Development of agro techniques for subtropical and temperate fruits	0
FR 11	Product diversification and value addition	0
FR 12	Development of ecofriendly plant protection measures for major pests, diseases and nutritional disorders	1
XXVIII	**Floriculture(FL)**	
FL 1	Germplasm collection, conservation, evaluation and improvement of export oriented flowers, foliage, aquatic plants and other plants of ornamental value	4
FL 2	Standardization of production technology for commercial flowers, cut foliage, dry flowers and plant products	0
FL 3	Standardization of protected cultivation technology in cut flowers and foliage	0
FL 4	Standardization of seed production technology of annual flowers and ornamentals	0
FL 5	Standardization of nursery; production and large scale propagation techniques for commercial flowers, foliage and other ornamentals	0
FL 6	Organic production technology in floriculture	0
FL 7	Evaluation of indigenous flora and introduction of new ornamentals	0
FL 8	Lawn grasses and lawn management	0
FL 9	Indoor plants and interior plan scaping	0

FL 10	Post-harvest handling, value addition and marketing of commercial flowers, foliage and other ornamentals	0
FL 11	Traditional flowers	1
FL 12	Developing improved varieties suited to humid tropics	2
FL 13	Standardization of production package of high value crop in protected structures	2
XXIX.	**Spices and Plantation Crops (SPC)**	
SPC 1	Introduction, exploration, collection, conservation characterization and evaluation of genetic resources	0
SPC 2	Flowering, fruit set and fruit development	0
SPC 3	Breeding for high yield and quality	1
SPC 4	Breeding for tolerance/resistance to biotic and abiotic stresses	0
SPC 5	Standardization of agro techniques	0
SPC 6	Integrated nutrient and irrigation management	0
SPC 7	Integrated pest and disease management	0
SPC 8	Organic farming	0
SPC 9	Investigation on emerging pest and diseases	0
SPC 10	Value addition	0
XXX.	**Pulses and Oilseeds (POS)**	
POS 1	Exploration, conservation and evaluation of genetic resources in pulses, oilseeds and minor non-edible oil seed crops	1
POS 2	Breeding for yield and quality in pulses	1
POS 3	Breeding for yield and quality in oilseeds	0
POS 4	Breeding for biotic and abiotic stress in pulses	0
POS 5	Breeding for biotic and abiotic stresses in oilseeds	0
POS 6	Standardization of management practices for specific resource condition in pulses	0
POS 7	Standardization of management practices for specific resource condition in oilseeds	0

POS 8	Pest and disease management in pulses and oilseeds	0
POS 9	Post-harvest processing and storage of pulses and oilseeds	0
POS 10	Production economics and marketability of pulses and oil seeds	0
POS 11	Identification /development of promising varieties/ cultures in underexploited legumes of humid tropics	2
XXXI.	**Forage and Green Manure Crops (FGM)**	
FGM 1	Crop improvement of fodder and green manure crops with respect to yield and quality	0
FGM 2	Standardization of agro techniques for fodder and green manure crops in different farming systems	1
FGM 3	Fodder and green manure crop based studies for edaphic enrichment	0
FGM 4	Biotechnological studies in fodder crops to combat biotic and abiotic stress	0
FGM 5	Utilization of non -conventional forages	1
XXXII.	**Aromatic and Medicinal Plants (AMP)**	
AMP 1	Exploration, collection and evaluation of germplasm of medicinal and aromatic plants	1
AMP 2	Crop improvement in medicinal and aromatic plants	0
AMP 3	Standardization of agro techniques for medicinal and aromatic plants in different cropping systems	2
AMP 4	Management of pests and diseases of aromatic and medicinal plants	0
AMP 5	Processing and utilization of aromatic and medicinal plants products	0
AMP 6	Chemical, characterization and quality evaluation of aromatic oils and medicinal plant products	0
AMP 7	Marketing of medicinal and aromatic plants including IPR issues	0
AMP 8	Development of cultivation practices for high value medicinal plants suitable for the State	4
AMP 9	Development of neutraceutical products of commerce from medicinal plants	2
XXXIII	**Soils and Agronomy (SA)**	
SA 1	Fundamental studies on soils and climatic factors in relation to crop growth	0

	i. Characterization of micronutrients	0
	ii. Critical levels of nutrients	0
	iii. Weather based forecasting models for yield, pest and disease incidence	0
SA 2	Characterization and management of soils problems limiting crop growth	0
	i. Soil salinity	0
	ii. Soil acidity	0
	iii. Toxic elements	0
	iv. Drained soils	0
	v. Degraded laterites	0
	vi. Other soil physical constraints	0
SA 3	Pedalogical investigations, land/soil quality appraisal	1
SA 4	Agro Techniques for water management in crops and cropping system including dry land farming	0
SA 5	Soil nutrient transformations	0
	i. Biochemical	0
	ii. Microbiological	1
	iii. Nutrient interactions	0
SA 6	Soil erosion and water shed management	0
SA 7	Soil fertility evaluation techniques and integrated plant nutrient management	1
SA 8	Agronomic management of crops including weed management and herbicides	5
SA 9	Technology and management of the components in the integrated farming system	1
SA 10	Soil pollution in agro ecosystems, remediation and long –term effects of manures/fertilizers	3
SA 11	Characterization and management of secondary and micronutrients for maximum productivity	1
SA 12	Bio availability of toxicants in soil	1

SA 13	Weed management and herbicides residue analysis	2
SA 14	Management of secondary and micronutrients for maximizing productivity	2
SA 15	Research to address soil deterioration and maintaining soil quality	2
SA 16	Low cost substitute for fertilizers	1
XXXIV	**Plant Protection (PP)**	
PP 1	Identification and characterization of pest and disease incidence	3
PP 2	Ecology and systematics of pests, nematodes and pathogens	0
PP 3	Strategy for biological control-Pest, Nematode and Disease	6
PP 4	Strategy for pest, nematode and disease management	0
	i. Chemical	0
	ii. Integrated management	0
PP 5	Monitoring and forecasting of pest, nematodes and disease incidence	0
PP 6	Residual toxicity of pesticides	3
PP 7	Serodiagnosis for the production of disease free planting materials	2
PP 8	Ornithology	0
PP 9	Alternate methods for managing insect pest, diseases nematodes and weeds as a substitute for banned chemicals Kerala	16
PP 10	Molecular characterization of insect pests, plant pathogens and biological control agents	3
PP 11	Characterization of insect pests, plant pathogens and bio control agents	3
PP 12	Developing plant based formulations for pest and disease management	1
XXXV.	**Biotechnology (BT)**	
BT 1	In vitro propagation	0
BT 2	In vitro crop improvement	5
BT 3	In vitro production of secondary metabolites	0
BT 4	Genetic modification of plants and microbes	0
BT 5	Molecular marker analysis	0

BT 6	Genomics and proteomics	1
BT 7	Bioinformatics	0
BT 8	Molecular marker and marker assisted selected	1
BT 9	Molecular diagnostic/characterization	1
BT 11	Integrated biotechnology	19
XXXVI	**Post-Harvest Technology(PHT)**	
PHT 1	Post-harvest handling and marketing	0
PHT 2	Post-harvest storage and preservation	1
PHT 3	Processing product development and utilization	2
PHT 4	Agro-waste utilization	0
PHT 5	Post-harvest biotechnology- Secondary metabolite production	0
PHT 6	Development of post-harvest management of under exploited crops of Kerala	1
PHT 7	Value addition and product diversification	4
PHT 8	Packaging and storage of commercially important agri produce for internal consumption and export	1
PHT 9	Quality control studies	1
PHT 10	Grading standards	0
PHT 11	Maturity indices	0
PHT 12	Byproduct utilization	0
PHT 13	Product development for bulk use and technologies for enhancing shelf life in major perishable fruits	2
XXXVI	**Agricultural Extension and Development Studies (AEDS)**	
AEDS 1	Communication, adoption and diffusion of technologies and impact studies	1
AEDS 2	Leadership group dynamics and tribal agriculture	3
AEDS 3	Public-private partnership in agricultural extension, institutional innovations and market led extension	1
AEDS 4	Participatory approaches for sustainable agricultural development	0

AEDS 5	Agricultural extension management and human resource development	0
AEDS 6	Vocationalisation, entrepreneurship and employment generation	1
AEDS 7	Instructional technology, adult, distance and continuing education	0
AEDS 8	Location specific and need based extension strategies, methods and systems in agriculture	2
AEDS 9	ICT in Agriculture-technology, society interfaces and linkages	5
AEDS 10	Agricultural statistics and labour studies	1
AEDS 11	Decentralization of People's Planning	1
AEDS 12	Innovations in resources and crisis management in agriculture for poverty alleviation	4
AEDS 13	Agripreneurship development and participatory approaches in technology dissemination	3
AEDS 14	Impact assessment of technologies and refinement	8
AEDS 15	Research on transfer of technologies	1
AEDS 16	ITK	1
AEDS 17	Research on utilization of technology	1
XXXVI	**Beneficial Organisms (BO)**	
BO 1	Bio inoculants and integrated plant nutrients managements	0
BO 2	Rhizobacteria and mycoinoculants for plant disease management	0
BO 3	Mushrooms as food, medicine and bioconversion agents	8
BO 4	Microbial diversity, identification of new sources of beneficial microorganisms from various ecosystems and microbial inoculum production	0
BO 5	Microbial biotechnology, genetic engineering and taxonomy of beneficial microorganisms	0
BO 6	Microbial agents and their formulations for pest and disease management	0
BO 7	Beneficial insects(honey bees, silkworm, pollinators, weed killers, parasitoids and predators)and earthworm	4
BO 8	Quality control of bio formulations	0
BO 9	Bio fertilizers	0

BO 10	PGPR organisms	0
BO 11	Soil plant health management and bioremediation	1
BO 12	Use of beneficial organisms/consortium for soil and plant health management, waste management and bioremediation	4
BO 13	Newer strains of edible and medicinal mushroom	1
XXXIX	**Food Science and Nutrition (FSN)**	
FSN 1	Food security, food consumption pattern and nutritional status	4
FSN 2	Food habits preferences, consumer reactions and ITK	0
FSN 3	Nutritional problems of the community and ameliorative measures	4
FSN 4	Quality evaluation of foods and food products	6
FSN 5	Technologies for food processing, value addition, diversification and conservation	0
FSN 6	Standardization and product development	5
FSN 7	Diet in health and diseases	2
FSN 8	Energy management an d working efficiency	0
FSN 9	Food biotechnology	0
FSN 10	Computer application for nutrition education and dietary counseling	0
FSN 11	Value addition and diversification of food	4
FSN 12	Food quality evaluation	2
XL.	**Organic Farming (OF)**	
OF 1	Organic nutrition and soil health management	1
	i. Use of organic manures, bio-fertilizers and natural materials	0
	ii. Different composts and composting techniques	0
	iii. Green manuring	0
	iv. Organic amendments for soil moisture conservation and augmenting biological properties	0
OF 2	Recycling of bio wastes (urban and rural) and crop residue management	0
OF 3	Development of crop specific/location specific agro techniques	1

	i. Organic production of cereals, fruits, vegetables, spices and medicines	0
	ii. Quality assessment and post-harvest technology	4
OF 4	Developing value added organic inputs-evaluation-production economics and marketing	1
OF 5	Strategies of total organic farming and organically based integrated nutrient management	0
	i. Nutrient management	0
	ii. Ecofriendly pest, disease, weed and nematode management	1
OF 6	Developing quality parameters of organic inputs-evaluation and quality control, natural materials and commercially available organic inputs	1
OF 7	Organic certification-developing standards	0
OF 8	Residual effects and long term effects of organic inputs	0
OF 9	Biodynamic farming	0
OF 10	Strategies for sustainable organic farming	0
OF 11	Ecofriendly management of pest and diseases	0
OF 12	Biodynamic of farming	0
OF 13	Development of concentrated liquid formulations and listing of enriched organic manures and formulations	1
XLI.	**Gender Studies (GS)**	
GS 1	Gender role analysis of farming systems	0
	i. Activity analysis of farming system	0
	ii. Time use pattern and energy utilization studies of farm operations by men and women	0
GS 2	Gender concerns in access and control of farm resources, natural resources, biodiversity, farmer support services and social institutions	0
GS 3	Gender issues, technological needs and constraints of women farmers	0
GS 4	Women farm labour, needs, constraints and livelihood security	0
GS 5	Occupational problems and health hazards of women in farming, ergonomic studies and women friendly technologies	0

GS 6	Women empowerment and women entrepreneurship	0
	i. Empowerment measurement studies	0
	ii. Empowerment through group approaches,	0
	iii. Micro credits and micro enterprises	0
GS 7	Gender impact of farm technologies, extension policies, development programmes and farm support initiatives	3
GS 8	Gender sensitive agricultural development, training needs of scientists and development functionaries	0
GS 9	Engendering dimensions of ITK, IPR, biodiversity, agrarian changes and global trade relations	0
GS 10	Gender disaggregated database of agricultural sector and gender sensitive policy advocacy	1
GS 11	Research on gender specific issues in agricultural research, supervision, cultivation and selections for addressing the problems	1
GS 12	Entrepreneurship in agriculture	1
XLII.	**Agro- Economic Studies (AES)**	
AES 1	Natural resource and environmental economics	0
AES 2	Farm management and production economics	3
AES 3	Agricultural marketing, price policy and international trade	0
AES 4	Agricultural finance and project analysis	0
AES 5	Agricultural development economics and policies	0
AES 6	Market Intelligence studies	2
AES 7	Impact assessment of technologies	1
AES 8	Cost of production	1
AES 9	Analyzing international/National/State policies and sensitizing its impact on farm sector	1
AES 10	Economic impact and assessment of cost of production of major crops and technologies in Kerala	2
XLIII.	**Natural Resource Management (NRM)**	
NRM 1	Tools and techniques for inventorisation, characterization and monitoring	0

	of natural resources of Kerala	
NRM 2	Monitoring of natural resource degradation and adaptation to mitigate its adverse effects on agricultural production systems	1
NRM 3	Remote sensing, GIS and other ICT tools for improvement in agricultural education, research and advisory services	1
NRM 4	Sustainable land use plans for agro-ecological zones in the State	0
NRM 5	Integrated input management for sustained soil health and crop productivity	1
NRM 6	Technologies for managing wetlands and water logged/saline lands	0
NRM 7	Participatory research and development of watersheds in various agro-ecological zones to enhance the productivity and resource conservation	0
NRM 8	Inter-displinary initiatives for farming systems and watershed research	1
NRM 9	Agro-eco-zone specific diversification of agriculture and hi-tech production systems	0
NRM 10	Plant biodiversity assessment through remote sensing	0
NRM 11	Precision Farming	1
XLIV.	**Crop Physiology and Biochemistry (CPB)**	
CPB 1	Stress physiology-physiological basis of crop responses to biotic stresses, abiotic stresses and crop resilience to climate change	2
CPB 2	Physiological mechanism/constrains in crop productivity under modern farming system like precision farming/protected cultivation, mechanical, organic and aerobic farming system	1
CPB 3	Growth physiology of crops (flowering, reproduction, seed physiology and senescence)	1

Thrust areas PG research under each PC groups for a period from 2015 to 2017

Code	Thrust areas	2015-2017
I.	**Rice (R)**	
R 1	Collection, conservation and cataloguing of rice germplasm	0
R 2	Breeding for higher yield, quality and resistance to biotic/abiotic stresses	2
R 3	Research on hybrid rice, transgenic rice and speciality rice	1
R 4	Development of location specific agro techniques for sustainable rice production	3

R 5	Management of abiotic stresses	3
R 6	Management of biotic stresses	2
R 7	Physiological approaches for enhancing crop productivity	0
R 8	Mechanization in rice cultivation	0
R 9	Post-harvest technology in rice	0
R 10	Socioeconomic dimensions of rice cultivation in Kerala	0
II.	**Spices and Plantation Crops (SPC)**	
SPC 1	Germplasm collection, conservation and evaluation	2
SPC 2	Breeding for high yield and quality	1
SPC 3	Breeding for pest and disease resistance / tolerance	0
SPC 4	Propagation and nursery techniques	0
SPC 5	Agro techniques for yield and quality improvement	1
SPC 6	Integrated nutrient management	2
SPC 7	In situ moisture conservation and irrigation management	0
SPC 8	Integrated pest and disease management	0
SPC 9	Good agricultural practices and organic farming	0
SPC 10	Post-harvest handling and value addition	0
SPC 11	Biotechnology aspects	0
SPC 12	Developing user friendly machines	0
III.	**Vegetables (Veg)**	
Veg 1	Development of F1 hybrids in major vegetables	3
Veg 2	Development of vegetable varieties with resistance to major biotic and abiotic stresses	2
Veg 3	Development of packages for protected cultivation / precision farming for high productivity	3
Veg 4	Site specific crop management strategies in vegetables for targeted yields	1
Veg 5	Adaptability, improvement and large scale multiplication of under-exploited and ethnic vegetables, and cool season vegetables	3

Veg 6	Developing technologies for homestead, kitchen garden, grow bag and terrace vegetable cultivation including soil-less production technologies.	0
Veg 7	Eco-friendly technologies for plant protection in vegetables with special emphasis on pests, diseases, birds and nutritional and physiological disorders	0
Veg 8	Seed production, processing, storage, testing and quality enhancement in vegetables	0
Veg 9	Collection, characterization and maintenance of germplasm of major vegetables	0
Veg 10	Breeding for yield, pest resistance of yard long bean	1
Veg 11	Standardization of nutrient recommendations including macro and micronutrients under open and polyhouse condition	1
IV.	**Fruits (FR)**	
FR 1	Collection, characterisation, documentation, conservation and evaluation of germplasm of major and minor fruits	1
FR 2	Identification/development of improved varieties for commercial cultivation and utilisation.	0
FR 3	Refinement of propagation and management methods	3
FR 4	Development of organic management practices.	1
FR 5	Management of pest and diseases	0
FR 6	Domestication, evaluation and management of exotic fruits.	0
FR 7	Identification of subtropical fruit varieties for plains, development of agro techniques for subtropical and temperate fruits	0
FR 8	Identification of fruit crops and varieties suitable for homestead cultivation	0
FR 9	High tech fruit culture (high density planting, fertigation, tree size control, protected cultivation, canopy regulation etc.)	0
FR 10	Biotechnological interventions in fruit crops.	0
FR 11	Development of pre and post -harvest technologies for enhancing shelf life of major fruit crops.	0
FR 12	Product diversification, by-product utilisation and waste management of fruit crops.	0
FR 13	Mechanization in fruit cultivation, harvesting, postharvest handling and processing	0

FR 14	Influence of climatic variations in the performance of fruit crops	0
V.	**Field Crops – cereals (other than rice), millets, pulses, oil seeds, fodder crops and green manure crops (FC)**	
	Cereals (other than rice) and millets	
FC 1	Screening and agro-techniques for millets and cereals other than rice for changing climatic conditions / major cropping systems of Kerala.	0
FC 2	Development of package of practices for baby corn, sweet corn and sweet sorghum.	1
	Pulses	
FC 1	Screening varieties for stress situations and high yield	2
FC 2	Identification/ development of suitable varieties for rice fallows	0
FC 3	Agro techniques for yield maximization and quality improvement including mulching, fertigation and weed management	3
FC 4	Development of photo insensitive varieties in pulses	0
FC 5	Isolation and formulation of native bio fertilizers for pulse crops	0
FC 6	Plant protection methods including botanicals and microbial consortium	0
FC 7	Management of storage pests and diseases	0
	Oil Seeds	
FC 8	Collection, conservation and cataloguing of germplasm of oilseed crops	0
FC 9	Developing high yielding varieties with tolerance to biotic and abiotic stresses suitable for rice based cropping system	0
FC 10	Weed management in oil seeds	0
FC 11	Harvesting and processing technology for oil seeds	0
FC 12	Investigating therapeutic and nutraceutical value of sesamum / ground nut	0
FC 13	Developing value added products	0
FC 14	Agrotechniques for under exploited oilseeds	1
	Fodder crops	
FC 15	Identifying high quality fodder crops / varieties.	1
FC 16	Developing varieties suited to biotic and abiotic stresses and for soil	0

3/6

	conservation.	
FC 17	Developing package for plant protection, higher yield and quality.	3
FC 18	Improving seed setting in cereal and legume fodders.	0
FC 19	Fodder preservation techniques.	2
	Green manure crops	
FC 20	Green manuring in major cropping systems of Kerala for soil health and productivity.	0
FC 21	Soil carbon sequestration and micro nutrient addition potential of green manure / green leaf manure crops.	0
FC 22	Exploitation of green manure potential of non-conventional sources like mimosa, mikania, merrimia, wild coccinia etc.	0
VI.	**Floriculture (FL)**	
FL 1	Protected cultivation and precision farming in commercial flowers and foliage	0
FL 2	Standardization of production technology and improvement of cut flowers and other ornamentals	2
FL 3	Evaluation of indigenous flora and introduction of new ornamentals	0
FL 4	Post-harvest handling, value addition and market studies	0
FL 5	Interior plant scaping and pollution abatement studies	0
FL 6	Landscape horticulture	0
FL 7	Developing of improved varieties suited to humid tropics	1
VII.	**Aromatic and Medicinal Plants (AMP)**	
AMP 1	Exploration, conservation and evaluation of germplasm	2
AMP 2	Genetic improvement for yield and quality	0
AMP 3	Nursery and agro techniques in Medicinal & Aromatic Plants	4
AMP 4	Management of pest and diseases in Medicinal & Aromatic Plants	0
AMP 5	Post-harvest technology, value addition and product development	0
AMP 6	Chemical characterization and quality studies in medicinal and aromatic plants and their products	0
AMP 7	Economics and marketing of Medicinal & Aromatic Plants	0

VIII.	**Biotechnology, Biochemistry and Plant Physiology (BBP)**	
BBBP 1	Plant Tissue Culture for	0
	i. Micro propagation of recalcitrant species and commercially important crops	0
	ii. Crop improvement	3
	iii. Secondary metabolite production	2
BBBP 2	Molecular characterization, diversity analysis and Marker Assisted selection.	1
BBBP 3	Genome mapping, gene annotation and genetic transformation	1
BBBP 4	Genome, transcriptome, proteome metabolome and phenome analysis	5
BBBP 5	Bioinformatics resources and applications in agriculture.	0
BBBP 6	Nano biotechnology and molecular diagnostics	2
BBBP 7	Physiology of crops in precision farming/protected cultivation/organic farming/aerobic system and tissue culture	0
BBBP 8	Physiological approaches for increasing crop productivity and stress tolerance	7
BBBP 9	Physiological basis of crop response and resilience to climate change	4
BBBP 10	Biochemical basis and characterization of	0
	i. Important disorders / diseases in crop plants	0
	ii. Agroproducts / New phytocompounds / Biomolecules	0
BBBP 11	Integrated biotechnology- Integration of Plant Biotechnology with industrial, environmental, animal, medical, food, algal biotechnology and metagenomics	36
BBBP 12	Somatic embryogenesis in black pepper	1
IX.	**Soil Health and Organic Farming (SHOF)**	
SHOF 1	Basic Studies on Soils	0
SHOF 2	Soil Fertility evaluation and nutrient management for sustaining soil health and yield maximization.	5
SHOF 3	Plant nutrition and nutrient use efficiency.	3
SHOF 4	Nutrient management in high tech agriculture and soilless media.	0

SHOF 5	Natural Resource management for sustainable development and resource conservation.	4
SHOF 6	Characterization and management of constrained/ problem soils.	2
SHOF 7	Waste management for improving soil health and productivity.	4
SHOF 8	Environmental pollution and remediation measures.	1
SHOF 9	Organic farming and good agricultural practices for soil health and safe food production.	2
SHOF 10	Soil ecology and ecosystem conservation.	0
SHOF 11	Utilisation of non-conventional forages	1
SHOF 12	Urban and peri-urban cropping/ farming systems	1
X.	**Farming System Research and Climate Studies (FSRCS)**	
FSRCS 1	Cropping systems research	1
FSRCS 2	Multi-enterprise farming systems/Homestead Farming	1
FSRCS 3	Urban and peri-urban cropping/ farming systems	2
FSRCS 4	Conservation agriculture	0
FSRCS 5	Integrated resource management in cropping/farming systems	7
FSRCS 6	Component interactions in cropping/farming systems	1
FSRCS 7	Agro-ecological characterization and watershed research	0
FSRCS 8	System based precision farming	0
FSRCS 9	Crop weather studies, meteorological parameter interactions and forecasting/simulation models	0
FSRCS 10	Climate resilient agriculture/climate change adaptation studies.	0
FSRCS 11	Ocean – climate interactions and animal response studies.	0
XI.	**Crop Pest and Beneficial Insects (CPBI)**	
CPBI 1	Ecology and Biosystematics	0
	i. Morphological characterization and documentation of insect pests/ natural enemies and non-insect pests of important crops	3
	ii. Molecular systematics for identification of crop pests and natural enemies	0

	iii. Exploration and collection of Insect and non-insect biodiversity	1
CPBI 2	Climate change and changing pest scenario	0
	i. Pest surveillance, short term and long term forecasting of pests	0
	ii. Population dynamics of crop pests in relation to weather parameters	0
	iii. Change in pest status and modes of attack	0
CPBI 3	Strategy for Pest management	8
	i. Estimation of crop loss and data base generation	0
	ii. Ecofriendly methods of pest control & Ecological Engineering	4
	iii. Chemical interventions	1
	iv. Screening germplasm of major crops for resistance to pests, identification of resistance mechanisms including biotechnological approaches	0
	v. Chemical ecology	0
	vi. Pest management under protected cultivation and High Tech Agriculture	0
	vii. Vector plant interaction	0
	viii. Spatial distribution, invasion dynamics and management of newly emerging and alien pests	0
	ix. Post-harvest Entomology	0
CPBI 4	Pesticide toxicology	1
	i. Monitoring pesticide residues in crops and environment and its management	0
	ii. Impact of pesticides on non- target organisms	0
	iii. Bio efficacy and chemo dynamics of pesticides	1
	iv. Nanotechnology in pesticide formulations	1
	v. Insecticide resistance and its management	2
CPBI 5	Biological Control of Insects, Non insect pests and weeds	1
	i. Potential indigenous natural enemies	1

	ii. Formulation technologies of bio pesticides and bio herbicides	1
	iii. Conservation techniques of bio control agents under field conditions	0
	iv. Studies on in-vitro production for obligate entomopathogens using cell line culture and molecular tools	0
	v. Studies on multiple tolerant bio control agents and entomopathogens	0
	vi. Tritrophic interactions	0
CPBI 6	Apiculture	1
	i. Honey bees for pollination of different crops in field and polyhouses	1
	ii. Location specific research on bee management	1
	iii. Quality control and value addition of honey	0
	iv. Cataloguing of floral calendar	0
	v. Meliponiculture	2
CPBI 7	Non-insect pests (mites, nematodes, rodents, birds, snail and slugs)	0
	i. Population dynamics of depredatory birds and its conservation management	0
	ii. Beneficial birds	0
	iii. Rodents and other Vertebrate pest management	0
CPBI 8	Insects as Bio resources	0
	i. Medicinal and edible insects	0
	ii. Insects as indicators of water pollution	0
CPBI 9	Molecular approaches in Entomological Research	0
	i. DNA fingerprinting to study population structure, biotype studies and monitoring genetic changes in insect pest population	0
	ii. Mapping of insecticide resistant genes in insects	0
CPBI 10	Beneficial insects (Honey bees)	2
CPBI 11	Alternate methods for managing insects, pest, diseases, nematodes and weeds as a substitute to banned chemicals in Kerala	1

XII.	**Plant Pathogens and Beneficial Microbes (PPBM)**	
PPBM 1	Detection, identification, characterization, molecular and Nano technological studies of plant pathogens and beneficial micro-organisms for crop nutrition, crop protection and microbial biotechnology.	6
PPBM 2	Development of novel strategies, beneficial microbes, their improved strains and biomolecules for ecofriendly management of crop diseases, crop nutrition, crop growth enhancement and biocontrol of weeds.	16
PPBM 3	Development of efficient microbial formulations and delivery systems for enhanced crop production and protection.	2
PPBM 4	Post-harvest and seed borne diseases, mycotoxins and their management.	0
PPBM 5	Crop loss assessment, disease mapping, epidemiological aspects and integrated management of major and emerging diseases of crop plants of Kerala.	3
PPBM 6	Mushroom production technology and its application in biodegradation, nutraceuticals and pharmaceuticals	3
PPBM 7	Molecular basis of beneficial microbial associations and host- pathogen interaction.	0
PPBM 8	Role of plant nutrition and climate change in the development and management of plant diseases.	0
PPBM 9	New generation fungicides, development of fungicidal resistance, non - target effects, compatibility and role of residues with respect to food safety and environmental concerns.	0
PPBM 10	Exploitation of microbes for bioremediation, biological waste management and waste water recycling.	0
XIII.	**Post-Harvest Technology (PHT)**	
A	Postharvest management	
PHT 1	Postharvest management in major and minor crops	3
PHT 2	Pre- harvest factors affecting post-harvest quality	0
PHT 3	Utilisation of microbial agents in post-harvest management	0
PHT 4	Application of biotechnology in post-harvest management	0
PHT 5	Post-harvest management in organic crops	0
B	Processing and value addition	
PHT 6	Processing and value addition	2

PHT 7	Packaging and storage of processed commodities	0
PHT 8	Bioactive compounds and development of functional foods	2
PHT 9	Waste utilization	0
PHT 10	Development of novel , organic and convenient food products	0
PHT 11	Quality control studies	0
XIV.	**Food Science and Nutrition (FSN)**	
FSN 1	Food security, food consumption pattern and nutritional status	0
FSN 2	Nutritional problems of the community	0
FSN 3	Quality evaluation of foods & Food products	2
FSN 4	Food Processing, Value addition and product diversification in foods.	4
FSN 5	Diet in Health and Diseases	3
FSN 6	Bio active components in foods – Antioxidants and phytochemicals	1
FSN 7	Food hygiene and safety	0
FSN 8	Bio waste utilization.	0
FSN 9	Traditional foods - in changing food habits.	0
FSN 10	Toxicological studies in foods and food products.	0
FSN 11	Wellness foods /Functional Foods/Nutraceuticals/Probiotics	0
FSN 12	Application soft wares/apps for nutrition education and dietary package	0
FSN 13	Developing regional standards for anthropometric indices	0
FSN 14	Analysis of bio active components in food and food products	1
XV.	**Agricultural Economics, Agricultural Statistics and Agribusiness Manage (AESBM)**	
	Agricultural Economics	
AESBM 1	Impact assessment of KAU technologies/other programmes	1
AESBM 2	Analyzing International/National/State policies and sensitizing its impact on farm sector	2
AESBM 3	Cost of production and marketing of major crops/inputs/technologies	2
AESBM 4	Natural resources and environmental economics	3

	Agricultural Statistics	
AESBM 1	Developing innovative methods for analyzing scientific data Agricultural statistics of Kerala and India	5
AESBM 2	Theoretical and applied studies	7
	Agribusiness Management	
AESBM 1	1. Agribusiness Management Studies	0
AESBM 2	2. Evaluation of rural financing scenario and financial institutions	0
AESBM 3	3. Management of co-operatives and group initiatives	0
AESBM 4	4. Value analysis of Agribusiness	0
AESBM 5	5. Evaluation of Agricultural and rural development programmes	0
XVI.	**Agricultural Extension and Development Studies (AEDS)**	
AEDS 1	Agricultural crisis and policy research	1
AEDS 2	ICT in Agriculture and media studies	1
AEDS 3	Participatory approaches	1
AEDS 4	Innovations and technology management	1
AEDS 5	Subaltern and Gender studies	4
AEDS 6	NRM and sustainable development	5
AEDS 7	Entrepreneurship and skill development	1
AEDS 8	Extension management and development studies	11
AEDS 9	Impact assessment of technologies and refinement	2
AEDS 10	Research on transfer of technologies	1
AEDS 11	Location specific and need based extension strategies, methods and systems in agriculture	1
AEDS 12	Women empowerment and gender analysis in agriculture, SHG approaches for agriculture development, entrepreneurship and skill development	1
XVII.	**Sugarcane and Tuber Crops (STC)**	
	Sugarcane	
STC 1	Developing varieties suitable for different agro climatic situations of Kerala	0

STC 2	Cost effective and input efficient technologies for high yield and quality in sugarcane	0
STC 3	Developing technologies for processing, product diversification and byproducts utilisation of sugarcane	0
STC 4	Management of biotic and abiotic stresses in sugarcane	0
STC 5	Mechanization in sugarcane cultivation and harvesting	0
	Tuber Crops	
STC 6	Development of high yielding, location specific and pest and disease resistant varieties in tuber crops	1
STC 7	Development of package of practices including organic package of practices in tuber crops	3
STC 8	Eco-friendly technologies for plant protection with special emphasis on vertebrate pests and virus diseases	0
STC 9	Development of technologies for large scale production of planting materials of tuber crops	1
STC 10	Utilisation of underexploited tuber crops	0

APPENDIX III

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF AGRICULTURE, VELLAYANI- 695 522

Questionnaire

Perceived usefulness and content analysis of post graduate theses in Agriculture: the case of College of Agriculture, Vellayani

1. Name of Teacher (Mr./Ms./Dr.) :
2. Discipline :
3. Permanent address :
4. Married/Unmarried :
5. If married, spouse details-
   a) Name :
   b) Occupation :
6. Age of the respondent :
7. Qualification (Please specify)

Degree	Name of the University	Year of completion
M.Sc.		
Ph. D		
Post. Doc		
Any other- specify		

8. Date of entry into service in KAU :
9. In which year of your service you started guiding :
10. Number of students guided : PG----/Ph.D.----
11. Number of students currently guiding : PG----/ Ph.D.----
12. Number of students who published their research work :PG----/ Ph.D.---
13. Total number of paper published by student : PG----/ Ph.D.---
14. Number of Externally Aided Projects : As PI----
    (Excluding Plan Projects) :
15. Number of conference/seminars/ workshops attended:
    a. Within Kerala :----------

b. In India :----------

c. Overseas :----------

16. a. Whether all the resources needed is available for PG and Ph.D students? Yes/No

b. Whether there is any difficulty in getting resources? Yes/No

Sl. No.	Item	a. If yes, Extent of availability			b. If yes; Extent of difficulty		
		VMA	A	LA	VD	D	L
1.	Literature						
2.	Research materials						
3.	Raw materials						
4.	Funds						

[VMA- Very Much Available; A- Available; LA- Least Available; VD- Very difficult; D- Difficult; LD- Least difficult]

17. Whether students according to you have attitude* towards research.

[Very good/Good/Poor]

(*Here attitude means the mental predisposition of the students towards research.)

18. Please mention the extent of usefulness of PG research :

a) For University [Very useful/Useful/Not Useful]

b) For Society(farming community) [Very useful/Useful/Not Useful]

c) For Personal benefit [Very useful/Useful/Not Useful]

19. Whether the students under your guidance do possess the following research skills.

a) Information Seeking Skills [Very much/Much/Not Much]

b) Methodology Skills [Very much/Much/Not Much]

20. Please rate the ability of your PG students in general to conduct research on the following statements:

Please tick (√) the relevant boxes based on the scale below:

Sl. No.	Statements	VP	P	NVP	S	VS
1.	Searching for a research problem					
2.	Doing a literature review					
3.	Ability to plan a research					
4.	Developing a research question					
5.	Selecting an appropriate research method					
6.	Design an experiment study					
7.	Selecting an instrument					
8.	Developing an instrument					
9.	Collecting of survey data					
10.	Choosing an appropriate 'method analysis of data'					
11.	Interpreting the result of a research study					
12.	Writing an abstract					
13.	Preparing a manuscript for publication					

[VP- Very Poor; P- Poor; NVP- Not Very Poor; S- Satisfactory; VS- Very Satisfactory]

21. Fund given by KAU for PG & PhD research scholars:
[Sufficient/Not sufficient/Least sufficient]

22. Please name 3 (three) journals you believe are the premier research journals for agriculture in your discipline:

    a. ----------
    b. ----------
    c. ----------

23. 'The research themes framed by our University for your department are adequate and currently addresses the problems of Kerala Agriculture'. Please assign a weightage on 10 for the statement. **(-------/10)**

24. What do you believe are the top five Research Themes to be focused currently in the field of agriculture:

    a. ----------

b. ----------
c. ----------
d. ----------
e. ----------

25. Whether any problems identified in ZREAC meeting are taken for research work (Yes/ No).
Please specify:

26. Enlist the most important 3 (three) gaps in agricultural research which need to be given priority or focused upon: (In case of more gaps in PG research please be free to mention the same).

a. ----------
b. ----------
c. ----------
Others:

27. Enlist 5 main constraints that your students face in PG research in agriculture.

a. ----------
b. ----------
c. ----------
d. ----------
e. ----------

28. What will be your suggestions to overcome the perceived constraints?

29. Please be free to render any additional comments to improve the quality of PG research in our university:

Thank you…

APPENDIX IV

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF AGRICULTURE, VELLAYANI- 695 522
Questionnaire

Perceived usefulness and content analysis of post graduate theses in Agriculture: the case of College of Agriculture, Vellayani

1. Name of students (Mr./Ms.) :
2. Class (year of study) :
3. Department :
4. Gender(Male/Female) :
5. Your Locality area(Village/Town/City) :
6. Your caste (ST/ SC/OBC/General) :
7. Family Detail:

Sl. No.	Family	Age	Educational Qualification	Occupation	Income
1.	Father				
2.	Mother				
3.	Brother				
4.	Sister				
5.	Others				

8. Educational details

Class of study	**Name of school/ College**	**G/AP/UP**	**English/Vernacular**
Kindergarten			
1-3			
4-6			
7-9			
10^{th}			
12^{th}			
Degree			
PG/Ph.D.			

[G- Government/ A-Aided Private/ UP- Unaided Private]

9. Attitude

Rank your attitude towards research according to 5 point Likert scale. Place a tick mark against the statements based on your degree of agreement that

ranges from 1-5 where a score of 1 indicates 'strongly disagree' and 5 indicate 'strongly agree'.

Statements	SA	A	N	D	SD
Research usefulness					
Research is connected to my field of study and its useful for my career					
Research should be indispensable in my professional training					
Research should be taught to all students					
The skills I have acquired in research will be helpful to me in the future and will employ research approaches in my profession					
Research Anxiety					
Research makes me nervous					
Research for me is complex and stressful					
Research makes me anxious					
I feel insecure concerning the analysis of research data					
Positive attitudes towards research					
I love and enjoy doing research					
I am interested in research					
Most students benefit from research					
I am inclined to study the details of research					
Relevance to life					
I aim to use research in my daily life					
Research-orientated thinking will help me in my professional life.					
Research thinking does not apply to my personal life					
Research is irrelevant to my life					
Difficulty of research					
I have trouble with arithmetic					
I find it difficult to understand the concepts of research					
I make many mistakes in research					
Research is difficult and complicated					

[Strongly agree (SA), Agree (A), Neither agree nor disagree (N), Disagree (D) and Strongly disagree (SD)]

Extent of usefulness of PG research

Parameter	VU	U	LU	NU
For me, personally				
For the farming community				
For the research institution/University				

[VU-Very Useful; U-Useful; LU-Less Useful; NU-Not Useful]

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10. Research skills

Following are statements reflecting the research skills in terms of a) information seeking skills and b) methodology skills. Please tick (√) the relevant boxes based on your perception as to the degree of agreement on the statements given below. The five point continuum is: Strongly agree (SA), Agree (A), neither agree nor disagree (N), Disagree (D) and strongly disagree (SD)

a) Information Seeking Skills

Statements	SA	A	N	D	SD
I premeditate the types of information I need like book, articles, journals and others					
I am aware that information found in journals are more often checked, edited and criticized compared to information found in magazines.					
I am aware that information can be obtained through various on-line and offline means (e.g. electronic media, images, audio and video).					
I identify and look for synonyms, themes or key words that can be used to find information based on my topic.					
I need to broaden my search using key words given that the existing source of information indicates that my topic of research is too narrow.					
I will look at the strategy to find information again in order to get exactly what I want if it is not successful the first time.					
I evaluate the accurateness of the content by reading other sources mentioned by the writer.					
I get the confirmation of my understanding on a certain topic by getting an opinion or an expert's view through available means.					
I am able to adjust with the various quotation/citations styles used for referencing.					
I write down the important concept myself using my own words while information gathering for more clarity in research work.					
I combine the main idea from one source or more in order to find a new idea.					
I can construct my own conclusion based on the information gathered.					

b) Methodology Skills

Please tick (√) the relevant boxes based on the scale below:

Please respond on your ability as a PG student to conduct research.

Statements	VP	P	NVP	S	VS
Ability to plan a research					
Developing a research question					
Searching for a research problem					
Doing a literature review					
Design an experiment study					
Selecting an instrument					
Developing an instrument					
Collecting of survey data					
Writing an abstract					
Preparing a manuscript for publication					
Selecting an appropriate research method					
Choosing an appropriate method analysis of data					
Interpreting the result of a research study					

[VP-Very poor, P-Poor, NVP- Not very poor, S-Satisfactory, VS-Very Satisfactory]

11. What are your views on the research being taught to PG students:

12. Whether all the resources needed is available (Yes/No).
    If yes- [Very Much Available/Available/Less Available]

13. Is there any difficulty in getting the resources (Yes/No)?
    If yes- [Very Difficult /Difficult /Less Difficult]

14. Fund given by KAU for your research work.(Sufficient/Not sufficient/Least sufficient):

15. How is the research work environment? Is it workable (Yes/No)
    If yes- [Very Much/Much/Not Much]

16. Did you get any help from your classmates or friends (Yes/No)
    If yes- [Very Much/Much/Not Much]

What was the extent of contribution of teachers for your research work?

Teachers	Very much	Much	Not much
Chairman			
Advisory committee members			
Other non-members			

17. What was the extent of contribution of Departments in general for your research work?

Departments	Very much	Much	Not much
Own Department			
Other Department			

18. Are you satisfied with your research (Yes/No).
    If yes- [Very Much/Much/Not Much]

19. Have you published any research work (Yes/No). If Yes in which Journals:

20. How much difficult is it to be published (Very Difficult/ Difficult/ Not Difficult).
    If difficult specify the difficulty with reasons:

21. Have you done any conference or seminar during your research period (Yes/No). Please specify the name and whether it is University/Regional/National/International level

22. How do you feel attending these kinds of seminars, conferences, workshops and alike. (Very useful/Useful/Not useful).

23. Did you receive any awards or incentives from participating (Yes/No). If yes please specify:

24. Please identify 5 journals you believe are the premier research journals for agriculture:

25. What do you believe are the top five Research Themes to be focused currently in the field of agriculture:

26. Enlist at least 3 gaps in agricultural research:

27. Enlist 5 main constraints you face in PG research in agriculture.

28. What will be your suggestions to overcome the perceived constraints?

29. Please be free to render any additional comments:

APPENDIX V

Check List for content analysis of PG research theses:

1. Title
    - No. of words
    - No. of thesis with scientific name in the title
2. Thrust Area

Year	PC Groups	Thrust Areas	No. of Thesis
Total			

- Total no. of thrust areas
- Total no. of thrust areas excluded

3. No. of Objectives
4. No. of words in an abstract
5. References

- No. of reference under each thesis
- Categorization of reviews based on years

Sl. No.	Earlier than 1900
1	up to 1900
2	1900-1925
3	1926-1950
4	1951-1975
5	1976-2000
6	after 2001

- No. of reviews from:
    - Books
    - Journals
    - Thesis
    - Reports
    - Conference/ seminars
    - Magazines
    - Newspapers
    - Online
    - Others

- Errors:
  - Reviews presented in Chronological order-
  - References presented in alphabetical order-
  - Page numbers not noted-
  - Abbreviations correctly for journal names-
  - Name of Journal/ Books not mentioned in italics-

6. Research methodology adopted

- Locale of study:
- Target crop and area
- Sample size
- No. of dependent/independent variables
- Sampling methods:
- Research design
- Types of data:
- Techniques for data collection:
- Analysis of data:

7. Thesis format:

- No. of pages
- No. of tables
- No. of figures
- No. of plates /photographs
- No. of appendices
- No. of abbreviations

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ABSTRACT

PERCEIVED USEFULNESS AND CONTENT ANALYSIS OF POST GRADUATE THESES IN AGRICULTURE: THE CASE OF COLLEGE OF AGRICULTURE, VELLAYANI

by

DEINICHWA DKHAR

(2017-11-116)

ABSTRACT

Of the thesis submitted in partial fulfilment of

the requirement for the degree of

MASTER OF SCIENCE IN AGRICULTURE

Faculty of Agriculture

Kerala Agricultural University, Thrissur

DEPARTMENT OF AGRICULTURAL EXTENSION

COLLEGE OF AGRICULTURE

VELLAYANI, THIRUVANANTHAPURAM-695 522

KERALA, INDIA

2019

ABSTRACT

A study on "Perceived usefulness and content analysis of Post Graduate theses in Agriculture: the case of College of Agriculture, Vellayani" was undertaken in the year 2018-19. The main objectives were to find out the perceived usefulness and pattern of post-graduate research studies on its contents, related parameter and trend of the identified thrust area for PG research. The study also explored and analyzed the constraints and opinions as perceived by the teachers and students in the conduct of post graduate research. The entire thesis submitted to College of Agriculture, Vellayani from 2012-2017 were enumerated under different divisions and was subjected to qualitative content analysis. The ex-post facto study of research themes for the study was covered for the period from 2008-2017. A total of 120 respondents comprising of 60 students and 60 teachers were selected for the study on perceived usefulness of PG research.

Over the years, Post Graduate (PG) research showed an increasing trend in number and maximum numbers of theses (109) were from the division of crop production. During 2008 to 2014, 12 PC groups were found to have 50 per cent or more untouched thrust areas and 90 per cent of this contributed from 'sugarcane and tuber crops' (STC) and 'spices and plantation crops' (SPC). For the period from 2015 to 2017, 11 PC groups had more than 50 per cent of untouched thrust areas among which 'fruits' (FR) contained 78.57 per cent of untouched areas. Irrespective of periods, the comparison between 10 similar Project Co-ordination (PC) groups revealed that out of 108 thrust areas 62 were untouched which constituted 57.40 per cent. The maximum untouched thrust areas were for FR (78.57%) and the minimum (36.36%) was for 'vegetables' (Veg). It was interesting to note that 'agricultural extension and development studies' (AEDS) touched upon all the 12 thrust areas. In most cases the number of thrust areas reduced over the years but the percentage of untouched area showed an increasing trend.

The results on content pattern of PG research was conducted for different parameters. In case of the number of words present in the title of theses, it was noted that 'Community Science' theses contained the minimum and maximum words (5-25). However, it was good to note that majority (76.99%) theses contained least to moderate number of words in the title. On perusal of data department wise, Agronomy comprises the lowest range (8-14) and majority of the theses (80.49%) were medium worded with a minimum of 5 to maximum of 17 words in the title. The results revealed that irrespective of different divisions, majority of the theses were found to have medium number of words in the title. The distribution of data was symmetric (0.50) in case of number of words with exception to social science theses that was moderately skewed (0.94) to the right. In case of theses title with scientific names, all the theses in the departments of Pomology and Floriculture, Vegetable Science and Plant Physiology contained scientific name. Results for the number of words in the abstract revealed that theses from the department of Soil Science and Agricultural Chemistry and Agronomy had the least (252) and maximum (1976) number of words respectively. Summarization of results on mean number of words in theses abstract using quartiles revealed that, theses of departments from crop production, crop protection and Agricultural Statistics belonged to the medium worded category. Irrespective of different departments, it was observed that out of 287 theses 64.81 per cent addressed 2-4 numbers of objectives. Overall, the data were highly skewed (1.37) to the right. Summarization of results based on mean number references in theses using quartile revealed that crop protection and crop improvement theses had medium (103 to 148) number of references, out of which 55.93 per cent was on publication made after 2001 and 71.35 per cent of the sources were Journals. The mean number of references for the entire thesis submitted was 134. The mean number of pages per theses cutting across all departments was 116. The average number of tables, figures and appendices (56, 21 & 4) were more for theses from department of Agricultural Statistics followed by 32 tables for Social science, 16 figures for theses from departments under crop production and 3 appendices each for crop protection and social science. In case

of average number of plates per theses, crop protection theses had maximum number (16) of plates. The most commonly used research design for Crop production is Randomized Block Design (44.31%), Completely Randomized Design (53.13% and 48.08%) for Crop protection and Crop improvement and Ex-post facto design (49.28%) for Social science theses. ANOVA (37.65%, 63.08% and 21.48%) is the commonly used statistical tools for analysis of theses belonging to crop production, crop protection and crop improvement. Percentage (20.41%), correlation (16.74%) and frequency (11.22%) computation followed by categorization based on mean (16.84%) or quartile (7.4%) were the major statistical tools used in social science division. Majorities (81.15%) of the studies were conducted in Thiruvananthapuram district and mainly focused on vegetables (37.07%), cereals (13.40%), fruits (12.46%) and spices (8.41%).

The dependent variables for the study were perceived usefulness and attitude of students and teachers towards PG research. 86.66 per cent of students and 97.78 per cent of teachers respectively perceived that PG research was useful to very useful in terms of personal benefits, benefits to farming community and institution undertaking research. When 68.33 per cent of the students possessed medium level of attitude towards research, 84.44 per cent teachers opined that students possessed good attitude towards PG research and only 13.33 per cent students had very good attitude. Sub-components of student's attitude towards PG research *viz*., research usefulness, research anxiety, positive attitude of students, relevance to life and difficulty of research were significant at one per cent level of significance.

The common three major constraints in doing PG research as perceived by both students and teachers were lack of proper infrastructure (Rank 1) followed by scarcity of land, labour and capital (Rank 2), privation of flexibility with approved technical programme (Rank 3). Poor writing skill of students (Rank 4) was considered to be an important constraint as discerned by teachers. The major suggestions as perceived by teachers for overcoming the general constraints for undertaking PG research were encouraging interdisciplinary need based research

with farmer orientation, utilization of ICAR funds for creation of a centralized multidisciplinary instrumentation lab for PG research, ensuring adequate land, labour and capital for departments undertaking field experiments and making research process flexible.