RESEARCH GUIDELINES OF K A U

XI PLAN (2007 - 2012)

PLANNING CELL
DIRECTORATE OF RESEARCH
KERALA AGRICULTURAL UNIVERSITY
VELLANIKKARA, THRISSUR – 680 656

English

RESEARCH GUIDELINES OF K A U XI PLAN (2007 - 2012)

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FOREWORD

Agricultural education and research in the state had a modest beginning when the erstwhile princely State of Travancore started a Demonstration Farm at Karamana in Thiruvananthapuram (1896) to impart training on modern agricultural practices. Later on, agriculture was introduced as an optional subject in the middle school (1922) and intermediate (1953) classes. In 1955, the erstwhile Government of Travancore- Cochin established two colleges (one each for Agriculture and Veterinary Sciences) respectively at Vellayani (Thiruvananthapuram) and at Mannuthy (Thrissur). Agricultural education and research gained further momentum with the commencement of thesis-oriented PG programmes leading to M. Sc (Ag), M.V. Sc and Ph. D degrees in 1961, 1962 and 1965 respectively. The Kerala Agricultural University (KAU) was established on 24 February 1971 as per the KAU Act (Act 33, 1971 of the Kerala State Legislative Assembly), to give the much-needed impetus for agricultural development in the state through education and research.

Today, KAU is one of the most sought after R&D institutes in the country. The state has a total geographic area of 39 lakh ha with a net-cropped area of 20.54 lakh ha. Kerala is also endowed with a long coastline of 580 km and with abundant source of rainwater (300 cm per annum). Diversified farming systems, intercropping, mixed cropping, sequential cropping and many other forms of poly culture involving wide spectrum of cereals, pulses and the predominance in horticultural crops *viz*., fruits, vegetables, latex and oil yielding plantation crops, beverages, spices, flower and foliage plants, medicinal and aromatic plants, timber yielding forest trees and animal and fish wealth are the hallmark that make Kerala a potential destination for agricultural research. In the past three decades KAU made significant contributions in agricultural education, research and extension. In 2003, KAU bagged the coveted "Sardar Patel Award" for the best ICAR institution in the country. This success was achieved mainly with the concerted effort and teamwork of the teachers and scientists of KAU for the last so many years.

Based on the interface discussions at various levels *viz*., field visit, meeting, seminar and zonal research extension advisory committee meeting etc., the University is adopting an approved research policy towards solving the problems of farmers. To frame a new dimension in the XI Plan, I feel it is relevant to identify priority areas of research for each campuses of KAU.

The guideline is the outcome of the efforts of the project coordinators, heads of stations and scientists of KAU. The sincere effort taken by the Planning Cell, Directorate of Research, in its compiling and editing is highly appreciated. I hope the book will ensure the desired quality of research among the young Scientists who can take care of the farmers of Kerala with the basic agenda like poverty alleviation, livelihood security and employment generation via agriculture, the ideal job in earth that keeps man close to nature.

K.R. Viswambharan, I.A.S
Vice Chancellor

CONTENTS

1. INTRODUCTION

The Kerala Agricultural University is committed to generate technologies in agriculture and allied areas and dissemination of the same to the farming sector of Kerala through the developmental agencies such as of the Departments of Agriculture, Animal Husbandry, Developmental Banks, NGOs and similar other establishments in the state. KAU fulfils its obligations and commitments through a network of 36 big and small campuses spread over Kerala consisting of 10 constituent colleges, 6 Regional Agricultural Research Stations, 26 Research Stations, 3 Centres of Advanced Studies, 7 Krishi Vignan Kendras, 10 Instructional Farms, the Central Training Institute, the Centre of Excellence in Training in Plantation Crops and the Communication Centre; In this endeavor, a contingent of 723 teachers/scientists, 1399 technical staff, 1398 administrative staff, 1173 permanent labourers and, 538 casual labourers are fully geared up to address the task assigned. The guidelines contained in this book will provide road map for the researchers in realizing the mandatory research requirements.

2. MANDATE AND MISSION

The mandate of KAU is aimed to achieve the overall development of agriculture encompassing field crops and horticultural crops, agricultural engineering, animal husbandry, fishery and forestry through conducting, interfacing and integrating education, research and extension, providing human resources, skills and technology required for the sustainable development of Kerala's agriculture and allied fields.

3. RESEARCH POLICY

Lack of technology is always pointed out as constraints for higher production in farming sector of Kerala. A true analysis reveals that this is not due to the non-availability of technology. But one can see that even the available technology is not effectively harnessed due to poor dissemination. Right technology at the right time is the need of the hour and a concerted and coordinated effort in the agricultural sector can only address the problem of the farms.

KAU as a nucleus institute in agriculture research has developed sufficient production technologies in more than 125 traditional and popular crops of humid tropics. An effective system for the timely dissemination of these technologies is the need of the hour. KAU can only initiate the work, whereas the Officers of the Developmental Departments like Agriculture and Animal Husbandry can play a vital role both in the dissemination as well as in the feedback. The Research policies of the KAU now enunciated are based upon the deliberations and feedback.

1. To sustain academic excellence in agricultural education and research by integrating the best of traditional knowledge with frontier technologies such as biotechnology, information technology and nanotechnology.

2. To generate technologies to improve production and productivity of location specific crops, livestock and fisheries.
3. To conduct basic, applied and adaptive research for developing appropriate technolo gies with special reference to the socio-economic conditions of the farmer.
4. To set up an extension network for the efficient transfer of the technologies developed by the university to farmers through the extension personnel of various develop mental departments.
5. To promote agri-based industries with indigenous and modern technologies.
6. To develop technologies for mechanizing farm operations in Kerala and lessening the drudgery and overcome the shortage of labourers.
7. To locate, preserve, patent/register and improve the available technologies and varieties.
8. To preserve the biodiversity in the state for future use in crop and animal breeding.
9. To facilitate professionalism of management friendly institutions and support service systems for assisting the farmers in maximizing the economic gains through the efficient utilization of domestic resources and effective management system.
10. To develop technical/skilled manpower required in agriculture and allied areas.

4. THRUST AREAS OF RESEARCH

The thrust areas have been categorized separately for various faculties and under different project coordination (PC) groups. A project coordinator nominated by the Director of Research will head each project coordination. The members of the group draw from different disciplines are experienced teachers as the selected by the coordinator and are approved by the Director of Research. The coordination group meeting will verify the new projects prior to the approval of the FRC (Faculty Research Council). The group is responsible for reviewing the ongoing projects and preparing research reports and timely monitoring. Details of various coordination groups under the thrust areas of research in various faculties are described below:

4.1. AGRICULTURE

1. RICE AND RICE BASED CROPPING SYSTEM (RRBC)

Project Coordinator

Dr. S. Leenakumary
Professor (PB & Gen)
Rice Research Station,
Moncombu, Thekkekkara P.O
Alappuzha – 688 503
Phone: 9446618082
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Thrust areas

1. Collection, conservation and cataloguing of rice germplasm
   i. Conservation and cataloguing of traditional rice varieties
   ii. Conservation and cataloguing of improved rice varieties
   iii. Conservation and cataloguing of exotic rice varieties

2. Breeding for
   i. Higher yield
   ii. Quality
   iii. Resistance to biotic stress
   iv. Resistance to abiotic stress

v. Millers choice

3 High tech innovations for crop production
   i. Hybrid rice
   ii. Transgenic rice
   iii. Others

4. Integrated nutrient management
   i. Use of organics and inorganics
   ii. Nutrient use efficiency
   iii. Use of ameliorants

5. Development of location specific agrotechniques
   i. Specialized crop techniques
   ii. Rice-fish culture
   iii. Others

6. Integrated pest and management
   i. Insects
   ii. Diseases
   iii. Weeds
   iv. Others

7. Water management
   i. Irrigation
   ii. Drainage

8. Seed technology
   i. Seed production
   ii. Storage
   iii. Quality

9. Mechanization in rice cultivation

   i. Improvisation of existing technology
   ii. Development of new technology

10. Post harvest technology

   i. Processing technologies
   ii. Value addition
   iii. Product diversification
   iv. Byproduct utilization

11. Socio-economic dimension

   i. Gender and social crisis
   ii. Marketing and pricing
   iii. Organizational concepts
   iv. Policy perspectives

2. COCONUT AND OTHER PALMS (COP)

Project Coordinator

Dr. P.C. Balakrishnan
Associate Director of Research (NR)
Regional Agricultural Research Station, Pilicode P.O
Kasargode – 671 353
Phone: 9447692354
KAU Webmail : adrpil@kau.in

Thrust areas

1. Germplasm conservation and evaluation
2. Breeding for higher production and quality
3. Breeding coconut varieties for pest/disease resistance
4. Nutrient management and irrigation requirement
5. Breeding and management of crop under stress conditions
6. Palm based farming system
7. Management of pest and disease problems
8. Management of root (wilt) affected coconut gardens
9. Coconut product diversification
10. Mechanization in palms

3. VEGETABLES (VEG)

Project Coordinator

Dr. M. Abdul Vahab
Professor & Head
Department of Olericulture
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522.
Phone: 9447192989
E mail: vahab786@yahoo.com

Thrust areas

1. Breeding in solanaceous vegetables for
   i. Yield
   ii. Quality
   iii. Biotic stress
   iv. Resistance to biotic stress
2. Breeding in cucurbits for
   i. Yield
   ii. Quality
   iii. Biotic stress
   iv. Resistance to abiotic stress
3. Breeding in leafy vegetables, leguminous vegetables and bhindi for
   i. Yield
   ii. Quality
   iii. Resistance to biotic stress
   iv. Resistance to abiotic stress
4. Improvement of underexploited vegetables
5. Standardization of agro-techniques in vegetable crops and protected cultivation
6. Vegetable seed production
7. Cool season vegetables
8. Developing database on land races of vegetables
9. Export oriented vegetables
10. Hybrid vegetables

4. SUGAR AND TUBER CROPS (STC)

Project Coordinator

Dr. R. Pushpakumari
Professor
Department of Agronomy
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
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Thrust areas

1. Survey, collection, preservation, maintenance and evaluation of germplasm of tuber crops
2. Standardisation of agro-techniques for tuber crops and breeding for yield, quality, pest and disease resistance
3. Integrated nutrient management for tuber crops
4. Collection, identification, improvement, maintenance and standardisation of agrotechniques for underexploited tropical root and tuber crops
5. Trade oriented production of tuber crops through diversification and development of value added products
6. Exploration, conservation and evaluation of genetic resources of sugarcane and sugar yielding crops
7. Standardisation of management practices of sugarcane for different situations
8. Sugarcane breeding for yield, quality, pest and disease resistance
9. Cropping systems involving sugar and tuber crops
10. Production economics, processing, product development and marketing

5. FRUITS (FR)

Project Coordinator

Dr. C.S. Jayachandran Nair
Professor & Head
Department of Pomology & Floriculture
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
Phone: 9847631754
E mail: csjnair@yahoo.co.in

Thrust areas

1. Collection, conservation, characterization and utilization of germplasm of fruit crops
2. Breeding for
   i. Yield
   ii. Quality
   iii. Resistance to biotic stress
   iv. Resistance to abiotic stress
3. Development of location/crop specific technologies for existing/new crops and varieties of fruit crops
4. Field level management of pest, disease and weed incidence through
   i. Chemical
   ii. Biological
   iii. Integrated management methods

5. Standardisation of agrotechniques for homestead and commercial cultivation of fruits
6. Standardisation of propagation techniques for rapid multiplication and production of elite planting materials
7. High-tech innovative fruit culture (high density planting, fertigation, use of bioregulators, protected cultivation, roof top cultivation, canopy regulation and tree size control etc.)
8. Development of technologies for organic farming
9. Development of technologies for export-oriented cultivation of fruits
10. Development of agrotechniques for subtropical and temperate fruits
11. Product diversification and value addition

6. FLORICULTURE (FL)

Project Coordinator

Dr. P.K. Rajeevan
Associate Dean i/c
College of Horticulture
Vellanikkara
Thrissur– 680 656.
Phone: 9447136344
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Thrust areas

1. Germplasm collection, conservation, evaluation and improvement of export oriented flowers, foliage, aquatic plants and other plants of ornamental value
2. Standardisation of production technology for commercial flowers, cut foliage, dry flowers and plant products
3. Standardisation of protected cultivation technology in cut flowers and foliage
4. Standardisation of seed production technology of annual flowers and other ornamentals
5. Standardization of nursery; production and large scale propagation techniques for commercial flowers, foliage and other ornamentals
6. Organic production technology in floriculture
7. Evaluation of indigenous flora and introduction of new ornamentals
8. Lawn grasses and lawn management
9. Indoor plants and interior planscaping
10. Post harvest handling, value addition and marketing of commercial flowers, foliage and other ornamentals

7. SPICES AND PLANTATION CROPS (SPC)

Project Coordinator

Dr. E.V. Nybe
Professor & Head
Department of Plantation crops and spices
College of Horticulture, Vellanikkara
Thrissur – 680 656
Phone: 9446437975
E.mail : evnybe@lycos.com

Thrust areas

1. Introduction, exploration, collection, conservation characterization and evaluation of genetic resources
2. Flowering, fruit set and fruit development
3. Breeding for high yield and quality
4. Breeding for tolerance/resistance to biotic and abiotic stresses
5. Standardisation of agrotechniques
6. Integrated nutrient and irrigation management
7. Integrated pest and disease management
8. Organic farming
9. Investigations on emerging pests and diseases
10. Value addition

8. PULSES AND OIL SEEDS (POS)

Project Coordinator

Dr. Sverup John
Professor (Plant Breeding & Genetics)
Onattukkara Regional Agricultural Research Station
Kayamkulam
Alappuzha – 690 502
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E.mail : sverup@sancharnet.in

Thrust areas

1. Exploration, conservation and evaluation of genetic resources in pulses, oilseeds and minor non-edible oil seed crops
2. Breeding for yield and quality in pulses
3. Breeding for yield and quality in oil seeds
4. Breeding for biotic and abiotic stress in pulses
5. Breeding for biotic and abiotic stresses in oilseeds

6. Standardisation of management practices for specific resource condition in pulses
7. Standardisation of management practices for specific resource condition in oil seeds
8. Pest and disease management in pulses and oilseeds
9. Post harvest processing and storage of pulses and oilseeds
10. Production economics and marketability of pulses and oil seeds

9. FORAGE AND GREEN MANURE CROPS (FGMC)

Project Coordinator

Dr. S. Lakshmi
Associate Professor
Department of Agronomy
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
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Thrust areas

1. Crop improvement of fodder and green manure crops with respect to yield and quality
2. Standardisation of agrotechniques for fodder and green manure crops in different farming systems
3. Fodder and green manure crop based studies for edaphic enrichment
4. Biotechnological studies in fodder crops to combat biotic and abiotic stress

10. AROMATIC AND MEDICINAL PLANTS (AMP)

Project Coordinator

Dr. Samuel Mathew
Professor (SS & AC)
Aromatic & Medicinal Plant Research Station
Asamanoor P.O, Odakkali
Ernakulam – 683 549
Phone: 9447061841
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Thrust areas

1. Exploration, collection and evaluation of germplasm of medicinal and aromatic plants
2. Crop improvement in medicinal and aromatic plants
3. Standardisation of agrotechniques for medicinal and aromatic plants in different cropping systems
4. Management of pests and diseases of aromatic and medicinal plants
5. Processing and utilization of aromatic and medicinal plant products
6. Chemical, characterization and quality evaluation of aromatic oils and medicinal plant products
7. Marketing of medicinal and aromatic plants including IPR issues

11. SOILS AND AGRONOMY (SA)

Project Coordinator

Dr. Sumam Susan Varghese
Professor
Department of Soil Science and Agricultural Chemistry
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
Phone : 0471 2731727
E.mail: sumamsvarghese@yahoo.co.uk

Thrust areas

1. Fundamental studies on soils and climatic factors in relation to crop growth
   i. Characterization of micronutrients
   ii. Critical levels of nutrients
   iii. Weather based forecasting models for yield, pest and disease incidence
2. Characterization and management of soil problems limiting crop growth
   i. Soil salinity
   ii. Soil acidity
   iii. Toxic elements
   iv. Drained soils
   v. Degraded laterites
   vi. Other soil physical constraints
3. Pedological investigations, land/soil quality appraisal
4. Agro Techniques for water management in crops and cropping system including dry land farming
5. Soil nutrient transformations
   i. Biochemical
   ii. Microbiological
   iii. Nutrient interactions
6. Soil erosion and water shed management
7. Soil fertility evaluation techniques and integrated plant nutrient management
8. Agronomic management of crops including weed management and herbicide
9. Technology and management of the components in the integrated farming system
10. Soil pollution in agro ecosystems, remediation and long-term effects of manures/ fertilizers

12. PLANT PROTECTION (PP)

Project Coordinator

Dr. T. Nalinakumari
Professor & Head
Department of Agricultural Entomology
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
Phone: (R) 0471 2384450
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Thrust areas

1. Identification and characterization of pest and disease incidence
2. Ecology and systematics of pests, nematodes and pathogens
3. Strategy for biological control
   i. Pest
   ii. Nematode
   iii. Disease
4. Strategy for pest, nematode and disease management
   i. Chemical
   ii. Integrated management
5. Monitoring and forecasting of pest, nematodes and disease incidence
6. Residual toxicity of pesticides
7. Serodiagnosis for the production of disease free planting materials
8. Ornithology

13. BIOTECHNOLOGY (BT)

Project Coordinator

Dr. K. Rajmohan
Professor & Head
Department of Plant Biotechnology
College of Agriculture, Vellayani
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Thrust areas

1. *In vitro* propagation
2. *In vitro* crop improvement
3. *In vitro* production of secondary metabolites
4. Genetic modification of plants and microbes
5. Molecular marker analysis
6 Genomics and proteomics
7. Bioinformatics

14. POST HARVEST TECHNOLOGY (PHT)

Project Coordinator

Dr. P. Jacob John
Professor & Head
Department of Processing Technology
College of Horticulture, Vellanikkara
Thrissur – 680 656
Phone: 9495013340
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Thrust areas

1. Post harvest handling and marketing
2. Post harvest storage and preservation
3. Processing product development and utilization
4. Agro-waste utilization
5. Post harvest biotechnology – Secondary metabolite production
6. Development of post harvest management of under exploited crops of Kerala
7. Value addition and product diversification
8. Packaging and storage of commercially important agri produce for internal consumption and export
9. Quality control studies
10. Grading standards
11. Maturity indices
12. Byproduct utilization

15. AGRICULTURAL EXTENSION AND DEVELOPMENT STUDIES (AEDS)

Project Coordinator

Dr. R. Prakash
Professor
Department of Agrl. Extension
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
Phone: 9446331825
E.mail: prakashraja@gmail.com

Thrust areas

1. Communication, adoption and diffusion of technologies and impact studies
2. Leadership group dynamics and tribal agriculture
3. Public-private partnership in agricultural extension, institutional innovations and market led extension

4. Participatory approaches for sustainable agricultural development
5. Agricultural extension management and human resource development
6. Vocationalisation, entrepreneurship and employment generation
7. Instructional technology, adult, distance and continuing education
8. Location specific and need based extension strategies, methods and systems in agriculture
9. ICT in Agriculture-technology, society interfaces and linkages
10. Agricultural statistics and labour studies

16. BENEFICIAL ORGANISMS (BO)

Project Coordinator

Dr. M. Govindan
Professor
College of Agriculture
Padannakkad
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Thrust areas

1. Bioinoculants and integrated plant nutrients managements
2. Rhizobacteria and mycoinoculants for plant disease management
3. Mushrooms as food, medicine and bioconversion agents
4. Microbial diversity, identification of new sources of beneficial microorganisms from various ecosystems and microbial inoculum production
5. Microbial biotechnology, genetic engineering and taxonomy of beneficial microorganisms
6. Microbial agents and their formulations for pest and disease management
7. Beneficial insects (honey bees, silkworm, pollinators, weed killers, parasitoids and predators) and earthworm
8. Quality control of bioformulations
9. Biofertilizers
10. PGPR organisms

17. AGROFORESTRY AND SILVICULTURE (AFS)

Project Coordinator

Dr. T.K. Kunhamu
Associate Professor
Department of Silviculture & Agroforestry
College of Forestry, Vellanikkara
Thrissur – 680 656
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E.mail: kunhamutk@yahoo.com

Thrust areas

1. Homegardens/homestead farming structure and composition – medicinal plants, tubers, vegetables, species, and fruit crops as understorey crops in homegarden systems and other woodlots
2. Competition/complementary and/or allelopathic influence of the homestead farming
3. Non wood forest products from agro forestry systems – techniques for generation, harvesting, handling, storage and value addition
4. Organic matter generations – planting green leaf manure trees. Trees for livefencing considering green leaf manure generation potential
5. Soil fertility improvement, organic matter addition and soil amelioration through integrating tree planting with agricultural production
6. Seacoast stabilization by integrating planting of trees, mangroves and crops
7. Integrating fish farming with growing trees and agricultural crops
8. Phyto-remediation for reclaiming wastelands
9. Refining agroforestry models and input management

18. FOOD SCIENCE AND NUTRITION (FSN)

Project Coordinator

Dr. Mary Ukkru
Professor
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Thrust areas

1. Food security, food consumption pattern and nutritional status
2. Food habits preferences, consumer reactions and ITK
3. Nutritional problems of the community and ameliorative measures
4. Quality evaluation of foods and food products
5. Technologies for food processing, value addition, diversification and conservation
6. Standardization and product development
7. Diet in health and diseases
8. Energy management and working efficiency
9. Food biotechnology
10. Computer application for nutrition education and dietary counseling

19. SEED TECHNOLOGY (ST)

Project Coordinator

Dr. K. Sudhakara
Professor (Silviculture &Agro forestry)
College of Forestry, Vellanikkara
Thrissur – 680 656
Phone: 9447671448
E.mail: sudhakarakudlu@yahoo.com

Thrust areas

1. Seed production of crop plants, forage crops, medicinal crops (including medicinal rice), ornamental plants, green manure crops, under-utilized crop plants and forest trees for different agroclimatic conditions
   i. Seed production under controlled condition
   ii. Development of seed yield enhancing techniques
2. Seed dormancy and germination, the effect of various pretreatments on seed dormancy and germination
3. Seed vigor, ageing and response to priming treatments
4. Seed treatments, packaging materials, storage techniques, seed purity and quality assessment – Revitalization of traditional knowledge on seed processing, storage and germination techniques
5. Seed borne diseases and insect pests; Value addition in seeds using trichoderma, pseudomoas, mycorrhiza, botanicals, *Rhizobium*, growth regulators, micronutrients, pesticide etc.
6. Seed biology, chemical composition, equilibrium moisture status, maturity indices and germination characteristics of forest trees. Mangrove species, aquatic species and weed species
7. Improvement of storage life of intermediate and recalcitrant seeds including development of cryopreservation and synthetic seed technology
8. Seed ecology – seed dissemination – soil seed bank studies
9. Fixing certification standards for tissue cultured crops, vegetative propagated crops and farmers' saved seeds
10. Hybrid seed production – formulating standards for testing hybrid seeds and hybrid derivatives

20. FOREST MANAGEMENT AND WILDLIFE (FMW)

Project Coordinator

Dr. K. Gopikumar
Professor & Head
Department of Forest Management & Utilization
College of Forestry, Vellanikkara
Thrissur – 680 656
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E.mail: gopikumark@yahoo.com

Thrust areas

1. Growth behaviour, measurement techniques, enumeration, volume increment, prediction and assessment model for fixing rotations
2. Nursery technology and management aspects of commercial forest tree species
3. Phytosociological, floral diversity, litter decomposition and ecological studies
4. Extraction and storage of non-timber forest produces
5. General survey, ecology, feeding, behaviour, habitat preference, population dynamic etc. of wildlife.
6. Migration studies of birds and animals
7. Domestication of wild animals
8. Environmental auditing and management, pollution control and impact assessment
9. Biofuels
10. NTFP

21. ORGANIC FARMING (OF)

Project Coordinator

Dr. K. Ushakumari
Associate Professor
Department of Soil Science & Agrl. Chemistry
College of Agriculture, Vellayani
Thiruvananthapuram – 695 522
Phone: 9446662992
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Thrust areas

1. Organic nutrition and soil health management
   i. Use of organic manures, bio-fertilizers and natural materials
   ii. Different composts and composting techniques
   iii. Green manuring
   iv. Organic amendments for soil moisture conservation and augmenting biological properties
2. Recycling of biowastes (urban and rural) and crop residue management
3. Development of crop specific/location specific agrotechniques
   i. Organic production of cereals, fruits, vegetables, species and medicines
   ii. Quality assessment and post harvest technology
4. Developing value added organic inputs-evaluation-production economics and marketing
5. Strategies of total organic farming and organically based integrated nutrient management
   i. Nutrient management
   i. Ecofriendly pest, disease, weed and nematode management

6. Developing quality parameters of organic inputs-evaluation and quality control, natural materials and commercially available organic inputs
7. Organic certification –developing standards
8. Residual effects and long term effects of organic inputs
9. Biodynamic farming
10. Strategies for sustainable organic farming
11. Ecofriendly management of pest and diseases
12 Biodynamics of farming

22. GENDER STUDIES (GS)

Project Coordinator

Dr. G. Sobhana
Professor (Agrl. Extension)
Instructional Farm, Vellayani
Thiruvananthapuram 695 522
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Thrust areas

1. Gender role analysis of farming systems
   i. Activity analysis of farming system
   ii. Time use pattern and energy utilization studies of farm operations by men and women
2. Gender concerns in access and control of farm resources, natural resources, biodiversity, farmer support services and social institutions
3. Gender issues, technological needs and constraints of women farmers
4. Women farm labour, needs, constraints and livelihood security
5. Occupational problems and health hazards of women in farming, ergonomic studies and women friendly technologies
6. Women empowerment and women entrepreneurship
   a) Empowerment measurement studies
   b) Empowerment through group approaches, micro credits and micro enterprises
7. Gender impact of farm technologies, extension policies, development programmes and farm support initiatives
8. Gender sensitive agricultural development, training needs of scientists and development functionaries
9. Engendering dimensions of ITK, IPR, biodiversity, agrarian changes and global trade relations
10. Gender disaggregated database of agricultural sector and gender sensitive policy advocacy

23. AGRI BUSINESS MANAGEMENT (ABM)

Project Coordinator

Dr. M. Mohandas
Professor
College of Cooperation and Banking
Vellanikkara
Thrissur – 680 656
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Thrust areas

1. WTO, IPR and agri-business
2. Marketing of agri-business products
3. Financial services and financial markets
4. Trade in agri-business
5. Product development, value addition and quality management in agri-business
6. Agri-entrepreneurship
7. Resource management in agri-business
8. Women and agribusiness
9. Economics of agri-business
10. Commodity exchanges

24. AGRO-ECONOMIC STUDIES (AES)

Project Coordinator

Dr. K.J. Joseph
Professor & Head
KVK, Kumarakom
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Thrust areas

1. Natural resource and environmental economics
2. Farm management and production economics
3. Agricultural marketing, price policy and international trade
4. Agricultural finance and project analysis
5. Agricultural development economics and policies

25. NATURAL RESOURCE MANAGEMENT (NRM)

Project Coordinator

Dr. N. Saifudeen
Professor and Head
Department of Soil Science & Agrl. Chemistry
College of Agriculture, Vellayani
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Thrust areas

1. Tools and techniques for inventorisation, characterization and monitoring of natural resources of Kerala
2. Monitoring of natural resource degradation and adaptation to mitigate its adverse effects on agricultural production systems
3. Remote sensing, GIS and other ICT tools for improvement in agricultural education, research and advisory services
4. Sustainable land use plans for agro-ecological zones in the State
5. Integrated input management for sustained soil health and crop productivity
6. Technologies for managing wetlands and water logged/saline lands
7. Participatory research and development of watersheds in various agro-ecological zones to enhance the productivity and resource conservation
8. Inter-disciplinary initiatives for farming systems and watershed research
9. Agro-eco-zone specific diversification of agriculture and hi-tech production systems
10. Plant biodiversity assessment through remote sensing

4.2. VETERINARY AND ANIMAL SCIENCES

1. ANIMAL DISEASE (AD)

Project Coordinator

Dr. T. Saradamma
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Thrust areas

1. Emerging diseases and health related problems of animals
2. Animal disease research
3. Diagnosis and control techniques
4. Zoonotic diseases

2. ANIMAL REPRODUCTION (AR)

Project Coordinator

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Thrust areas

1. Reproductive efficiency improvement and diagnostic techniques in animal
2. Clinico-gynaecological techniques
3. Reproductive health problem and surveillance
4. Assisted reproductive techniques

3. BIO TECHNOLOGY (BT)

Project Coordinator

Dr. G. Krishnan Nair
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Thrust areas

1. Molecular technology for production and reproduction
2. Germplasm resource bank
3. Biological production

4. CATTLE AND BAFFALO (CB)

Project Coordinator

Dr. V. Prasad
Professor & Head
University Livestock Farm, Mannuthy
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Thrust areas

1. Adaptation, conservation and characterisation of desi and cross bred animals
2. Techniques for improving production and performance
3. Low cost feeds and feeding formulation
4. Forage and forage crops for improving production performance.

5. ECONOMICS, STATISTICS & EXTENSION (ESE)

Project Coordinator

Dr. M.R. Subhadra
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Thrust areas

1. HRD and training
2. Problematic research regarding knowledge dissemination in Animal Husbandry
3. Economics of livestock production
4. Quality aspects of drinking water

6. GOAT AND RABBIT (GR)

Project Coordinator

Dr. K.C. Raghavan
Professor
CASAGB, Co VAS, Mannuthy
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Thrust areas

1. Goat, sheep and rabbit breeding
2. Characterization and improvement in native breeds for milk and meat
3. Problem oriented research
4. Non-conventional feed based production techniques

7. LIVESTOCK PRODUCTS TECHNOLOGY (LPT)

Project Coordinator

Dr. P. Kuttinarayanan
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Thrust areas

1. Value addition in milk, meat and egg
2. Non conventional meat from livestock
3. Upgradation of abattoirs and waste management
4. Standardization of ethnic milk, meat and egg production
5. Preservation and byproduct utilization
6. Food safety & control certification
7. Veterinary Public Health

8. POULTRY & DUCK (PD)

Project Coordinator

Dr. A. Jalaludeen
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Thrust areas

1. Nutritional requirements
2. Sustainable production
3. Collection, characterization and conservation of desi breeds
4. Livelihood security and human empowerment
5. Ornamental and pet birds

9. SWINE (SW)

Project Coordinator

Dr. K.V. Raghunandanan
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Thrust areas

1. Breeding with special reference to market/consumer demand
2. Prevention and control of emerging diseases
3. Standardisation of waste utilization for energy recycling
4. Backyard and homestead integration

10. WILD LIFE (WL)

Project Coordinator

Dr. P.C. Saseendran
Professor & Head
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Thrust areas

1. Non invasive method of musth in elephants
2. Conservation of endangered wild species
3. Invasive and noninvasive control of breeding in vermin wild species

4.3. FISHERIES

1. FRESHWATER AQUACULTURE (FA)

Project Coordinator

Dr. C. Mohanakumaran Nair
Professor and Head
Department of Aquaculture
College of Fisheries, Panangad
Cochin – 682 506
Phone: 9847023828
E. mail: naircm@hotmail.com

Thrust areas

1. Sustainable Aquaculture
2. Perfecting the Seed Production and grow out technology for indigenous food fish, shell fishes and ornamental fishes.
3. Recirculation of aquaculture.
4. Fisheries biotechnology and fish disease studies.
5. Aquatic plants culture.
6. Open water Aquaculture.

2. BRACKISH WATER AQUACULTURE (BWA)

Project Coordinator

Dr. K.S. Purushan
Professor and Head
Fishery Research Station, Puthuveypu
Cochin – 682 508
Phone: 0484 2502587
E. mail: kau-fs@yahoo.co.in

Thrust areas

1. Seed production of mud crabs Scylla spp. and fishes *Mugil cephalus* and *Lates calcarifer.*
2. Development of balanced and cost effective feed for enhanced aquaculture production.
3. Evolution of innovative techniques for fishery based integrated farming and multiple land use in coastal wetland.
4. Estuarine ecosystem and coastal zone management, abatement of pollution and disease menace and conservation of biodiversity including mangroves for sustainable fishery.
5. Transfer of state-of-art of technology of fishery based for sustainable production.

3. FISHERY BIOLOGY (FB)

Project Coordinator

Dr. T.M. Jose
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E. mail: josetm@sify.com

Thrust areas

1. Biodiversity and biological studies in freshwater prawns.
2. Biodiversity, biological studies, controlled breeding and seed production in indigenous freshwater ornamental fishes and crustaceans
3. Conservation of endangered species.
4. Taxonomic studies in deep-sea fishes and crustaceans.
5. Neural control of growth and reproduction in cultivated fishes and prawns.

4. FISHERY TECHNOLOGY (FT)

Project Coordinator

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Thrust areas

1. Marine bioactive compounds
2. Value added products from fresh water fishes.
3. Quality management of fish and fishery products.

5. FISHERIES MANAGEMENT (FM)

Project Coordinator

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Thrust areas

1. Impact of Globalization on the fishery sector
2. GIS application in fisheries
3. Socio-economics of fishing operations, fishing
4. Communities and Aquaculture.
5. Upwelling marine eco-system status of Kerala coast.

4.4. AGRICULTURAL ENGINEERING

1. FARM POWER, MACHINERY AND ENERGY (FPME)

Project Coordinator

Sri. Jippu Jacob
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Thrust areas

1. Tillage equipments and methods
2. Seeding and planting equipments and methods
3. Fertilizer and manure application equipments and methods
4. Plant protection equipments and methods
5. Harvesting equipments and methods
6. Primary post-harvest equipments and methods
7. Farm power sources and utilization
8. Energy sources and utilization

2. SOIL AND WATER ENGINEERING (SWE)

Project Coordinator

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Thrust areas

1. Rain water harvesting and ground water recharging
2. Cost effective micro irrigation and fertigation
3. Soil and water conservation studies on water shed basis
4. Irrigation water and waste water recycling
5. Multiple uses of water and increasing water productivity in agriculture

3. POST HARVEST TECHNOLOGIES & AGRICULTURAL PROCESSING (PHTAP)

Project Coordinator

Dr. Santhi Mary Mathew
Professor and Head
Department of Post harvest Technology KCAET, Tavanore
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Thrust areas

1. Developing technologies for reducing Post Harvest Losses of all food, feed and commercial crops.
2. Process and Product development.
3. Design, development and evaluation of post harvest equipments for primary and secondary processing of agricultural products.
4. Development of packaging and storage technologies for enhancing shelf life of agricultural commodities and processed foods.
5. Safety and quality of food products.

5. ACHIEVEMENTS MADE DURING THE IX AND X PLAN PERIOD

In the past three decades we made significant contributions in the field of agricultural education, research and extension. KAU has been maintaining the top position in the performances of students in the All India Competitive Exams. KAU secured first position, on All India basis, in junior research fellowship competitive examinations, during 2001, 2002, 2003 and third position during 2006. The students graduated from KAU have secured covetable positions in several outstanding Institutes in India and abroad as part of their higher studies.

KAU as a nucleus institute in agriculture research has developed sufficient production technologies in more than 125 traditional and popular crops of humid tropics.

Release of two hundred and fifty seven varieties of crops (rice, coconut, spices, cocoa, cashew, medicinal & aromatic plants, vegetables/pulses/tubers, fruits, orchids and fodder crops) which are high yielding and capable of withstanding biotic and abiotic stresses under a variety of biophysical resource environments and two nationally acclaimed breeds of poultry (Athulya and Gramalekshmi); biological control and suppression of the water weed popularly known African paayal (*Salvinia molesta*) that rendered rice production in the rice bowl Kuttanad using the tiny weevil *Cyrtobagous salviniae*; technology with focus on underground drainage for the reclamation of low productive highly acid sulphate soils of the low wetlands; standardisation of protocols for large scale multiplication by *in vitro* techniques in several crops; package of management practices for the rehabilitation of coconuts in the dreaded coconut root (wilt) and black pepper phytophthora foot rot disease affected areas that would help to sustain reasonable levels of income; control of coconut mite: germplasm collections in rice, coconut, cocoa, pepper, vegetable crops, medicinal and aromatic plants; conservation on the near extinct Vechur cattle; permanent manurial trials on coconut and paddy; high density planting in pineapple and cashew; increasing fertilizer use efficiency and thereby the availability of nutrients through slow release nitrogen fertilizers; development of technology for the commercial production of cashew apple syrup; use of biocontol agents like *Beauveria bassiana* and *Metarhizium anisopliae* in the management of banana pseudostem weevil; development of commercially viable technology for the hatchery production of seeds of the giant fresh water prawn (*Macrobrachium rosenbergii*);

standardization of integrated fish-rice-culture; designing and developing a simple coconut husking tool; designing and testing of underground check dam for the conservation and preservation of water suitable to hilly areas; standardization of iso electric focusing for the identification of meat from various species of animals; development of a cell culture duck plague vaccine from a local isolate and recommendation for simultaneous vaccination with duck pasteurellosis; development of a new mesogenic vaccine strain (RDV-M) for ranikhet disease for commercial use; evaluation of over 50 unconventional feeds and fodders and their incorporation in commercial feed mixes; standardization and wide-spread chemical tranquilization and control of elephants and other captive and wild animals; evolving of a milk recording system to predict 305 day's milk yield; preparation of seventeen blood-group antigens for grouping of cattle for progeny testing programme; are indeed some of the research findings and outputs of major economic significance from the fields and laboratories of the Kerala Agricultural University.

In 2003, KAU bagged the coveted Sardar Patel Award for the best ICAR institution in the country. This success was achieved mainly with the concerted effort and teamwork of the teachers and scientists of KAU for the last so many years.

6. PRIORITIES AREAS OF RESEARCH IN XI PLAN

Research programmes undertaken in the University are focused on increasing the productivity of crops, livestock and fish currently grown in the state. Analyzing the current agricultural scenario of the state, the KAU propose some of the research areas to be considered with priority during the XI plan period (2007-2012 aiming an increase in production and productivity to the tune of 4 to 5 % in the traditional crops, and animals. The University has to maintain significant strides in both research and academic programmes. Formulating a database on various location specific "field problems", availability of "labour force for agricultural operations", "farmers requirement" in terms of seed, planting materials and other inputs are some of the thrust areas to be given due importance in the extension sectors.

A time bound and strategic planning is essential during the XI five-plan period to utilize the available resources of the KAU. The Research policy of the university, gaps identified during the X plans period, thrust areas identified by various project co ordination groups, mandate of the research centre, lead functions, testing functions, potential of the centre, scientific expertise of the centre and the location specific problems were taken in to account as criteria for fixing the priority areas of research for each centre.

Recognizing the highly heterogeneous biophysical resource-base of the state, the research agenda is organized for six agro ecological zones. Six Regional Agricultural Research Stations (RARS) besides teaching institution and research stations falling in each zone. Considering this into account, the following guidelines are issued while preparing project proposals for getting sanction both from the internal as well as the external funds. The projects can be formulated with short-term (1 or 2 years) or long-term (3 to 5 years) objectives such as production increases, environmental safety, sustainability, nutritional and livelihood security, employment potential and poverty alleviation through revitalizing the farming sector of Kerala. Multi-disciplinary or even multi-faculty research approaches can also be envisioned while selecting and implementing the project.

6.1. *COLLEGE OF AGRICULTURE , INSTRUCTIONAL FARM AND THE REGIONAL AGRICULTURAL RESEARCH STATION (SOUTHERN ZONE), VELLAYANI, THIRUVANANTHAPURAM.*

The Agricultural College and Research Institute started functioning in 1955 as the first college in the state for offering professional degree programme in agriculture and when the Kerala Agricultural University was established, the college was declared as a constituent institution of the University. Advancement of learning and prosecution of research particularly in agriculture, horticulture and other allied branches in terms of state, national and international norms is one of the mandates of the institution. Updating the scientific knowledge of the field staff, disseminating the technology to the farmers and public through the developmental departments and functioning as a referral institute in catering to the demands of the extension personnel and the farmers are also framed as the mandates of the institute.

The college is situated 12 km south-east of the capital city of Thiruvananthapuram and 4 km east of world famous Kovalam Beach Resort. The location is at 8.5° N latitude, 76.9° E longitude and at an altitude of 29 m MSL. The College campus has a total area of 243.23 hectares consisting of wetland, dry land and garden land. Almost all tropical crops are grown in the farm. The RARS (SZ) is presently attached to this campus and the region comprises of the districts *viz*., Thiruvananthapuram, Kollam, Pathanamthitta, Alappuzha and Kottayam excepting the problem areas of Alappuzha and Kottayam districts. The institute has evolved several high yielding varieties of rice, coconut, vegetables, tubers, flowers, mushrooms and fodders. Several technical authorities in India have acclaimed the seed and planting material distribution system adopted in this farm. The farm, surrounded by the fresh water lake "Vellayani" in all the three sides has an excellent potential in ecotourism with special emphasis to "lakeshore tourism"

The college is actively engaged in teaching, research and extension components of agriculture and allied sectors of the state. The lead functions of the RARS, Vellayani are research under partial shade conditions of the homesteads, tuber crops, export oriented vegetables and cut flowers, fruits, spices and plantation crops. The centre has verification function for rice, fruits, homestead farming, coconut, tuber crops, vegetables and farm machinery for garden lands. The AICRPs for nematodes, forage crops, pesticide residue, mushrooms and honey bees are also functioning successfully in this campus.

1. Eco friendly integrated pests and disease management in fruits, vegetables, tubers, coconut and pepper with bio agents and other non-chemical approach
2. Organic farming and GAP in coconut, pepper, fruits, vegetables and tuber crops
3. Integrated farming systems in coconut based farming
4. Value addition in rice, coconut, jack and tuber crops
5. Research on underexploited vegetables and export oriented vegetables and cut flowers
6. Quality improvement in vegetable seed production
7. Database on pesticide residue in farm sector

8. Establishment of agri. eco tourism for education purpose
9. Technology development for beekeeping with stingless honeybee for employment generation and poverty alleviation
10. Bioinformatics and floricultural biotechnology
11. Database on ITK and technology adoption by farmers
12. Marketing strategies in agricultural sector

6.2. CROPPING SYSTEM RESEARCH STATION, KARAMANA, THIRUVANANTHAPURAM

The lead function is research on rice and rice based cropping system. Verification functions include agro techniques, integrated farming system with rice/vegetables/fodder/ fish/poultry/cattle etc. The station has 20.61 ha of land in the heart of Thiruvananthapuram city.

1. Multi location testing of rice varieties and hybrids
2. Research on urban horticulture with emphasis on roof gardening, pot culture, nutrition garden
3. Research on vermi-composting, mushroom production and waste decompose

6.3. COCONUT RESEARCH STATION, BALARAMAPURAM, THIRUVANANTHAPURAM

The station has 14.33 ha of garden land. Mandatory research areas are multi location testing of coconut varieties and hybrids and standardization of agro techniques for coconut and coconut based farming system in red soils.

1. Identification, production and distribution of market oriented coconut varieties and hybrids
2. Multi location testing of varieties and hybrids of coconut
3. Production of high value coconut products (coconut milk)
4. Soil and water conservation in coconut garden and homesteads.
5. Intercropping modules for coconut based cropping system

6.4. FARMING SYSTEM RESEARCH STATION, SADANANDAPURAM, KOLLAM

The station is in an area of 8.96 ha of land eastern side of the Thiruvananthapuram – Angamali MC Road. The lead functions are homestead farming, soil and water conservation and management. Verification functions are tuber crops, coconut, rice, tree horticulture, agro forestry and cashew.

1. Homestead management
2. Organic waste recycling for vegetable and fruit cultivation in homesteads
3. Rain water harvesting techniques in homesteads
4. Designing low cost solar equipments
5. Developing tree crop modules for homesteads

6.5. SOIL CONSERVATION RESEARCH STATION, KONNI, PATHANAMTHITTA

Lead functions are soil and water conservation in hill slopes, water management and soil erosion checking devices. Testing functions are watershed management and geo-textiles. The station was established during 1998 in an area of 46.93 ha.

1. River bank protection using coir geo-textiles
2. Formulating soil conservation techniques for hill regions with special emphasis on crop management practices
3. Developing micro watersheds in the hill homesteads with participatory approaches
4. Strategies for water resource development in hilly areas
5. Studies on the impact of development activities on soil erosion and stream flow

6.6. REGIONAL AGRICULTURAL RESEARCH STATION (ONATTUKARA ZONE), KAYAMKULAM, ALAPPUZHA.

The centre was established in 1937 as a Rice Research Station under the erstwhile Travancore University. The total area is 11.45 ha. The mandatory research area is strengthening of research in the Onattukara tract of south Kerala. The lead functions of this station are research on rice, coconut, oil seeds and pulses with verification functions *viz.*, homestead research with vegetables and tubers, medicinal plants, cut flowers, foliages and mushrooms.

1. Strengthening research on rice, pulses and oil seeds cultivation in Onattukkara.
2. Research on mid whorl yellowing of coconut
3. IPM in pulses and oil seeds
4. Comprehensive coconut care programme
5. Research on horticultural crops with special reference to fruits, vegetables, tubers medicinal and aromatic plants suited to Onattukkara

6.7. REGIONAL AGRICULTURAL RESEARCH STATION (PROBLEM ZONE), KUMARAKOM, KOTTAYAM.

The centre established in 1947 as the Coconut Research Station has lead functions to solve the location specific problems in the special zones comprising Kuttanad, Kole and Pokkali tracts and to integrate farming systems incorporating crops, livestock and fish. Coordinating the research efforts to compensate the loss of income due to the root wilt incidence is also considered with priority. The station has an area of 44.43 ha of land to cater the research need of the distinct farming situations identifies in the zone *viz.*, kayal, karappadam, kari and pokkali.

1. Management of coconut root (wilt) disease
2. Research on integrated farming in Kuttanad with special emphasis to agri-auqa–animal (AAA) components

3. Utilization of bio-energy resources for farm power, cleaning water bodies and organic farming
4. Development of homestead models and organic farming modules for coconut and rice based farming systems of Kuttanadu
5. Research on underexploited horticultural crops with special emphasis on kodampuli mangosteen, rambuttan and nutmeg
6. Development of an ecofriendly agri-aqua backwater tourism model for Kerala

6.8. SUGAR CANE RESEARCH STATION, TIRUVALLA, PATHANAMTHITTA

Research on sugarcane and sugar cane based products is the lead function of this station with an area of 9.35 ha. Verification function is also there on vegetable crops with special reference to the research on reclaimed alluvial soil.

1. Research on sugarcane varieties and their agro techniques
2. Strengthening research in cucurbitaceous vegetables in reclaimed alluvial soils
3. Product diversification in sugarcane
4. Organic vegetable cultivation using locally available bio waste

6.9. RICE RESEARCH STATION, MONCOMBU. ALAPPUZHA.

The centre was established during 1940 in an area of 9.17 ha accounting the need of research in the unique rice ecosystem (only place in world where rice is grown below to mean sea level). The research mandate includes crop improvement, crop management and crop protection in terms of rice cultivation of Kuttanad area. Production technology for rice grown below to sea level are also deserve due recognition in national level.

1. Genetic improvement of native and introduced rice varieties for high yield, early duration, resistance to biotic and abiotic stress and suitable for Kuttanad
2. Production of good quality seeds of high yielding and hybrids of rices
3. Organic rice farming for Kuttanad.
4. Site specific nutrient management for direct seeded rice in Kuttanad
5. Management of salinity and soil acidity during Punja season
6. Studies on minimum tillage under rice (Punja)- water fallow system in Kuttanad
7. Mechanization for wet sown rice under puddled conditions
8. Developing forewarning models for the major pest and diseases of Kuttanad and their management.

6.10. RICE RESEARCH STATION, VYTTILA. ERNAKUI M.

The station is situated in a representative site in the ntre of the pokkali tract. Started functioning during the year 1958 in a leased land in Kunnara and was shifted to the present site with an area of 8.68 ha during 1963.Rice cultivation by protecting the traditional pokkali system, organic rice production protocol and improvement, management of saline tolerant rice varieties are the lead functions.

1. Research on organic rice production
2. Improvement for yield and saline tolerance
3. Rice-fish farming
4. AAA farming system

6.11. COLLEGE OF FISHERIES, PANANGAD, ERNAKULAM.

The mandate of the college is the development of fisheries sector of the state and the country. The college forms the nucleus to undertake and coordinate fishery research in the state. Evolving new and cost effective technologies for fish culture in different environment, captive breeding and product development in traditional fishes of Kerala are also reckoned as the mandate. The College has an area of 28.36 ha of land adjacent to the Aroor –Edappalli NH 47 by pass.

1. Food safety and quality management in fishery sector
2. Fisheries in fresh water lakes with special reference to prawn
3. Aqua Clinic
4. Seed/ fingerling production in native and fresh water fishes
5. Captive breeding in ornamental fishes
6. Value addition in fresh water fish products
7. Identification and extraction of bioactive compounds
8. Nutritionally balanced and cost effective feeds for aquaculture

6.12. FISHERIES RESEARCH STATION, PUDUVEYPU, ERNAKULAM

The station started functioning since July 1979 with a total area of 133.63 ha of the then accredited wetland assigned free of cost by the Revenue Department, Govt. of Kerala. The present campus of 20.24 ha of saline marsh area with mangroves and other salt resistant species of grass and shrubs is located at a distance of 2 km west of Murikkumpadam in Vypeen Island. Developing appropriate farming techniques involving fish and supplying brackish water fish seeds to the farmers for commercial level production are the mandate of the station. Field level testing of the fishery technology is the verification function.

1. Brackish water fish farming methods
2. Fishery-based integrated farming and multiple land use in coastal wetlands
3. Mangrove associated ecosystem management and biodiversity conservation for sustainable fishery
4. Artificial seed production of Mud Crab *Scylla* sp. and fishes like *Mugil cephalus* and *Latus calcarifer*
5. Nutritionally balanced and cost effective feeds for aquaculture
6. Estuarine ecosystem management, abatement of pollution and disease menace and biodiversity conservation for sustainable fishery

6.13. REGIONAL AGRICULTURAL RESEARCH STATION (CENTRAL ZONE), PATTAMBI, PALAKKAD

The station started functioning in 1927 with the name Paddy Breeding Station and the then mandate was to improve the local bodies of the erstwhile Madras Presidency. The centre was elevated as the Regional Agricultural Research Station for central zone with the implementation of the National Agricultural Research Project (NARP) in 1981with a total area of 63.13 ha. Generation and transfer of technology related to rice and rice based cropping systems, pulses, vegetables, organic farming and seed technology are the lead functions.

The first high yielding short duration dwarf rice variety (Annapurna), the most popular rice variety, Jyothy and 56 other high yielding rice varieties are the contribution of this station. The station has also developed agro techniques for growing rice at different locations and various seasons. Two high yielding varieties of cowpea, one coleus and developing integrated weed management can also be highlighted as the achievement of this station.

1. Strengthening rice research for increasing productivity under stress situation
2. Intensification of research for increasing productivity of pulses
3. Organic farming for sustainable crop production
4. Seed production and seed technology research
5. Integrated pest management in rice
6. Intensification of research on rice genetics and breeding with special reference to hybrid rice
7. System of rice intensification (SRI)
8. Management aspect related to mechanized farming

6.14. AGRONOMIC RESEARCH STATION, CHALAKUDY, THRISSUR.

The centre was established in 1972 by shifting the farm started at Pariyaram during 1962 by the Department of Agriculture. The mandate of the station is to develop a low cost high tech water use and high profit land use pattern by evolving production technologies for utilizing scarce moisture resources and to serve a s a model centre of crop production for the command area of Chalakudy Irrigation Project.

Water management for rice, rice based cropping system and other annual crops including vegetables are the lead functions. Verification function is agro technique in rice and rice based cropping system. The station has an area of 8.95 ha.

1. Integrated nutrient management in rice and rice based cropping system
2. Fertilization under bubbler irrigation system
3. Water management studies in horticultural crops
4. Quality analysis of rainwater under different storage structures, filters and catchments
5. Micronutrient fertilization in horticultural crops
6. Hybrid seed production in vegetables
7. Cut flowers and selected vegetables under protected cultivation

6.15. AROMATIC AND MEDICINAL PLANTS RESEARCH STATION, ODAKKALI, ERNAKULAM.

The centre was established in 1951 as Lemongrass Breeding Station under the Department of Industries of the erstwhile Travancore-Cochin Government. In 1954, it was baptized as Lemon grass Research Station. Consequent to the formation of KAU, the station became an integral part of the University's research network and accordingly in 1982, the centre was renamed as Aromatic and Medicinal Plants Research Station. The mandate of the station covers the diversified research in all tropical aromatic and medicinal plants. Verification function is the quality assessment and certification in pharmaceutical components of the medicinal and aromatic plants.

1. Comprehensive development of medicinal and aromatic plants sector in Kerala through technological interventions, supplies and services
2. Agrotechnique for medicinal plants
3. Processing and value addition in medicinal plants
4. Organic cultivation of medicinal and aromatic plants

6.16. COLLEGE OF VETERINARY AND ANIMAL SCIENCES, LIVESTOCK FARM, PIG BREEDING FARM, POULTRY FARM, GOAT AND SHEEP FARM, RABBIT FARM AND VETERINARY HOSPITAL , MANNUTHY, THRISSUR, CATTLE BREEDING FARM, THUMBURMUZHI, THRISSUR AND THE LIVESTOCK RESEARCH SATATION, THIRUVAZHAMKUNNU, PALAKKAD

The college was established during 1955 with a view to train sufficient veterinary personnel. The college has a Livestock Farm, a Pig Breeding Farm, a Poultry Farm, a Goat and Sheep Farm, a Dairy Technology Unit, a Meat Technology Unit and a Veterinary Hospital in the campus with an area 149.33 ha. The Livestock Research Satation, Thiruvazhamkunnu (with an area of 163.38 ha) and the Cattle Breeding Farm, Thumburmuzhi (with an area of 25.54 ha) are also attached to this institute for teaching, research and training purpose.

Mandates of the centre are to train sufficient number of veterinary personnel to meet the expanding need of the state; to train livestock and poultry farmers; to conduct need based and problem oriented research in the field of animal husbandry and veterinary science; to update the scientific knowledge of the field staff in veterinary science; to disseminate the technology in animal science to the farmers and public through the developmental departments and to function as a referral institute in catering to the demands of veterinary practitioners.

The strategies developed by this leading research centre in terms of livestock production, animal disease diagnosis, livestock health and animal disease control, livestock products development, diversification and public health and wild and domestic animal care programmes are worth to consider as the academic excellence and based on which the Department of Animal Husbandry, Kerala as well as the Kerala Livestock Development Board formulated their developmental activities for the state. Standardization of iso electric

focusing for the identification of meat from various species of animals; development of a cell culture duck plague vaccine from a local isolate and recommendation for simultaneous vaccination with duck pasteurellosis; development of a new mesogenic vaccine strain (RDV-M) for ranikhet disease for commercial use; evaluation of over 50 unconventional feeds and fodders and their incorporation in commercial feed mixes; standardization and wide-spread chemical tranquilization and control of elephants and other captive and wild animals; evolving of a milk recording system to predict 305 day's milk yield; preparation of seventeen blood-group antigens for grouping of cattle for progeny testing programme; are indeed some of the research findings and outputs of major economic significance

Livestock production

1. Conservation, adaptation and feasibility studies of Indian dairy cattle and buffaloes in Kerala condition.
2. Conservation and upgradation of Vechur cattle in Kerala.
3. Performance status of crossbred cattle of Kerala.
4. Evolve rabbits and pigs suited for the prevailing agro-climatic conditions of Kerala.
5. Improvement of Malabari goats under an open nuclear breeding brogramme.
6. Evolving a meat strain of goat suitable to Kerala conditions utilizing local breeds.
7. Molecular technologies to improve production criteria in Kerala.
8. Sustainable duck and backyard poultry production.
9. Summer management of animals
10. Plantation based milk and meat production
11. Azolla based small farm animal poultry production.
12. Screening of feeds and fodder for anti nutritional factors, mycotoxins and pesticide residues and development of techniques for their amelioration.
13. Establishment of protein requirements of dairy cattle in terms of RDP and UDP under Kerala conditions.
14. Animal production modules to combing the present agrarian crisis with special reference to the disadvantaged districts of Kerala

Animal disease diagnosis

1. Establishment of disease free zones in the state and a centre for surveillance and reporting of infectious diseases.
2. Animal disease diagnosis, vaccine and biological research
3. Study of environmental related problems of livestock and their interactions with man.
4. Species-specific diagnosis of haemoprotozoans using ELISA, employing recombinant antigens.
5. Use of reverse line blot hybridization technique for the diagnosis of parasitic infections in vectors.

6. Micro array technology to profile gene expression of Taxa on a genome wide scale.
7. Pyrosequencing for genotyping and quantification of tissue cyst forming coccidian.
8. Elisa based diagnosis of mycotoxins in feed.
9. Application of Nanotechnology in screening of pathogens of animals and birds

Livestock health and animal disease control

1. Etiology, diagnosis, treatment and control of various field oriented reproductive problems of cattle, buffalo, pig and goat in Kerala State.
2. Biomedical research on the use of various implants in clinical use.
3. Improvements in diagnostic and therapeutic procedures on animal diseases.
4. Epidemiological and clinico-therapeutic studies of podo-dermatitis in cattle.
5. Reproductive biotechnology assisted reproductive techniques and micromanipulation of gametes and embryos.
6. Specializations in orthopaedic surgery like bone plating, dynamic decompression techniques and joint surgeries in small and large animals, physiotherapy and rehabilitation.
7. Investigation on production diseases in livestock and development of modern technologies.
8. Treatment and control of mastitis in livestock.
9. Development of modern reproductive diagnostic techniques in large and small animals.
10. Improvement in ophthalmology and ophthalmic surgical technique in small and large animal patients
11. Control of rabies in domestic animals.
12. Clinico-gynaecological studies in canine reproduction.

Livestock products development, diversification and public health

1. Value addition to make meat industry sustainable in the absence of typical meat breeds of animals in India.
2. Production of non-conventional and delicacy meat from small animals (rabbits, ducks, desi birds, Malabari goats, Vechur beef).
3. Upgradation of abattoirs of Kerala to the required standards and introduction of HACCP and ISO certification for meat processing factories.
4. Quality improvement of milk from farm to consumer level.
5. Development and standardization of indigenous milk products and fortification of milk with indigenous fruits and vegetables.
6. Development of rapid assays for assessing hygienic status and detection of pathogens in meat and milk.
7. Diagnostic facilities for zoonotic diseases in animals of the state.
8. Veterinary public health programmes for implementation through panchayats, veterinary dispensaries and residents association.

6.17. PINEAPPLE RESEARCH STATION, VAZHAKULAM, ERNAKULAM

Mandate of this small station established in 1995 with an area of 0.06 ha is to undertake research on pineapple in terms of location specific improvement, sustainable management and pests and disease surveillance.

1. Organic pineapple production
2. Location specific improvement
3. Pests and disease surveillance
4. Collection, conservation and characterization of germplasm of passion fruit

6.18. AGRICULTURAL RESEARCH STATION, MANNUTHY, THRISSUR

The station was established during the year 1957 in an area of 38 ha. Lead function is breeding and management of rice for Kole lands. Verification function includes coconut and vegetables with special reference to organic farming. The centre has developed an extra short duration red kernelled rice variety "Hraswa" maturing in 75-80 days and high yielding rice varieties *viz*., Ahalya and Manupriya for the Kole lands.

1. Breeding rice varieties for Kole land
2. Poly house technology for vegetables
3. Hybrid vegetable production
4. Gene sanctuary for Jack
5. Rice-vegetable organic farming systems
6. Location specific testing of farm machinery
7. Agro-ecotourism

6.19. COLLEGE OF HORTICULTURE, AICVIP, AICRP ON M &AP, CADBURY- KAU CO-OPERATIVE COCOA RESEARCH PROJECT, COLLEGE OF CO-OPERATION AND BANKING, VELLANIKKARA, THRISSUR

The mandate of the institution established in the year 1972 is producing trained graduates both in horticulture and agriculture for the successful implementation of the agricultural and rural development programmes of the state. B. Sc (Hort.) and the B. Sc (Ag.) programmes were started in 1972 and 1977 respectively however, the B. Sc (Hort.) programme was discontinued from 1980-81. The College is situated in the KAU headquarter with a total area of 391 ha. The College has several schemes/ centres *viz*., AICVIP, AICRP on Weed Control, M&AP, Biological Control of Crop Pests and Weeds, Cadbury Cocoa Research Project, Radio Tracer Laboratory (RTL) and Centre for Plant Biotechnology & Molecular Biology CPB&MB. An Instructional Farm is also attached with the college for providing practical facilities. ARS, Mannuthy is also attached to the College for undergoing practical training and work experience in rice cultivation.

The College maintained a consistent and excellent track record in the national competitions like JRF, SRF and ARS-NET examinations. The Board of Radiation and Isotope Technology (BRIT), Mumbai, the sole agency under the Department of Atomic Energy,

Govt. of India supplied a "beta shield" free of cost to Radio Tracer Lab as a complement for the isotope aided works being conducted in this lab. The Godrej Agrovet Ltd. Mumbai identified this lab as the only facility in the country to absorption, translocation and metabolic studies in plants using radiolabeled compounds of herbicides pesticides etc.

The College has developed a number of high yielding, disease and pest resistant varieties of crops plants *viz*., rice, vegetables, tubers and medicinal and aromatic plant. management practices and *in vitro* propagations protocols have been standardized in several popular crop plants of Kerala. A well-established medicinal garden, "Dr Vishwanathan Memmorial Herbal Garden" is a point of attraction to the students as well as the research scholars.

1. Rice hybrids for Kerala
2. Biodegradation and recycling of agricultural wastes in perennial crops
3. Pest surveillance, monitoring, forecasting and IPM in coconut, fruits, vegetables and spices
4. Biotechnology tools for the betterment of biopesticides, biocontrol agents, productive insects and semichemical.
5. Genetic improvement in medicinal plants for adaptability and quality
6. Packaging and storage studies in fresh and minimally processed fruits and vegetables
7. Propagation techniques in plantation crops, spices, medicinal and aromatic plants
8. Bioprospection of spices, medicinal and aromatic plants
9. Agricultural trade agreements and development policy
10. Market led extension and participatory approach and Information communication technology for TOT
11. Remote Sensing, GIS and other ICT tools for improvement in agricultural education, research and advisory services
12. Standardization of functional foods and dietary management in life style diseases

6.20. COLLEGE OF FORESTRY, VELLANIKKARA, THRISSUR

The College was established in 1986 as per the Govt. order No. 12-10/85 Edn. dated, 28.07.1986 with a mandate to carry out teaching and research in forestry and make forestry professional rather than protective forestry. It is located in the main campus of the KAU, Vellanikkara.

The lead functions are to train the students in various subject matter areas of forestry to make them competent to maintain and manage the forests in the most professional manner and to award B. Sc (Forestry) and M. Sc (Forestry) degrees. Auxiliary functions include carrying out research in the fundamental and applied aspects of Forestry with appropriate extension programmes. The College has five research projects funded by various external agencies. A good instructional farm with an area about 3.0 ha and a digital herbarium are being maintained in the college.

1. Agri-Silvi-Horticulture modules for Kerala
2. Seed technology and forest nursery management
3. Database for non-timber forest production
4. Conservation of endangered forest flora and fauna in humid tropics
5. Wood science technology
6. Forest plantation management
7. Wild life management

6.21. BANANA RESEARCH STATION, KANNARA AND PINEAPPLE RESEARCH CENTRE, VELLANIKKARA, THRISSUR

Lead functions are research on banana/pineapple and banana based cropping system with verification function includes vegetable seed production with special reference to amaranth. The station has 17.33 ha of land at Kannara with a germplasm of 212 accessions of banana. The station also evolved two banana hybrids for commercial cultivation. Many management practices and plant protection measures of banana are the contribution of this centre.

1. Conservation of germplasm of banana and pineapple
2. Breeding banana and pineapple for yield, quality and consumer acceptance
3. Protocol for pineapple based homestead farming
4. Ecofriendly management of kokkan and bacterial wilt diseases in banana
5. Tissue culture in banana and pineapple
6. Management of rhizome and pseudostem borer

6.22. CASHEW RESEARCH STATION, MADAKKATHARA, THRISSUR

The mandate is to bring about scientific improvement in cropping and management in cashew in Kerala and undertake appropriate TOT measures to disseminate the scientific information to the farmers through the extension personal of the Department of Agriculture. The station has 50.70 ha of land near to the main campus of KAU. Six high yielding varieties of cashew, propagation techniques *viz.* epicotyl and soft wood grafting and management schedule for tea mosquito and stem borer of cashew are the contribution of this station.

1. Increasing productivity of cashew by breeding and management
2. Post harvest technology and small scale processing in cashew apple
3. Canopy management through growth retardants
4. Evaluation of promising clones of cashew
5. IPM for tea mosquito in cashew using bio rationales
6. Protocol for organic farming in cashew
7. High density planting and management

6.23. KELLAPPAJI COLLEGE OF AGRICULTURAL ENGINEERING AND TE TAVANUR, MALAPPURAM

The college campus is located in Tavanur Village on the south bank of Bhara in Malappuram Distirict, 7 km west of Kuttippuram. The campus was the seat c Institute established in 1963. The Institute was renamed as Institute of Agricu Technology in 1971 and the University subsequently opened the faculty of Agrl. Engg. & Technology in 1985 and the centre was upgraded and renamed as Kelappaji College of Agricultural Engineering & Technology.

Mandate of the Institution is to impart education in UG and PG levels in the Agricultural Engineering and to conduct research and extension activities in the faculty to support the farms of the KAU and the Department of Agriculture. The College campus has an area of 39.74 ha. *Kera Mitra*, the coconut husking tool, *self-centering basin lister*, *direct drive micro tiller/weeder*, *large diameter pit digger*, *powered palm climber*, *rotary coconut husker* and *tractor operated ditcher cum bed former* are the contribution of this centre.

1. Tillage implements in different soil types and farmsteads
2. Tillage implements for steep slopes of Western Ghats and similar sort
3. Implements for sowing, planting and transplanting of major crops, like rice, coconut, banana, vegetables, etc.
4. Machinery for weeding and intercultural operations in different farmsteads and plantations,
5. Mechanization of rice cultivation in Pokkali lands
6. Harvesting implements for plantation crops like coconut, arecanut and fruit trees like jack and mango.
7. Post-harvest engineering of important crops for preservation, value addition, handling, and packaging
8. Development, use, and management of renewable energy sources
9. Precision farming techniques in horticultural and plantation crops
10. Watershed-based soil and water conservation, utilization and management
11. Improving the efficiency of the existing implements and machinery in agriculture sector

6.24. CASHEW RESEARCH STATION, ANAKKAYAM, MALAPPURAM

The prime objective of the station established in 1963 is to evolve materials, methods and means to increase the yield of cashew through breeding, management and plant protection protocols.

The station with an area of 9.92 ha of land maintains 216 hybrids and 18 parental combinations of cashew. Three cultivars of cashew namely Anakkayam 1, Dharasree and

Mrudhula were evolved and released from this station. The verification function of the station includes crops like cashew, coconut and vegetables.

1. Germplasm conservation and evaluation
2. Management protocol for cashew cultivation in laterite soil
3. Nursery and plant propagation in cashew, mango, pepper and coconut

6.25. REGIONAL AGRICULTURAL RESEARCH STATION (HIGHRANGE ZONE), AMBALAVAYAL, WAYANAD

The station was established originally as the Horticultural Research Station during the year 1946 in area of 103.10 ha of land. The status of the RARS was given along with the implementation of NARP during the year 1982. Pepper and pepper based cropping system in high ranges, protocol for growing cool season vegetables and hill paddy, propagation, soil and water management practices of sub tropical fruits and tree spices and protocol of coffee based cropping system are the lead functions of this station. The verification function includes research on essential oils, medicinal plants and spices like ginger and turmeric.

Release of three high yielding rice verities for the high range situations, propagation techniques in most of the subtropical fruits and plantation crops, identification of high yielding ginger varieties for rain fed conditions, developing management strategies for soft rot diseases of ginger, assisted pollination technique of vanilla, rooting techniques for pepper, identifying the table variety of banana and standardizing the pruning technique in eucalyptus for maximum oil yield are some of the contribution of this centre.

1. Research on comprehensive crop care programme for Waynad farmers with special reference to the present agrarian crisis
2. Management of quick wilt disease in pepper gardens of high ranges
3. Developing protocol for production of scented rice
4. Research in cool season vegetable production
5. Integrated management of soft rot and bacterial wilt in ginger using biocontrol agents
6. Protocol for organic ginger cultivation
7. Value addition and preservation in ginger
8. Establishing a rural bio resource complex for applying biotechnology

6.26. COLLEGE OF VETERINARY AND ANIMAL SCIENCES, POOKOT AND REGIONAL CATTLE INFERTILITY RESEARCH CENTRE, KOZHIKODE

The mandate of the college established in 1998 is to impart quality veterinary education and to provide qualified veterinary personnel to meet the demand of the veterinary and animal science sector in the state.

The lead function is to impart veterinary education as per the norms of the Veterinary Council of India for B. V. Sc & AH degree programme and the auxiliary function is to produce sufficient veterinary professionals trained for undertaking R&D and extension activities in Kerala.

1. Database on the medicinal properties of the indigenous plants of Wayanad with special reference to animal husbandry
2. Monitoring the residual levels of antibiotics and pesticides in milk, meat and their products
3. Molecular and parasitological diagnosis economically important parasitic diseases
4. Alternative and newer methods for the control of parasitic diseases
5. Identification and characterization of bacterial pathogens causing infection to cattles and goats
6. Identification and characterization of mycotic agents causing abortion in cattle and goats
7. Marked assisted selection
8. Animal biotechnology tools for disease diagnosis
9. Conservation of indigenous breeds and landraces of domestic animals
10. Surveillance of important zoonotic diseases in domestic animals and man
11. Techno economic feasibility of dairying and allied animal husbandry activities.
12. Innovative technologies for value addition of milk and meat for attaining rural livelihood security
13. Animal production modules to combing the present agrarian crisis with special reference to Wayanad
14. Enhancement of production performance of cattle of Northern Kerala with special reference to their infertility problems.

6.27. CARDAMOM RESEARCH STATION, PAMPADUMPARA, IDUKKI

The centre is situated in the cardamom hill reserve of the Western Ghats at an elevation of 1100 m above MSL with a temperature range from 12° C to 32° C in the Pampadumpara Village of Udumbanchola Taluk in Idukki Dist. The cool breezy climate lends a unique atmosphere to any man of aesthetic sense. The station is encircled by network of State and National highway that link Munnar and Thekkaddy, the well known tourist centres of Kerala. This station was established in 1956 under the State Department of Agriculture, Government of Kerala and later transferred to KAU in 1972 and during this year itself this station was selected as one of the coordinating centers for spices under the AICRP.

The mandates are doing research in cardamom in terms of improvement, management and protection of the crop. The subsidiary activities include research and testing of location specific requirements in pepper, floriculture and cool season vegetables. Quality planting material supply in cardamom, pepper and floriculture plants is also undertaken. Pests surveillance during epidemics of pests as well as diseases and issuing of phyto-sanitary certificates in the nurseries of Idukki district are also contemplated as the mandate.

1. Conventional and molecular breeding of cardamom
2. Developing package on integrated pest management

3. Processing and value addition of cardamom
4. Research on organic cardamom production
5. Crop care programme for pepper growers of Idukki
6. Research on floriculture
7. Cool season vegetables suitable to Idukki

6.28. REGIONAL AGRICULTURAL RESEARCH STATION (NORTHERN ZONE) PILICODE, KASARGODE

The station was established as the Coconut Research Station during the year 1916 by the then Madras Government along with the centers at Kasaragod, Nileshwar I and Nileshwar II. Under NARP scheme, this station was recognized as a RARS for the northern region comprising the districts of Kasaragod, Kannur, Kozhikode and Malappuram with effect from 1.06.1980. The present area at the RARS, Pilicode is 57.87 ha and that of Nileshwar 17.25 ha.

The centre maintains 35 exotic and 40 indigenous types of coconut. The first ever plantation of hybrid coconut in the world established during the year 1936 at Nileshwar is still maintained in this station. High yielding coconut hybrids viz., WCT x CGD, Lakshhaganga, Keraganga, Anandaganga, Kerasree, Kera saubhagya and Kerasagara are the contribution of this station. Standardization of most of the management practices for production and protection of the crop was the finding of this station. Twenty three bold nut cashew cultivars are maintained in this station.

Research on coconut and coconut based farming system, technology verification and testing centre for rice, vegetable, cashew, pulses and oil seeds are the lead functions. Serving as a commodity verification and testing centre for rice, pulses, oil seeds and vegetables.

1. Strengthening research on coconut hybrids
2. Research on cashew for northern region
3. Developing dwarf and semi dwarf cultivars
4. Integrated farming in coconut based farming system
5. Value addition and product diversification in coconut
6. Strengthening research on pickling type mangoes
7. Screening of bio pesticides for summer vegetables

6.29. PEPPER RESEARCH STATION, PANNIYUR, KANNUR

The centre was established in 1949, to improve pepper cultivation and was uplifted in 1952 and became a constituent institute of KAU later in 1972. Since then, research on crop improvement, crop management and crop protection aspects of black pepper were carried out in this station. Release of seven high yielding pepper varieties (Panniyur 1 to Panniyur 7), production of nucleus planting materials and the development of bush pepper are the contribution of this centre.

Undertaking research programmes in pepper in terms of improvement, management and protection of the crop is the primary responsibility of the station. The mandate also include studies on various aspects of pepper industry in the country so as to give it a firm footing and confidence to face competition from other pepper producing countries of the world.

1. Strengthening research on black pepper
2. Evaluation of pepper genotypes for draught tolerance
3. Management of little leaf disease of pepper
4. Evaluation of medicinal plants as intercrop in pepper
5. Breeding for Phytophthora foot rot tolerant pepper
6. Processing and value addition in pepper

6.30. COLLEGE OF AGRICULTURE, PADANNAKKAD, KASARGOD

The college was started in 1994 with the B. Sc (Agri.) programme. This is the third agricultural college under the KAU. This college fulfils the aspirations and the long-cherished wish of the people of Northern Malabar to have an agricultural college in the region. The main factors which influence the decision are the backwardness of the area and its peculiar agro climatic conditions.

The mandates of the institution include teaching, research and extension activites to the northern region of Kerala consisting of the districts *viz.*, Kasargod, Kannur, Kozhikode and Wayanad.

1. Management of root grub in coconut through microbial agents
2. Induction of variability in vanilla
3. Management of fruit fly in cucurbits using parapheramones and kairomones
4. Carbon isotope discrimination in pepper
5. Validation of ITK
6. Mushrooms for northern regions
7. Improvement on dessert mangoes for the northern region

6.31. DIRECTORATE OF RESEARCH, VELLANIKKARA, THRISSUR

The mandate of the Directorate is to play as a nodal centre to plan, coordinate, monitor and evaluate the entire research programmes of the Kerala Agricultural University. Arranging brainstorming sessions of the Scientists, formulating strategic, novel and innovative research ideas, providing proper research guidelines for implementing the plan, non-plan and other externally aided projects are also contemplated as the mandates of the Directorate of Research. Programmes for regulating the seed and planting material productions, documentation and commercialization of the proven technology through adaptive research for the benefit of the farming community are also there.

1. Network centre for seed and planting material production, distribution booking and testing

2. Establishing a rapid action force in agriculture for diagnosis and follow up
3. Establishing a "Centre for Research and Certification in Organic Farming"
4. Establishing an AGRI TECHNOPARK (Industrial application of Agri-technology)
5. Water harvesting in garden lands
6. Precision farming
7. Strengthening of the Directorate of Research with Directorate of Planning and Directorate of Seed Research
8. WTO Center
9. IPR Cell

7. GUIDELINES FOR SUBMITTING PROGRAMME OF RESEARCH WORK FOR THESIS FOR MASTER'S AND PH. D DEGREE

The format for preparing the M. Sc and Ph. D research projects is given as ANNEXURE I and II. Postgraduate students should prepare the programme of research preferably in the mandatory areas of research work prioritized for the college/ campus by the Directorate of Research. The chairman of the advisory committee (major advisor) should consult the concerned Project Coordinator to avoid duplication while suggesting the research programme. The major advisor and the advisory committee should scrutinize the project in the first semester of their admission itself. Three hard copies of the programme approved by the Major advisor and the advisor committee members are to be submitted to the Professor (Research Coordination) of the concerned faculty through the Head of the Department for further approval by the staff council of the College with following members. 1. Director of Research 2. Director of P.G Studies. 3. Faculty Dean 4. Professor (R.C) 5. Associate Dean of the Concerned College 6. Associate Directors of Research, M&E, Planning and V&AS (for veterinary faculty) from the HQ and Project Coordinators besides the members of the Advisory committee of each student and other Faculty members. The Professor (RC) shall inform the decisions of the college council to the Professor Academic in charge of PG education of a college who in turn shall communicate these decisions to the concerned Heads of the Department for incorporating necessary corrections, if any, in the M. Sc and Ph. D research programmes.

In the case of M. Sc research programmes, after approval by the College Council, the Associate Dean/ HOD shall forward five hard copies of each proposal to Professor (RC) who in turn shall submit these proposals to the Faculty Dean for final approval. After approval by the Faculty Dean, two copies of the same are to be forwarded to the Director of Research for according the Technical and administrative sanction prior to the release necessary fund by the Comptroller for implementing the project. The code number for these projects shall be allotted by Professor (RC) after according the T&AS by the Director of Research. In the case of Ph. D research programmes, after approval by the College Council, the Associate Dean/HOD shall forward five hard copies of each proposal along with CD (one for the whole Department) to Professor (RC) for further approval by the FRC. The decisions of the FRC shall be communicated to the Associate Dean/HOD by the Professor (R.C).

After incorporating the corrections (if any) suggested by the FRC, the Associate Dean / HOD shall forward 45 hard copies of each proposals to Professor (RC) who in turn shall forward forty copies of the same through the Dean, Faculty of Agriculture to the Director of P.G studies for necessary approval by the Academic Council. After incorporating the corrections (if any) suggested by the Academic Council, the Associate Dean/ HOD shall send five hard copies of these proposals to Professor (RC) who in turn will forward two copies of the same through the Faculty Dean to the Director of Research for according the Technical and Administrative sanction prior to the release necessary fund by the Comptroller for implementing the project. The code number for these projects shall be allotted by Professor (R.C) after according the T&AS by the Director of Research. No student in KAU can operate any research project without appropriate code number.

8. GUIDELINES TO TEACHERS FOR SUBMITTING RESEARCH PROJECTS FOR GETTING THE APPROVAL OF THE FRC

A. KAU Research projects

Scientists can undertake research projects in their specialized areas in accordance with the mandate, potential and priority areas identified specifically for the institution where he/ she is working. For using the university fund, they should prepare the project proposal in the prescribed format as given in ANNEXURE III in duplicate and forward to the concerned Project Coordinator sufficiently in advance who will scrutinize them and return the same to the concerned P.I along with the remarks of the Project coordination group, for incorporating necessary changes (if any) in the project proposal. Five hard copies of these proposals along with CD and the evaluation report of the P.C group as per the Proforma given in ANNEXURE IV are to be forwarded to Professor (R.C) by the concerned Project Coordinator for necessary approval by the FRC. The PI should present the project in the FRC for getting the approval. The decisions of the FRC shall be communicated to all the Heads of Stations/ Project Coordinators by Professor (R.C). After incorporating the changes (if any) suggested by the FRC, three copies of these proposals are to be sent to Professor (R.C) by the concerned Project Coordinator for the allotment of code number. No scientist in KAU can operate any research project without appropriate code number.

B. Externally aided Research Projects

As far as possible, the externally aided research projects are to be prepared in accordance with the mandate, potential and priority areas identified either for the University or specifically for the institution where the concerned scientist is working. These proposals after discussion in the appropriate P.C group shall be forwarded in the required format with specified copies to the Dean/Associate Dean/ADR/Station Head. The forwarding authority should furnish a certificate indicating the quality and relevance of the project in connection with the mandate of the campus while sending the project to the Director of Research. The Director of Research is the final authority to decide whether the project has to be sent / modified or rejected. After approval by the funding agency and after according the Technical and Administrative sanction for implementing the project at KAU by the Director

of Research, three copies of these proposals in the original format as given in ANNEXURE IV along with a copy of the T&AS are to be forwarded to Professor (RC) through the concerned Project coordinator for the allotment of code number. A list of such projects shall be included in the minutes of the ensuing FRC for information of all concerned by Professor (RC). No scientist in KAU can operate any research project on external funding without appropriate code number.

9. GUIDELINES TO STUDENTS FOR PREPARING FINAL REPORT OF THE RESEARCH PROJECTS UNDERTAKEN AS PART OF THE THESIS WORK

Every M. Sc / Ph. D student should prepare and submit 5 copies of the final report of their research project carried out as part of the thesis work with in 15 days of the date of final viva–voce examination to the HOD through the major advisor. The HOD will forward 3 copies of the same to the Project Coordinator for further compilation while preparing the annual research report. The format is given as ANNEXURE V.

10. GUIDELINES TO SCIENTISTS FOR PREPARING RESEARCH REPORT OF PROJECTS UNDERTAKEN BY THEM WITH INTERNAL AS WELL AS EXTERNAL FUNDINGS

Scientists should prepare the details of the research works carried out by them in various projects implemented with funding both from the university as well as external source. The report should be submitted annually to the Project Coordinator through the HOD in duplicate on or before 30th April. The format for the same is given as ANNEXURES VI &VII. No scientist in KAU can operate any research project without preparing and submitting annual research report in time.

11. GUIDELINES TO PROJECT COORDINATORS FOR COMPILING RESEARCH REPORT OF THEIR COORDINATION GROUP

Each Project coordinator shall compile the details of the research work done by various Scientists under his /her PC group with funding both from the University as well as an external source. After discussion in the P.C group, a consolidated report of various ongoing/concluded research projects along with a separate list of on going research projects has to be prepared in the approved format (ANNEXURE VIII) by the concerned Project Coordinator. Two hard copies of the same along with CD are to be forwarded to Professor (RC) before 31st May each year for the preparation of the Annual Research Report of the University. It is the duty of the Project coordinator to see that every project in his coordination group bear the appropriate code number allotted by the Professor (Research Coordination). Those projects without the specified code number can not be included in the Research Report of KAU.

12. GUIDELINES TO CONDUCT MULTI LOCATION TRIAL (MLT)

Multi location trial is an experimental field / laboratory trial of a technology evolved by a Scientist or a group of Scientists of KAU that has been proved statistically superior under field/ laboratory conditions of the Colleges / Research Station. The aim of this trial is to compare the proven technology with the existing superior one prevailing in the State. The trial should be carried out at least in two Research Stations in each zone except the zone where the technology was generated. The Scientist(s) who evolved the technology is responsible to implement the programme. One Scientist can be included from each location as associate in the experiment with due credit. The trial should be carried out with minimum statistical requirements such as treatments, replications and degrees of freedom etc. As the experiment is conducted in the Research Station, superiority should be there for the technology under test with statistical significance and at least 15-20% advantage (25% for the hybrids) over the existing superior one in that specified category. The results of the MLT should be presented by the PI in meetings and workshops of Zonal Research Extension Advisory Committee (ZREAC), Variety Evaluation Committee (VEC), State Seed Sub Committee (SSSC) / Central Seed Committee on Crop Standards, Notification and Release of Varieties, State Mini Package Workshop (SMPW) or State Package Workshop (SPW) along with other information prior to release / popularize/ recommend the technology. The format of the proposal on MLT is given in ANNEXURE IX

13. GUIDELINES TO CONDUCT FARM TRIAL (FT)

Farm trial is an experimental field trial of a technology evolved by a Scientist or a group of Scientists of KAU that has been proved statistically superior under laboratory / field conditions of the Colleges / Research Stations. The aim of this trial is to compare the proven technology with the existing superior one prevailing in the location/region or the whole state. The trial should be carried out in the farmers' field by the Scientist(s) who evolved the technology in the presence of the Extension personnel(s) of the concerned location(s), concerned Project coordinators, and the Department officials of the location(s). The trial should be carried out with minimum statistical requirements such as treatments, replications and degrees of freedom. As the experiment is conducted in the farmers' field, significant deference may not be necessary always. However, there should be an advantage of at least 15% deference (25 % for the hybrids) for the technology over the existing one of that location. When the technology is aimed for recommendation for an entire agro climatic zone, it should be tested in at least 10 different locations with in a zone and when it is intended for recommendation through out the state, the trial should be carried out in all the five agro climatic zones of Kerala in at least four locations per zone except the zone where the technology was generated. Farm trials are required in the case of all technologies developed by KAU *viz.*, improvement, management and protection of crops / animals/ fishes before they recommend to the farming sector. However this may not be insisted in the case of perennial crops like coconut, areca nut, mango, cashew, jack etc. and large animals like cattle, buffaloes, horses etc. The results of the FT should be presented in meetings and workshops of Zonal Research Extension Advisory Committee (ZREAC), Variety

Evaluation Committee (VEC), State Seed Sub Committee (SSSC) / Central Seed Committee on Crop Standards, Notification and Release of Varieties, State Mini Package Workshop (SMPW) or State Package Workshop (SPW) along with other information prior to release / popularize/ recommend the technology. The format of the FT proposal is given in ANNEXURE X.

14. GUIDELINES TO RELEASE A NEW VARIETY/HYBRID

The scientists can initiate action to release the superior varieties/ hybrids located out of their experiments provided they are tested under the laboratory, field and farmers plot by following all the statistical requirements and formalities *viz.*, Progeny Yield Trials (PYT), Comparative Yield Trial (CYT), Multi Location Trial (MLT) and Farm Trial (FT). The Proforma for submission of proposal for release of crop varieties to central sub committee on crop standards, notification and release of varieties is given as ANNEXURE XI. The details should be submitted to the Director of Research, KAU in triplicate with a formal letters from the Project Coordinator, Head of the Department/Station with a brief resume of the variety in a paragraph along with other relevant documents for presenting before the Variety Evaluation Committee (VEC) meeting of the KAU held annually or biennially. Scientist identified, as the breeder of the variety should present the highlights of his/her variety through Power Point presentation before the VEC. In case the variety is cleared by the VEC, the Scientist should arrange to take 40 copies of the proposal incorporating the suggestions or corrections raised by the committee and it should be brought before the Central Sub Committee on Crop Standards, Notification and Release of Varieties (CSCCSNRV) and present the highlights of the variety through power point. The breeder should ensure that attractive photos (with laminated on in A4 size) are submitted to the Director of Research and sufficient samples of breeder seeds are available for further multiplication and distribution.

15. GUIDELINES TO RECOMMEND NEW PRODUCTION PROTOCOL

Prior to dissemination, a new management protocol of any of the components in crop and animal production has to be included in the Package of Practices recommendation published periodically by the Director of Extension, Kerala Agricultural University. The Principal Investigator of the technology should present the necessary proposal on this in the "Mini Package Workshop" (MPW) arranged by the DOR, KAU. If it is cleared in the MPW, it will be brought in the final Package of Practice (POP) workshop arranged by the Director of Extension of KAU. The proposals for including in the Package of Practices are to be prepared in triplicate in the proforma given as ANNEXURE XII and submitted to the Director of Research.

ANNEXURE I

Acad, Form 10

Faculty of ……..

PROGRAMME OF RESEARCH WORK FOR THESIS FOR MASTER'S DEGREE

1. Title of thesis
2. Locations
3. (a) PC Group
   (b) Thrust area
   (c) Code No
4. (a) Name of student
   (b) Admission No.
5. (a) Name of Major Adviser
   (b) Designation
6. Objective
7. Practical/Scientific utility
8. Important publications on which the study is based
9. Outline of technical programme
10. Main items of observations to be made
11. Financial outlay

Place: Signature of the student

Date:

Name and signature of members of the Advisory Committee

1. Major Advisor
2. Professor and Head
3. Member from the Department
4. Member from outside Department

Place: Signature of Head of the Department

Date:

Appendix-I (for reference)

Appendix-II (for time frame of study)

ANNEXURE II

Acad. Form 10

Faculty of .....

PROGRAMME OF RESEARCH WORK FOR THESIS FOR DOCTORATE DEGREE

1. Title of thesis
2. (a) Title of the departmental/KAU research project of which this forms a part
   (b) Code No. if any and order by which the departmental/KAU project is approved
   (c) Name of PC Group
   (d) Thrust area
3. (a) Name of student
   (b) Admission number
4. (a) Name of major advisor
   (b) Designation
5. Objective of the study
6. Practical/Scientific utility
7. Important publications on which the study is based
8. Outline of the technical programme
9. Main items of observations to be made
10. Facilities
    (a) Existing
    (b) Additional facilities required
11. Duration of the study
12. Financial estimate

Place: Signature of the student

Date:

Name and signature of members of the Advisory Committee

1.

2.

3.

4.

Place: Signature of Head of the Department

Date:

Appendix-I (for reference)

Appendix-II (for time frame of study)

ANNEXURE III

PROFORMA – 1

KERALA AGRICULTURAL UNIVERSITY

(Station/Department project-proforma revised in the 63rd meeting of FRC)

1. Name of the Faculty
2. Name of research centre
3. Relevant PC group
4. Thrust area and No.
5. Sub area and No.
6. Project title and No.
7. Name's and designations of
   (a) Principal investigator
   (b) Associates
8. Objective
9. Review of Literature
10. Technical programme and observations
    (give a time frame for the work proposed in phases of six months)
11. Expected date of start
12. Likely date of completion
13. Approximate cost (year-wise)
14. Funding agency

15. Signature of project leader

Place:

Date :

Certified that the project will be implemented soon after receipt of administrative sanction

Head of Department/Station(Signature with date)

Certified that the project was critically examined in the PC group meeting of ..... held on ..... and approved / not approved to present in the FRC meeting.

Project Coordinator
(Signature with date)

ANNEXURE IV

KERALA AGRICULTURAL UNIVERSITY

Faculty of .....

EVALUATION OF RESEARCH PROJECTS BY PROJECT COORDINATION GROUP

Name of the P C group:

Name of Project Coordinator:

Title of the project:

REMARKS OF THE PC GROUP

Date of the PC group meeting: .....

1. Relevance to the identified thrust / priority areas: relevant / not relevant
2. Objectives: clear / vague
3. Review of literature: adequate / not adequate
4. Technical programme: relevant to objective / not relevant
5. Observation proposed: sound / defective
6. Layout and treatments: adequate / not adequate
7. Time frame: sound / needs revision
8. Recommendation: recommended /returned for modifications / not recommended

Place: Signature of Project Coordinator

Date:

ANNEXURE V

FORMAT FOR FINAL REPORT OF THE RESEARCH PROJECTS UNDERTAKEN BY STUDENTS AS PART OF THE THESIS WORK

1. Faculty
2. Department and College
3. Location(s) where the experiment was conducted
4. Title of thesis
   (a) PC Group
   (b) Thrust area
   (c) Code No
5. (a) Name of student
   (b) Admission No.
6. Name of Major Adviser and Designation
7. Members of Advisory Committee and Designation
8. Objective
9. Date of start
10. Date of completion
11. Outline of technical programme
12. Deviation made if any and the justification
13. Results obtained (with highlighting photos, graphs and tables)
14. Summary and conclusions
15. Technology or academic findings generated
16. Future line of work
17. List of publications
18. Details of field books and basic records

Signature of Student

Signature of Major Advisor

Place: Signature of Head of the Department

Date:

ANNEXURE VI

FORMAT FOR PREPARING ANNUAL RESEARCH REPORT OF PROJECTS UNDERTAKEN BY SCIENTISTS WITH INTERNAL AS WELL AS EXTERNAL FUNDINGS

KERALA AGRICULTURAL UNIVERSITY

Faculty of .....

PC group.....

1. Department and College/ Station:
2. Location(s) where the experiment was conducted
3. Title of project
4. Thrust area
5. Code No
6. Principal Investigator (period wise):

Name and designation	From	To
6.1.		
6.2.		
6.3.		

7. Associates (period wise):

Name and designation	From	To
7.1.		
7.2.		
7.3.		

8. Objective
9. Outline of technical programme
10. Deviation made if any and the justification
11. Date of start
12. Date of completion
13. Results obtained during the period:
14. Work plan for the next year

15. Signature of Principal Investigator

Place:

Date: Signature of Head of the Department

ANNEXURE VII

FORMAT FOR PREPARING FINAL RESEARCH REPORT OF PROJECTS UNDERTAKEN BY SCIENTISTS WITH INTERNAL AS WELL AS EXTERNAL FUNDINGS

KERALA AGRICULTURAL UNIVERSITY

Faculty of .....

PC group.....

1. Department and College/ Station:
2. Location(s) where the experiment was conducted:
3. Title of project:
4. Thrust area:
5. Code No
6. Principal Investigator (period wise):

Name and designation	From	To
6.1.		
6.2.		
6.3.		

7. Associates (period wise):

Name and designation	From	To
7.1.		
7.2.		
7.3.		

8. Objective:
9. Outline of technical programme:
10. Deviation made if any and the justification:
11. Date of start
12. Date of completion
13. Budget amount sanctioned
14. Budget amount spent
15. Source of fund

16. Results obtained in chronological sequence:
    (with highlighting photos, graphs and tables)
17. Summary and conclusions:
18. Technology or academic findings generated:
19. Highlights and Future line of work:
20. List of publications:
21. Details of field books and basic records:

Signature of: Principal Investigator

Place:

Date:

Signature of Head of the Department

ANNEXURE VIII

FORMAT FOR COMPILING RESEARCH REPORT BY THE PROJECT COORDINATOR

KERALA AGRICULTURAL UNIVERSITY

1. Faculty:
2. PC group:
3. Name of Coordinator:
3. Highlights during the period:
4. Concluded experiments (Title, code No. location and a brief report):
5. Experiments in progress (Title, code No. and the trend of the result):
6. List of ongoing research projects

Place: Signature of Project Coordinator

Date:

ANNEXURE IX

THE PROFORMA FOR THE PROPOSAL OF MULTI LOCATION TRIAL

1. Name of the crop:
2. Name/category of the technology:
3. Sponsored:

4a. Institution or agency responsible for the development of the technology:

b. Name of the person(s) who helped in the development of the technology:

5a. Name and Code No. of the project from which the technology formulated:

b. Objectives of the project:

6. Details of the initial results:
7. Details of the results of field trial:
8. Specific areas of its adaptation:
9. Advantages (yield difference) over the ruling practice/ variety:
10. Details of benefit: cost analysis:
11. Economic impact on adopting this technology:
12. Details of the results of the farm trial:
13. Details of the MLT proposed:

    a. Treatments:
    b. Replication:
    c. Plot size/No. of plants/plot:
    d. Area required/location:
    e. No. of location:
    f. Total area for the trial:
    g. Date of sowing/planting/applying the treatment:
    h. Observations to be recorded with time:
    i. Duration of the trial:
    j. Date of harvest:

14a. Whether recommended by seminar/conference/workshop:

b. If so, justification for the release of the proposal with specific recommendations:

15. Any other pertinent information:

Date: Signature of the breeder Signature of the Head of Institution

Place

ANNEXURE X

THE PROFORMA FOR THE PROPOSAL OF FARM TRIAL

1. Name of the crop:
2. Name/category of the technology:
3. Sponsored:

4a. Institution or agency responsible for the development of the technology:

b. Name of the person(s) who helped in the development of the technology:

5a. Name and Code No. of the project from which the technology formulated:

b. Objectives of the project:

6. Details of the initial results:
7. Details of the results of field trial:
8. Specific areas of its adaptation:
9. Advantages(yield difference) over the ruling practice/ variety:
10. Details of benefit: cost analysis:
11. Economic impact on adopting this technology:
12. Details of the farm trial proposed:

    a. Treatments:
    b. Replication:
    c. Plot size/No. of plants/plot:
    d. Area required/location:
    e. No. of location:
    f. Total area for the trial:
    g. Date of sowing/planting/applying the treatment:
    h. Observations to be recorded with time:
    i. Duration of the trial:
    j. Date of harvest;

13a. Whether recommended by seminar/conference/workshop:

b. If so, justification for the release of the proposal with specific recommendations:

14. Any other pertinent information:

Date: Signature of the breeder Signature of the Head of Institution

Place:

ANNEXURE XI

THE PROFORMA FOR SUBMISSION OF PROPOSAL FOR RELEASE OF CROP VARIETIES TO CENTRAL SUB COMMITTEE ON CROP STANDARDS, NOTIFICATION AND RELEASE OF VARIETIES

1. Name of the crop and species:

2a. Name of the variety under which tested:

b. Proposed name of the variety:

3. Sponsored:

4a. Institution or agency responsible for the development of the variety:

b. Name of the person(s) who helped in the development of variety:

c. Name and Code No. of the project from which the variety evolved:

5a. Parentage with details of its pedigree:

b. Breeding objectives:

c. Breeding method

6. State the varieties, which most closely resemble the proposed variety in general characteristics:

7a. Whether recommended by seminar/conference/workshop/state seed committee:

b. If so, justification for the release of the proposed variety with specific recommendations:

c Specific areas of its adaptation:

8. Recommended ecology:

9. Description of the variety:

a. Plant height:

b. Distinguishing morphological characters:

Days to flower

No. of fruits or grain or economic parts/plant

Length of fruit

Girth of fruit

No. of seeds /fruit

Branches /plant

Fruit/ economic part yield

c. Flowering characters:

d. Fruit/grain/tuber characters:

e. Physiological features:

f. Duration/ Maturity range:

g. Reaction to pests:

h.Reaction to diseases:

i. Reaction to stress

j. Agronomic/ horticultural features:

k.Quality characters:

10. Data on farm /Regional/multi location/district/state or international trials proving the superiority of the variety over the local control:

11a. Agency responsible for maintaining breeder seed:

b. Quantity of breeder seed in stock:

12. Information on the acceptability of the variety:

Specific recommendation if any for seed production:

Economic impact on growing this variety:

15. Any other pertinent information:

Date: Signature of the breeder

Place:

Signature of the Head of Institution

Date:

Place: Kerala Agricultural University

Director of Research

ANNEXURE XII

THE PROFORMA FOR SUBMISSION OF PROPOSAL FOR INCLUDING IN THE MINI PACKAGE WORKSHOP

KERALA AGRICULTURAL UNIVERSITY

1. Name of the crop:
2. Name/category of the technology:
3. Sponsored:

4a. Institution or agency responsible for the development of the technology:

b. Name of the person(s) who helped in the development of variety:

5a. Name and Code No. of the project from which the technology formulated:

b. Objectives of the project:

6. Details of the initial results:
7. Details of the field trial:
8. Details of the farm trial:
9. Details of the MLT:

10a. Whether recommended by seminar/conference/workshop/state seed committee

b. If so, justification for the release of the proposed package with specific recommendations:

11. Specific areas of its adaptation:
12. Details of benefit: cost analysis:
13. Economic impact on adopting this technology:
14. Any other pertinent information:

Date: Signature of the breeder

Place:

Signature of the Head of Institution

Date:

Place: Kerala Agricultural University

Director of Research