2012 - 2013

Annual Report

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Kerala Forest Research Institute

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Kerala Forest Research Institute
An Institution of Kerala State Council for Science, Technology and Environment
Peechi - 680 653, Thrissur, Kerala

Cover Page Pictures

Front Cover - Dragon Fly (*Tramea basilaris*)
by Rajkumar KP, Ecology Department

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KFRI

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KRFI at a glance 2012 - 2013

Kerala Forest Research Institute (KFRI) is in the scientific fraternity of the country for over 35 years now. With its scientific outputs, involvements and timely interventions, KFRI has made its presence felt in the forest sector of the state as well as in the international scenario. The global concern over depleting forest cover, biodiversity and deteriorating environmental quality has reached its peak during these years. Socially acceptable, economically viable and environmentally sustainable ways of conservation is the need of the hour. Here, KFRI has a leading role, which we have been doing for decades now and the present situation puts us in a more responsible position to play a critical role in analyzing and implementing available environmental policies, cost-benefit analysis of forest sector, Non Timber Forest Produce production and viability, combating climate change, and sustainability of ecosystems and various other production systems. Over the years, the thrust of the research related activities of KFRI has widened to different aspects of environment quality, biodiversity loss, valuation of ecosystem services, livelihood assessments, policies and its implementation and societal development. KFRI is constantly striving to make forestry research socially relevant.

During the year 2012-13, KFRI has been making significant contributions in terms of research, extension and outreach activities of local importance as well as of global relevance. There has been 87 ongoing Research/Extension projects covering different aspects of forestry and societal relevance. Financial supports for these projects were from International, National and State agencies, namely, Food and Agricultural Organization, Ministry of Environment and Forests- Government of India, Department of Biotechnology- Government of India, Department of Science and Technology- Government of India, National and State Medicinal Plants Board, State Department of Planning and Economic Affairs, Hindustan Newsprint Ltd., Kerala Forest Department and KFRI Plan Grants. The Institute received Rs.15.03 crores as grants from Kerala State Council for Science Technology and Environment, Government of Kerala, of which Rs. 8.20 crores was under plan grants and the rest under non-plan. Financial support received from external agencies for specific projects was Rs 2.21 crores. Funds from plan grants were utilized for research and extension projects and for infrastructure development.

THE INSTITUTE

The origin of Kerala Forest Research Institute dates back to over three decades. The Institute was established in 1975 by the Government of Kerala as an autonomous organization under the Travancore-Cochin Literary, Scientific and Charitable Societies Act, 1955. With the formation of Kerala State Council for Science, Technology and Environment (KSCSTE) in 2003, the Institute was brought under the Council along with other Science & Technology institutions of the State. KFRI is one of the leading forestry research institutes dedicated to tropical forestry. The Institute has been instrumental in developing solutions to diverse problems faced in tropical forestry and these findings have helped in evolving strategies for conservation and sustainable use of forest resources of the State.

Vision

To become a centre of excellence in tropical forestry, to provide scientific backbone for effective conservation of forest ecosystem and sustainable utilization of natural resources for ensuring benefits to the society.

Mission

To provide technical support to facilitate scientific management and utilization of forests for social benefits. Accordingly, the Institute envisages to:

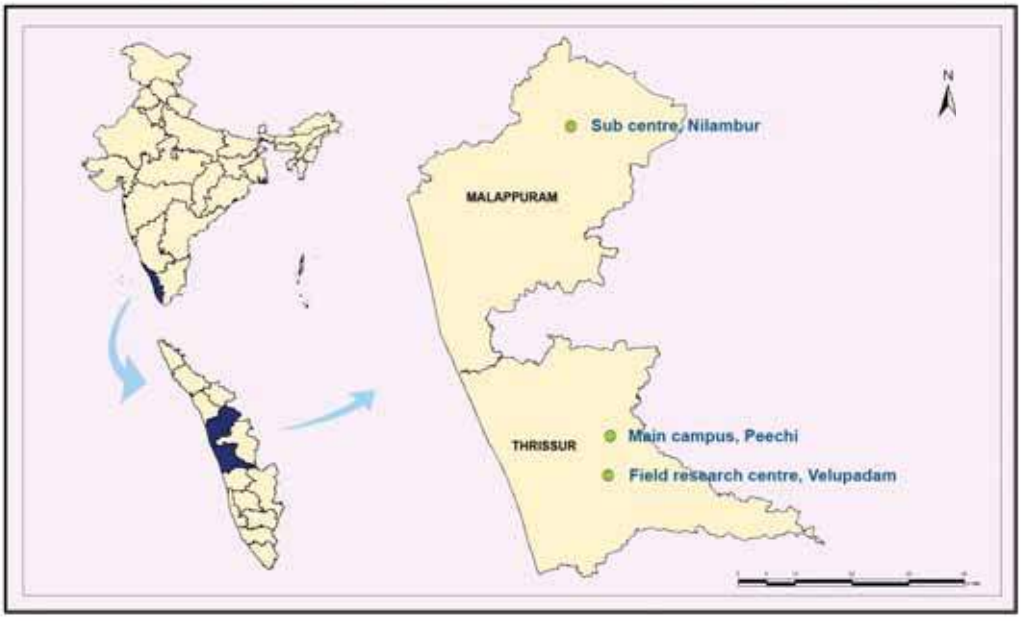
a. Conduct inter/multidisciplinary research on priority areas of tropical forestry including wildlife management, socioeconomics, indigenous knowledge, value addition of forest products, participatory forest management and livelihood improvement of forest dwellers/ dependants by scientific management of forest resources,

b. Provide technical advice and solutions to practical problems related to forest conservation and sustainable utilization of forest resources, and

c. Disseminate knowledge and information on forest-related matters to end-users, farmers, general public and transfer of technology to stakeholders for social benefits.

Main campus, Peechi

The main campus of KFRI is located in central Kerala at Peechi, about 20 kms east of Thrissur city in a 28 hectare Reserve Forest area adjacent to Peechi-Vazhani Wildlife Sanctuary. The Institute has a Sub-centre at Nilambur in Malappuram District and a Field Research Centre at Velupadam in Thrissur District.



Sub-centre, Nilambur

The Sub-centre campus at Nilambur with facilities for laboratory work and field trials in a 43.36 hectare area is about 140 kms away from the main campus. A bambusetum with 21 species of bamboos and trial plots of several tree species are maintained at the Sub-centre. The sub-centre also houses a teak museum, a bio-resources nature park, medicinal plant garden and a model butterfly garden.

Field Research Centre, Velupadam

The Field Research Centre (FRC) at Velupadam in Thrissur District is spread over an area of 47.43 hectare. It is 36 kms away from the main campus at Peechi.

Mainly nursery and field trials are conducted at the FRC campus. A bambusetum, one of India's largest live collections of bamboos, is the main attraction of Velupadam campus.

Organization

The total staff strength of the Institute is 117 which include 40 scientists, 66 administrative staff and 11 technical staff. In addition, 103 project personnel attached to various research projects provide the necessary research support. The Research Council (RC) is the vital body responsible for overseeing and guiding the formulation and implementation of various research programmes of KFRI. The RC comprises of eminent scientists in the field of forestry research/management in the country. The RC also monitors the quality and content of research undertaken by the Institute and provides guidance for improvement. A Management Committee (MC) chaired by the Institute's Director oversees the administration and management of KFRI. The Committee approves and manages both administrative and financial matters. The routine administration of the Institute is looked after by the Director in accordance with the decisions of the MC. Administrative and Accounts Sections, coordinated by the Registrar assists the Director in managing the day-to-day functioning of the Institute. The financial and expenditure matters of the Institute are scrutinized by an Internal Auditor.

The scientific manpower of KFRI is organized into nine Programme Divisions each comprising different Departments for effective implementation of multidisciplinary research in forestry and to disseminate the research findings to the stakeholders. Each Division is headed by a Programme Coordinator and each Department, by a Head. The Programme Divisions are: Sustainable Forest Management, Forest Genetics and Biotechnology, Forest Management Information System, Forest Ecology and Biodiversity Conservation, Wood Science and Technology, Forestry and Human Dimensions, Forest Health, Extension and Training, and Library and Information. Besides these, there is a Central Instrumentation Unit as a common facility. A Research Monitoring and Evaluation (RME) Unit headed by the Research Co-ordinator is also functioning to facilitate and monitor research activities in the institute

Research Divisions

Sustainable Forest Management

The Division consists of Tree Physiology, Silviculture and Soil Science Departments. The main areas of research of the Division are: seed technology, improved nursery and silvicultural practices, production of better clones and quality planting stock of plantation species, and sustainable forest management. Besides, studies have also been undertaken on eco-restoration and afforestation of degraded sites, raising green belts in coastal areas, control of riverbank erosion by planting, evaluation of factors affecting plantation productivity, soil nutrient management for important forestry species, composting technology for soil amelioration, and environmental physiology, especially water use, photosynthesis and microclimate. Monitoring weather parameters is also being undertaken by the Division.

Forest Genetics and Biotechnology

Departments of Forest Genetics and Tree Breeding, and Biotechnology are the components of the Division. The main research activities of the Division are in the fields of genetic improvement of teak, DNA fingerprinting, marker-assisted selection, gene mapping and population genetics. Assessment of genetic diversity of forest species, selection of plus trees and genetic improvement, studies on breeding system and gene flow are the other aspects of research in the Division. Tissue culture of important forestry species and medicinal plants and low cost micro-propagation technology are also undertaken in the Division.

Forest Management Information System

The information needs of the stakeholders of forestry sector are met by the Division of Forest Management Information System using modern tools of statistics, Geographic Information System and remote sensing. Creation of databases on biophysical and socio-economic aspects pertaining to forests, forest sector analysis and projections, mapping forest cover and biodiversity, and modeling the growth dynamics of plantations and natural forests for effective management are some of the major works carried out in the Division.

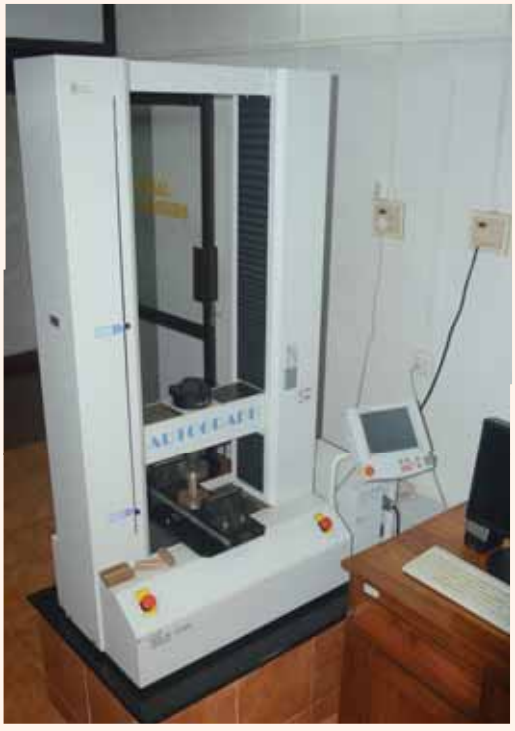
The Division has also developed a growth simulator for teak plantations in Kerala. Ecological studies on the Shola forests of Kerala based on remote sensing data and simultaneous calibration of allometric relations in teak stands were achieved using multilevel models. Stand modeling, biodiversity mapping, ecosystem analysis, GIS, forest resource mapping, population analysis and organization of a data bank of forestry in Kerala are other programmes undertaken by the division.

Forest Ecology and Biodiversity Conservation

Departments of Forest Ecology, Botany, Wildlife and Non-Wood Forest Products constitute the Division. The thrust areas of research of the Division are ecosystem and landscape analysis, rehabilitation and restoration, population ecology, biodiversity evaluation and conservation of fragile ecosystems, traditional knowledge system analysis and biodiversity-informatics. Inventorisation of biodiversity of different forest types and protected areas, evaluation of below-ground biodiversity, taxonomic studies and conservation of RET species of flora have been some areas of research in the Division. Besides, the Wildlife Department deals with inventorisation of fauna, endangered animals, man-wildlife interaction and wildlife census. Attached to the Wildlife Department is a Wildlife Museum with an exhaustive collection of species. Nursery and plantation technology of selected indigenous timber species, phytochemical analysis of medicinal plants, ethno-biological studies and cultivation of medicinal plants and other NWFPs, such as bamboos and rattans, are other activities of the Division. The NWFP Department works on isolation, characterization and bioactivity studies of molecules from medicinal plants of Western Ghats. Besides this, studies on pesticide residue analysis from different matrices and their effects on the ecosystem are also taken up.

Wood Science and Technology

The Division undertakes research and extension activities related to wood structure, properties and utilization, and evolves processing technology for timber and has facilities like wood preservation plant, drying kiln and instruments like Universal Testing Machine (UTM), image analyzer and NIR spectroscope. The Division has undertaken extensive studies on wood structure, properties and preservative treatments for various timber species, like teak, eucalyptus and rubber wood. Also, anatomical and utilization studies on bamboos, reeds and canes have been undertaken.



Forestry and Human Dimensions

The Division consists of Forest Economics, and Sociology Departments. The main areas of research in this Division are: livelihood and recreation, environmental conservation, natural/forest resource management, economic valuation of natural resources, sustainable utilization of non-timber forest products, policy and strategic planning. Other areas are sustainable forest management, participatory role of local communities in the conservation and sustainable management of forest ecosystem, resource use conflict and livelihood issues and agro-forestry systems. Assessment of supply-demand position of wood for the State, estimation of availability of bamboo in home gardens, evaluation of the livelihood conditions of bamboo workers in Kerala and establishment of a model watershed with people's participation are some of the achievements of the Division.

Forest Health

Forest Entomology and Forest Pathology are the two Departments under this Division. The main areas of research include various aspects of microbes, insects and weeds in the forest ecosystem. The Division maintains authentic collections of microbes and insects of Kerala forests and also of microbial pathogens of forest insects. Eco-friendly technologies are being developed to manage the pests, diseases and weeds in forest plantations, through biological means. Management of nursery and plantation diseases, diversity of plant pathogenic fungi in different forest ecosystems, Vescicular-Arbuscular and ectomycorrhizal fungal diversity and biological control of weeds are the main areas of research in Pathology Department.

In Entomology Department, the thrust areas include monitoring of forest insect diversity, control of termites in plantations, wood damaging insects and teak defoliator, and traditional methods of post-harvest protection of bamboo from insect borers. The mass production technology of the biopesticide *Hyblaea puera* Nucleo Polyhedrosis Virus (HpNPV) has been standardized, and the application technology has been transferred to stakeholders. The concept of butterfly garden has been popularized and technical advice is being provided to various agencies for the establishment of butterfly parks.

Extension and Training

The Division liaises with the users /stakeholders, facilitates transfer of technology to various stakeholders and conducts training programmes in different aspects of tropical forestry like forest management, forest seed management, medicinal plant cultivation, environmental impact assessment, biodiversity monitoring and evaluation, remote sensing and GIS, root-trainer technology, clonal propagation, tree improvement and statistical application in forestry. The Division has excellent facilities for conducting training programmes including lecture halls, trainees' hostel and vehicles for field trips. The Division also liaisons and coordinates technical support to the various stakeholders and departments, researchers, student community and general public.

Library and Information

KFRI library with a core collection of 16,000 books and 9,000 back volumes of journals on forestry caters to the information requirements of scientists and research scholars of the Institute and elsewhere. The collection includes many valuable reference books, doctoral thesis and back volumes of periodicals and databases in CD-ROMs. The Institute being a member of international bodies like Asia Pacific Association of Forestry Research Institutions (APAFRI), International Research Group on Wood Protection (IRGWP), International Union for Conservation of Nature and Natural Resources (IUCN) and International Union of Forestry Research Organizations (IUFRO), the library gets the publications from these organizations. More than 90 journals including 30 foreign journals are subscribed by the library. Online Public Access Catalogue of books and back volumes are available. In addition, the library provides online access to over 1900 journals related to environment and forestry, which has provision for accessing full text/abstracts and search facility. Bibliographical databases developed on specialized topics are made available in CD-ROM. The CD Server installed in the library provides access to not only these CD-ROMs but also the TREECD 1939-1990 which covers Forestry Abstracts, Forest Products Abstracts and Agro Forestry Abstracts in addition to other Abstracts. Annotated bibliographies on teak, bamboo and rattan, both in print and CDs are also available. Bamboo Information Centre- India hosted by KFRI is a source of published literature on bamboos world over which is updated regularly. As a step towards establishing a forestry portal, e-books, e-prints, research reports and scientific papers are presently available for searching. A comprehensive collection of scientific papers and other scientific documents by the scientists of the Institute constitutes another valuable section of the digital library.

Support Sections

The three support sections of the institute are Administration, Accounts and Engineering. The Administrative Section headed by Registrar, helps Director in running the day to day administrative activities of the Institute. All administrative sanctions related to project implementations are handled at Administrative Section. The Accounts Section looks after the accounting and financial management of the Institute. All financial transactions related to projects implemented by the Institute are handled at the Accounts Section.

The Accounts Section is responsible for all payments, including payroll. It is also responsible for maintenance of relevant records and accounts and for ensuring effective financial management practice in place. The Engineering section handles civil and electrical work separately. The civil section looks after the implementation of new constructions and maintenance of existing infrastructure. The electrical section is responsible for the installation and maintenance of electrical infrastructure and uninterrupted power supply.

Facilities

KFRI houses a number of highly sophisticated experimental research facilities. These include Laboratories, Collections, Plant Propagation Facilities, Networks and Helpline; Monitoring and Centralized facilities. Laboratories include tissue-culture, clonal multiplication, physiology, wildlife biology, soil science, molecular biology, wood science and technology, biochemistry, forest pathology, entomology, silviculture and Geographic Information System and remote sensing. These research laboratories are designed to serve staff scientists and research scholars as well as researchers from universities, industry, foreign institutions, and other government laboratories. Collections include, arboretum, bambusetum, palmetum, herbarium, medicinal plants garden, orchidarium, xylarium, wildlife museum, teak museum, butterfly garden and insect collections. For plant propagation there are nurseries, green house, mist chamber and the Kerala Forest Seed Centre. Networks and Helpline housed in KFRI are Asia-Pacific Forest Invasive Species Network (APFISN), TeakNet, Bamboo Technical Support Group (BTSG) (south zone) of the National Bamboo Mission and the Tree Health Helpline. The monitoring facilities are the established permanent plots and weather stations. Library, Central Instrumentation Unit, Land Area Network (LAN), training facilities, stores, seminar and conference facilities, field work support (vehicles), staff accommodation, guest house and research scholars hostel are the centralized facilities of KFRI. A Seismic Observatory operated and maintained by the Centre for Earth Sciences (CESS) is in KFRI main campus.

Asia-Pacific Forest Invasive Species Network

The Office of the Asia-Pacific Forest Invasive Species Network (APFISN) functions at KFRI. The Network is a cooperative alliance of the 33 member countries in the Asia- Pacific Forestry Commission (APFC) - a statutory body of the Food and Agriculture Organization of the United Nations (FAO). The Network focuses on inter-country cooperation that helps to detect, prevent, monitor, eradicate and/or control forest invasive species in the Asia-Pacific region.

At APFISN efforts are made to: spread awareness of Forest Invasive Species (FIS) throughout the Asia-Pacific region, exchange and share information on forest invasive species among member countries, facilitate access to technical expertise, research results and training and education opportunities, strengthen capacities of member countries to conduct research, manage FIS and prevent new incursions, and develop strategies for regional cooperation and collaboration in combating threats posed by FIS.

The Network is supported by FAO and United State Department of Agriculture (USDA) Forest Service. The Network publishes a bi-monthly newsletter 'Invasive' and fact sheets on major invasive weeds and pests, which is intended to share information among the member countries on FIS and the threats they pose. APFISN co-organized the Asian Regional Conference of Biodiversity India at Bangalore (August 2012), and the "Impact of climate change to forest pests and diseases in the Tropics in Yogyakarta in Indonesia (October 2012). Other activities during the period include the publication of a "Handbook on Invasive plants of Kerala", printing and distribution of desktop calendars, distribution of printed posters describing APFISN activities and establishment of linkages with Convention on Biological Diversity (CBD), Forest Invasive Species Network for Africa (FISNA) and Pacific Invasives Learning Network (PILN).

TEAKNET

TEAKNET (International Teak Information Network) was established to address the issues of the global teak sector. TEAKNET is basically managed by an International Steering

Committee and since 2008 is located at Kerala Forest Research Institute (KFRI), Peechi, India, which acts as the host institution for the functioning of Teaknet. TEAKNET aims to transform the global teak sector from its current suboptimal state to that of a dynamic entity for

the benefit of all stakeholders of the sector. TEAKNET organized The World Teak Conference (25-30 March 2013) on "Sharing our Planet: Teak Model Development towards the Improvement of Mankind", in Bangkok, Thailand (Funded by FAO- RAP, Bangkok) in association with the Plant Genetic Conservation Project under the Royal Initiative of Her Royal Highness Princess Maha Chakri Sirindorn, Food and Agriculture Organization of the United Nations (FAO), International Tropical Timber Organization (ITTO) and the Teakwood Working Party (Div5.06.02) of International Union of Forest Research Organizations (IUFRO). The Conference covered the key areas of genetics, silviculture and utilization; environment, climate change and carbon trading; economics and investments; rural development. Dr. K. Jayaraman, TEAKNET Coordinator presented a status paper on "Role of Teak in meeting the global hardwood crisis". Continuance of regular TEAKNET activities include website updation, releases of a quarterly TEAKNET bulletin, enrollment of new TEAKNET members and answering the queries regarding various aspects of teak at a global level.

Bamboo Technical Support Group National Bamboo Mission

The Bamboo Technical Support Group – KFRI is one of two such groups set up in the country to support the National Bamboo Mission (Ministry of Agriculture and Co-operation) in its mission of bringing integrated development of the bamboo sector. BTSG-KFRI caters to the requirements of the six states in South of India viz., Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Goa and Maharashtra. The most popular of BTSG activities has been the various training programmes organized in the past few

years. Field functionaries and farmers involved in cultivation and utilization of bamboo have been imparted training on diversity of bamboo species, their biology, and diverse range of uses it is put to, the methods of propagation, establishment and management of plantations, harvesting and utilization. The faculty is drawn

mostly from the scientists of various disciplines in KFRI that has been in the forefront of research in bamboo for the past three decades. Other activities have been to offer support on technical matters relating to bamboo to the National Bamboo Mission headquarters and to farmers and artisan. The bamboo nursery set up in KFRI also provides planting material of the important commercial bamboo species to farmers. The Bamboo Information Centre hosted by the Library is a source of published literature on bamboo world over.

Teak Museum

Teak Museum, established by KFRI at its Nilambur Sub centre campus is the first of its kind in the world dedicated to a single species–Teak. *(Tectona grandis* L.f). The museum provides information on various aspects of teak that includes history, cultivation, management, utilization and socioeconomics. Nilambur, located in Malappuram District of Kerala State is the place where India's first Teak plantation was raised more than 150 years ago during 1842-44. The Teak Museum was established in collaboration with the Kerala Forest Department and was opened to the public on 21st May 1995. The double storied museum exhibits articles describing the historical, aesthetic and scientific aspects concerning the teak tree. While the ground floor houses the exhibits of historical and aesthetic value, the first floor is mostly devoted to exhibits and information of scientific nature.

A Teak Information System (touch screen facility) in the Museum helps visitors to get information on various aspects of the teak tree, such as habit, distribution, history, morphology, cultivation, harvesting, timber, and utilization. In addition various educational, and extension programmes like orientation, workshops, nature study programmes and summer training courses are also organized for various stakeholders and it also conducts various other activities like contests, field trips and exhibitions, and documentary fests for the students and the general public on environmentally significant days. The Museum attracts on an average, every month about 16000 visitors including students, farmers and teak users. Approximately 1, 61,395 visitors visited the Teak Museum in the year 2012-13.

Tree Health Helpline

The Tree Health Helpline was initiated to help tree growers by giving them advice on pest and disease management associated with tree crops. Both the private sector and public sector tree growers are expected to be benefited by this service. The helpline attends largely to the queries received from the Forest Department on pests and diseases associated with teak and eucalyptus. A total of 163 queries, multi disciplinary in nature were registered with the tree health helpline in 2012-13. The queries related to pests and diseases were mostly concerned with the pests of *Tectona grandis, Swietenia mahagoni, Albizia* spp. and *Mangifera indica.* Fertilizer application for teak was the most frequent query to the tree health helpline. Some of the trees for which estimation of volume of timber and market values were estimated are *Tectona grandis, Swietenia mahagoni, Ailanthus spp.,* and *Macaranga spp., Gliricidia spp., Aytocarpus spp., Dalbergia spp. and Dysoxylum spp.* The *Ficus religiosa* tree in front of the temple at Kolazhy, Thrissur, was saved from the axe with the intervention of Helpline. Decision to cut the tree fearing its fall was reverted as verification indicated no health issues in the tree. The certificate given by Helpline was used to obtain a stay on cutting from the court of law. The major queries were on pest attack, wood quality, fungal attack, seedlings, soil queries, fertilizer applications, seed processing, planting methods, species information, volume of timber, harvesting time, physiological problems, parasitic problems, species – site matching, micronutrient deficiency, social issues, species identification, calculating the volume of timber, seeds, suitable intercrops, and availability of seeds.

Kerala Forest Seed Centre

The Kerala Forest Seed Centre (KFSC), established in 2003, is a joint venture of Kerala Forest & Wildlife Department (KFD) and KFRI. KFSC is headed by Dr. R.C. Pandalai, Senior Scientist of KFRI having professional training and experience in the field of Forestry /Silviculture. A Forest Range Officer and a Section Forest Officer on working arrangement is deputed to KFSC from KFD. KFSC is administered by an Advisory Committee comprising officials from both KFD and KFRI. The Centre envisages collecting forest seeds of superior trees/stands, processing, storing and distributing certified seeds to the KFD and other Government Departments, NGOs and farmers in and out of the State. Immediately after collection, seeds are processed through appropriate methods. Quality of the seeds will be assessed through cutting / tetrazolium /H_2O_2/germination test prescribed by the International Seed Testing Association (ISTA) and assessed for viability. Viable and healthy seeds are then stored at optimum storage condition (ambient & controlled temperature and relative humidity in plastic bins/gunny bags/plastic bags depending on their storage physiology). Seeds stored at KFSC are being subjected to routine viability tests at regular intervals. About 1000 kg certified seeds of 57 forest species were supplied to different stakeholders during 2012-2013. In addition to distribution of certified seeds, facilities are also used to undertake research in seeds of tropical forest species and provide training on seed technology to the forestry professionals, researchers, students and others interested in seeds.

Palmetum

Palmetum is a live collection of indigenous and exotic palms, which serves as a facility for educating the public about the need for conservation of palms. KFRI Palmetum was established in Peechi Campus in 2000 which contains 135 species of palms under 52 genera. Of these, 75 are indigenous palms and 60 are exotic

species with 8 species being critically endangered, 9 endangered, 8 vulnerable and 23 near threatened categories as per IUCN standards. The exotic species include those which are commonly found in Indian parks, gardens and along avenues. Rare species like *Bentinckia condapanna, Bentinckia nicobarica, Rhopaloblaste augusta, Calamus nagbettai, C.brandisii, C. vattayila, Wallichia disticha, W.nana, Korthalsia laciniosa, Korthalsia rogersii, Licuala spinosa* and mangrove species like *Phoenix paludosa* and *Nypa fruticans* are also represented in the collection.

Arboretum

The KFRI Arboretum is a living laboratory, including trees, lianas which acts as an outreach, teaching, and research facility dedicated to preserving the beauty and ecological functions of our biodiversity hotspot. Developed in the

Peechi main campus during 2003-2008, the arboretm covers an area of about 5 hectares. Arboretum currently holds 3200 accessions belonging to 178 species under 50 families and 128 genera, with more than 50 taxa endemic to southern Peninsular India. Arboretum is maintained with grid maps with markings of the location details of each of the live collection:

The Arboretum is also recognized internationally by Index Seminum with ID No. 1518 and is also enlisted in the National Network of Botanical Gardens in India. Among the 178 taxa in the arboretum, there are two gymnosperms and 176 are angiosperms. Among the angiosperms, 162 taxa are dicotyledons belonging to 118 genera and 47 families and monocotyledons are represented by 14 species of 3 genera and 2 families.

One of the interesting features of KFRI arboretum is the collection of species representing Myristica swamps, the evergreen, water-tolerant trees considered as the most primitive of the flowering plants or "living fossils" on earth. The swampy trees like *Myristica fatua* (Kotthapanu) *Myristica beddomei* (Pathiripoovu), *Myristica malabarica* (Ponnampayin), *Gymnacranthera farquhariana* (Undappayin) are conserved in the collection of KFRI arboretum representing different populations. This live collection will serve as a conservatory of rare species, and a ready source of propagules for eco-restoration programmes. For researchers, KFRI arboretum can be used for taxonomical, biotechnological studies, like DNA barcoding, silvicultural, ecological and synecological studies apart from its educative and aesthetic values. This live collection of more than 3000 trees facilitates conservation of the species grown in the arboretum, saving them from rarity and extinction from their natural habitats in the region and promotes nature education programmes. Some of the important Southern Peninsular Indian endemic species are represented in the Arboretum. The Arboretum promises to be a rewarding experience to visiting students especially biology students.

Bambusetum

The Bambusetum of KFRI established in 1988 at Field Research Centre (10°26'07.95" N; 76°21'32.92" E), Velupadam in Thrissur District, Kerala, has been an attraction to researchers and visitors ever since. The bambusetum has been enriched with different bamboo species up to 2013. Three types of planting stock (offsets, rhizomes and seedlings) collected from different parts of the country (Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Orissa, Tripura and West Bengal) were used for planting. Presently, 65 species under 14 genera viz., 26 species of *Bambusa, Davidsea attenuata*, 9 species of

Dendrocalamus, 2 species of *Dinochola,* 7 species of *Gigantochola, Guadua angustifolia, Melocanna baccifera,* 7 species of *Ochlandra, Oxytenanthera abyssinica, Phyllostachys sulphurea*, 2 species of *Pseudoxytenthera,* 3 species of *Schizostachyum,* 2 species of *Sinarundinaria* and 2 species of *Thyrsostachys* are growing well in the Bambusetum.

Herbarium

The KFRI herbarium was established in 1982 and it is recognized by the International Association of Plant Taxonomists (IAPT), and is known by the acronym KFRI by Index Herbarium (Taxon 37: 503. 1988). Now the herbarium holds over 10,306 specimens representing more than 2040 species from 203 families and is one of the major reference herbaria of forest plants. It holds wide collection of flowering plants of Kerala, especially medicinal plants and a pan Indian collection of rattans, palms and bamboos of India including Andaman and Nicobar Islands. The species in the herbaria are indexed in alphabetical order with collection numbers under respective plant families. Bentham and Hooker's system of classification (1867-1883) has been followed for the systematic arrangements. The predominant plant families in the collection are Poaceae (171 spp.), Orchidaceae (151 spp.), Arecaceae (109 spp.), Fabaceae (81 spp.), Euphorbiaceae (96 spp.) and Rubiaceae (90 spp.). The herbarium is also represented with more than 90 species of pteridophytes. For instant access of specimens from any part of the world, we have digitized all specimens and that can be accessed by botanists and other researchers free of charge through the data portal at http://kfriherbarium.org/. The website provides basic and advanced search capabilities. Default search can be conducted in all fields of the herbarium database, while advanced search allows searches in specific fields.

Medicinal Plants Garden

The Medicinal Plants Garden at Peechi campus covering approximately 0.5 hectare is maintained as a reference collection of authentic medicinal plants of Kerala forests. At present, there are around 280 species of medicinal plants consisting of herbs, shrubs, climbers and trees. The collection in the garden is enriched by bringing new plants collected from the wild or through exchange with other botanic gardens. During the year, 25 spp. of medicinal plants were collected as part of enrichment of the existing germplasm of which 12 spp. are new to the garden viz., *Hydnocarpus macrocarpa, Piper barberi, Jasminum grandiflorum, Plectranthes amboinicus, Plectranthes hadiensis var. tomentosa, Spilanthes vazhachalensis*, *Spilanthes ciliata,*

Cucumis sativus f. Hardwickii, Humboldtia vahliana, Thottea dinghoui , Jasminum flexile var. flexile, Canarium strictum. The garden is visited by school, college students, researchers and general public.

Wildlife Museum

Wildlife museum in KFRI has an exhaustive collection of specimens including many invertebrates, fishes, amphibians, reptiles, birds and mammals. Wildlife Department of KFRI has been collecting biological specimens of selected groups as part of different studies since 1978. The collection was initiated with the intention of preserving specimens which has been collected in routine project work. At present the wildlife museum holds over 1000 specimens collected from various forest areas in the State which is a valuable source of study material to researchers and students. The collection contains over 1000

specimens and many species are yet to be identified. Of the identified specimens more than 50 per cent of species found in Kerala comprise of 90 rare coral snakes, kraits and many more, 76 amphibians including the rare and endangered living fossil *Nasikabatrachus sahyadrensis,* 49 mammals include rare little Indian porpoise, flying squirrel, spiny dormouse and 8 aves. Number of invertebrate species such as molluscus, meretrix species and spiders from various regions of the State are also preserved. The specimens housed in KFRI serve unique role in information dissemination and they are used for graduate and undergraduate training, species identification workshops and educational programmes by State and local agencies. The goal of this museum is to continue specimen-based research with technical services and education which will establish KFRI as a key reference facility in Kerala addressing environmental issues, such as, wildlife conservation, endangered species recovery, native fish decline, landscape ecology, systematic and biodiversity studies. KFRI Wildlife museum is dedicated to education, outreach, conservation and research in biodiversity.

Central Nursery

The Central Nursery of KFRI in the current year developed and supplied more than 2.5 lakhs superior quality seedlings of about 115 species having high demand under timber yielding, fruit bearing and medicinal categories of plants. The nursery ensures the timely availability of planting material to the farmers, general public and other departments. Apart from the above species and aspects, the nursery is engaged in handling a number of rare and threatened species from Western Ghats, related with various research programmes conducted by the Institute. Standardization of nursery techniques of various species in collaboration with KFRI

Seed Centre is the other major task of the Central nursery. The data generated in the nursery is used in the ongoing research programs and is useful in future research programmes too.

Orchidarium and Fernery

Orchidaceae, one of the largest families of flowering plants, consists of about 700 genera and 30,000 species and with untold number of hybrids. The Orchidarium and Fernery are meant to provide artificial conditions similar to their habitats and help in *ex situ* conservation and their multiplication, besides providing materials for study purposes. Though about 265 species have been recorded from Kerala, some species are known only by their type collections and a

few are presumed to be extinct. Among the orchids of Kerala, thirteen species are used medicinally. At present the Orchidarium /Fernery of KFRI has 240 species including Rare, Threatened, Terrestrial, Epiphytic species of Orchids and Ferns. It also maintains some rare ornamental orchids and ferns.

Xylarium

Xylarium is a collection of well-curated authenticated wood specimens intended as a display for scientific research, teaching, environmental education and other programmes. KFRI xylarium was established in the year 1979, and has a collection of 587 specimens, 133 samples representing 68 genera and 114 species from India/Kerala and the rest are from 13 foreign countries. The xylarium database has detailed records, such as, family name of the tree from which the wood was collected, species name, original wood specimen number, date of collection, collector(s) name, herbarium number of the voucher specimen, country, altitude, latitude, longitude, habit, habitat, note on collection or accession, among

other. For each wood specimen, there will be a corresponding voucher herbarium specimen deposited in the KFRI Herbarium with the same accession number. Without this cross-reference, the wood collection is of no value. The dimension of the KFRI xylarium sample is: 10 x 6 x 1 cm for small specimens and 16 x 10 x 2 cm for large specimens following international standard. The Xylarium of KFRI has been indexed in Kew Royal Botanic Garden, in its Index Xylarium- a directory of Institutional Wood Collections from around the world. With a view to improve our collection of wood samples, KFRI has few xylarium samples (Indian species) available for mutual exchange.

Bioresources Nature Park

A Bioresources Nature Park (BRNP) was established at KFRI Sub-centre Nilambur, with the financial support from Department of Biotechnology, Ministry of Enivironment and Forest and Department of Planning and Economic Affairs, Government of Kerala. The Bioresources Nature Park features conservation themes, for groups such as, algae, bryophytes, pteridophytes and plants found in specialized ecological niche such as xerophytes (cacti and succulents) and hydrophytes (aquatic plants). Besides these beneficial plants (medicinal plants), ornamental and aesthetic plants (orchids), with special reference to endemic and rare, endangered and threatened (RET) species are also featured in the park. Propagules of over 1200 species of plants have been collected and introduced in the thematic areas of the nature trail. In the orchid house of the park one can familiarize some of the rare orchids, south Indian endemic species, medicinal orchids and

commercially important orchids including some of the prettiest orchids in south India. The Fern House features around 80 species of ferns, including endemic, rare, endangered and ornamental ferns. The Aquatic plants include different forms, such as, floating hydrophytes, submerged and rooted hydrophytes, emergent rooted hydrophytes, and floating leaved and rooted hydrophytes. The Xerophyte and Succulent garden has both outdoor landscaped

rock garden and a green house to display medicinal and ornamental species. A collection of bio-fence and bio-fuel species among other attractions too are displayed. Thallophyte and Bryophyte specimens are displayed in a specially designed shade house with mist and drip irrigation facilities. In the Palm Garden, besides the 40 ornamental palm species many palms which have economic, ecological and cultural significance are grown. A Taxonomic Garden, where plants of over 100 angiosperm families are assembled is part of the Bioresources Park. The butterfly garden in the Park has been developed by planting larval and adult host plants and subtle modification of the habitat whereby one gets to see the entire life cycle of a variety of butterflies. The BRNP also has a model bamboo house established by the State Bamboo Mission. Burials of Megalithic period dating to about 1800 to 2300 years old was located and reported by Dr. U M Chandrasekhara, Scientist F, Scientist-in-Charge, Nilambur Sub-Centre. This was confirmed by Archeologists of the Thrissur Circle of Archeological Survey of India. The archeological and historical importance of Nilambur is evident through this burial.

Butterfly Garden

Butterfly garden developed by KFRI is an important achievement in the field of nature education. Butterflies are reared in the laboratory and released into semi-natural enclosure where their food plants are grown. Practically a large number of butterflies captivate the eyes of the visitors in the background of which they receive elucidative lessons on ecology, environment, biodiversity, food web and biological balance.

KFRI has two butterfly gardens; one in its main campus at Peechi and another in the Subcentre campus at Nilambur. Some of the butterflies that can generally be seen in the garden include lemon butterfly *(Papilio demoleus)*, southern birdwing *(Troides minos)*, common rose *(Pachliopta aristolochiae)*, light blue tiger *(Tirumala limniace)*, dark blue tiger *(Tirumala septentrionis)* and common crow *(Euploea core)*. Plants that are raised in the garden for forage by butterflies include *Clerodendrum paniculatum, Crotalaria pallida, Crotalaria retusa, Cuphea hyssopifolia, Gardenia sp., Gloriosa superba, Heliotropium*

keralense, Hibiscus spp., Impatiens sp., Ixora spp., Jasminum spp., Jatropa spp., Lantana spp. Plants such as *Aristolochia indica, Thottea siliquosa, Tylophora indica, Asclepias sp., Carissa carandus, Ruta graveolens, Aegle marmelos, Cassia spp., Albizzia spp., Kalanchoe spp., Musaenda luteosa, Citrus spp.* and *Murraya koenigii* are introduced as larval host plants to sustain various butterflies in the garden. KFRI continues to provide technical advice for establishing of small and big butterfly parks. This year recorded 11228 individuals of butterflies belonging to 58 species.

Central Instrumentation Unit

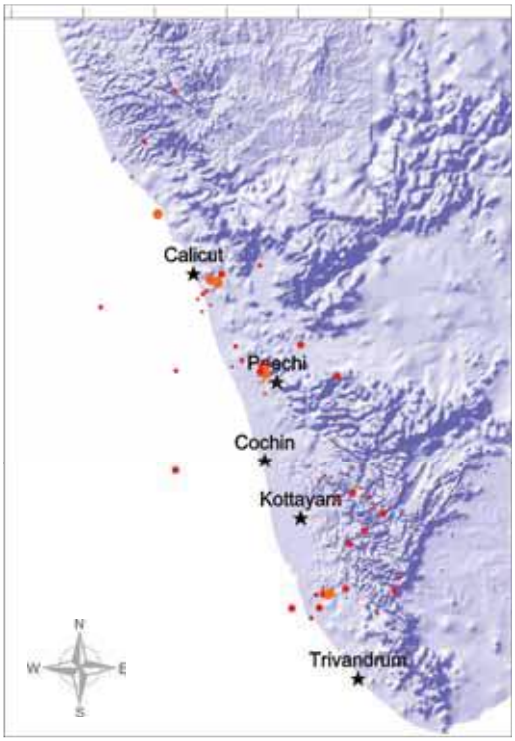
A Central Instrumentation Unit (CIU) was established in KFRI in 2006 for the purpose of assembling sophisticated analytical instruments in a centralized area, for use by researchers of different departments of the Institute. Since then various instruments have been added to the facility and now the CIU caters to the demand of researchers within the institute and also to outside users. The major instruments in the CIU are high performance liquid chromatography, gas chromatography, GC-mass spectrometer, CHNS elemental analyzer, autoanalyzer, real time PCR machine, spectrophotometer and soil CO_2 exchange system, among others. The CIU also has a sample preparation lab and other minor instruments like, muffle furnace,

precision water bath, analytical balance, rotary shaker and ultrapure water system. The CIU also offers the facilities to researchers from other organizations on payment.

Seismic Observatory

Centre for Earth Science Studies (CESS) operates a well-maintained Broadband Observatory at Peechi in the campus of KFRI since 1999. It is a Part of the 10 Broadband stations set up by

Department of Science and Technology (now funded by Ministry of Earth Science) to strengthen earthquake monitoring in peninsular India and for improving the detection and location capabilities of earthquakes in the shield region. The data recorded here is used for the studies of local/ regional earthquakes. The observatory plays host to a remarkable number of visitors, including students and thus serves as a good educational facility to the public. It also provides information on earthquakes to Government agencies as well as media and



Tremors recorded in Kerala during 2012 - 13

general public. Continuous archiving of data, Phase picks, wave form files and catalogue of events recorded in the observatory have been routinely carried out and the details have been sent to the Indian Meterological Department on a half-yearly basis. Continuous data are being transmitted online to National Geo Physics Research Institute, Hyderabad through V-Sat connectivity.

During March 2012 - Feb 2013, Peechi station recorded 2062 earthquakes. There were 1886 global events, 29 events from other parts of India (mainly from Maharastra, Sikkim-Nepal border, Rajastan, Madhya Pradesh, Haryana, Assam, Uttaranchal) and 29 from Andaman-Nicobar region. Among the regional events, 16 events are from the neighbovring area of Tamil Nadu (mainly from Vallakovil, Dharapuram, Thiruchirappily, Chettikurissy, Kambam, Thenkasi), 7 from Karnataka (Madikkeri, Dommanagodu, Mysore), 3 from Andhra Pradesh(Prakasam Dist). There were 9 global earthquakes having magnitude >=7. These were from Chile, Mexico, W coast of N Sumatra, Banda sea etc. Other than earthquakes, the observatory recorded local explosions too. There were 105 tremors from Kerala during this period mainly from Thrissur, Kollam, Kozhikode, Malappuram and Idukki District. Field investigations were carried out and the investigation report was submitted to the Government of Kerala.

Research Programmes

Completed Research Projects

KFRI Research Report No 433

Potential of using coir geo-textiles in highly degraded areas for improving the soil and productivity.

(M Balagopalan).

Coir geo-textile currently enjoys a high demand across the world. In the study, experiment was conducted in split plot design with two nutrient combinations viz., control (To) and high input management (TI) as the main plot treatments and three coir geo-textiles size levels viz., without coir geo-textiles (A); 1 cm x 1cm mesh size coir geo-textile (B) and 2 cm x 2 cm mesh size coir geo-textile (C) as the subplot treatments. Among the two plots where coir geo-textiles were spread, erosion and loss of nutrients were lower in plots where coir geo-textiles of 1 cm x 1 cm mesh size were spread. There was considerable increase in the soil moisture and decrease in the soil temperature in all the months in plots with coir geo-textiles. Soil moisture and soil temperature were substantially lower in the plots where coir geo-textiles of l cm x l cm mesh size was spread.

KFRI Research Report No 434

Development and maintenance of the medicinal plants garden in the Peechi Campus. (N Sasidharan).

Collection of medicinal plants is unsustainable, because little consideration is shown by people while collecting. Outside the forests, there is no *ex situ* conservation centre for the medicinal plants. The National Medicinal Plants Board (NMPB) also supports *ex situ* conservation of medicinal plants. Among the Research & Development centers of the Kerala State Council for Science, Technology & Environment, Kerala Forest Research Institute, Peechi; Jawaharlal Nehru Tropical Botanical Garden and Research Institute, Palode, Thiruvananthapuram, and Malabar Botanical Garden, Olavanna, Kozhikode, maintain medicinal plants gardens. The Medicinal Plants Garden at Peechi campus was established as early as in 1979. The Nilambur Sub centre of the Institute also has medicinal plants garden with about 200 species. The main objectives of establishing the medicinal plants garden of KFRI are conservation, education and extension. The medicinal plants garden of the Institute was part of a research project study on the Medicinal Plants of Kerala Forests.

KFRI Research Report No 435

Model watershed - maintenance monitoring and outreach.

(S Sankar, TP Thomas, KK Unni).

Water is a vital natural resource which is indispensable for the existence of all living matter. The necessity for its conservation needs emphasis. To control the water yield and to improve the water resources, the proper approach is sound watershed management. Watershed integrates all the hydrological phenomena pertaining to its boundaries and as such is a logical unit for planning optimal development of soil and water resources. Conventional methods of creating reservoirs, dams, inter-basin transfers have failed to achieve the desired results on the one hand and cost the exchequer dearly on the other. In this context, cost effective localized methods to control the flow of water and also to enhance infiltration gather importance.

KFRI Research Report No 436

Species recovery of selected endangered rattan species of the Western Ghats. (EP Indira).

Two types of DNA markers, Random Amplified Polymorphic DNA (RAPD) and Inter- simple

sequence repeat (ISSR), were employed to estimate the genetic diversity of 12 populations belonging to the four Calamus species. The results through 20 RAPD and 9 ISSR marker analysis highlighted that the population of *C. dransfieldii* seen only in Dhoni Forest of Olavakkode Division has high gene diversity. The populations are moderately diverse and the genetic differentiation between them is around 20 per cent. Within population gene diversities are low in *C. vattayila* populations at Nelliampathy, Sholayar and Kallar. Likewise, OPAW 20 another RAPD marker is capable of detecting male plants in *C. brandisii.* One thousand seedlings of *C. vattayila* and *C. travancoricus,* originated from nine populations from Kerala, were field planted in Malayattur Division. For enriching the existing populations to create genetically robust populations, populations having high gene diversity were identified.

KFRI Research Report No 437

Common Birds of Kerala. KFRI

(EA Jayson).

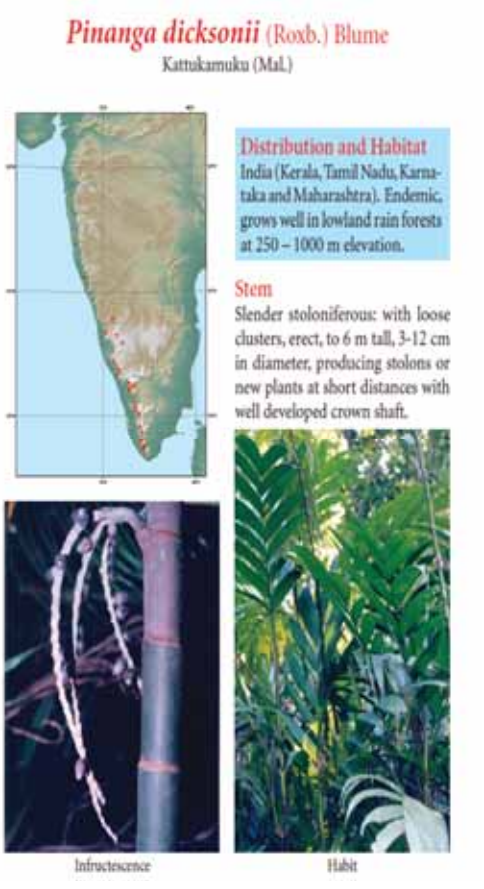
Books available on the birds of Kerala are published by Dr. Salim Ali, Birds of Kerala and the classical Malayalam book by K.K. Neelakantan Keralathile Pakshikal. An addition to the Birds of Kerala was published by Sasikumar et al. in 1993 including the newly discovered bird species from Kerala. Another book on the Waders of Kerala was published by Sasikumar et. al. 2005 and inventory on the birds of Kerala was published by Easa and Jayson (2004). This publication will be useful to the bird watchers, students, naturalists, conservationists and to the scientific community. Available data on the birds of Kerala was collected from literature and reprints. In addition to these, notes were added from the personal observation on birds in the field. Basic information on morphology and behaviour was adopted from published material.

KFRI Research Report No 438

A Field Guide to the Palms of India.

(C Renuka, VB Sreekumar).

Palms are woody monocotyledons belonging to the family Palmae (Arecaceae). They are a natural group of plants with a characteristic appearance that enables most people to recognize them without great difficulty. The Kerala Forest Research Institute has been surveying and studying the palm resources of India since 1983. The long field experience and research has resulted in the publication of a field guide, which covers 105 palms under 22 genera with simple description, maps and colour



photographs representing the species from all over India including Andaman & Nicobar Islands. Relevant illustrations are provided for easy understanding of scientific terms in this guide. The classification of palms is followed by a generic key and under each genus, generic

Leaves
Pinnate, forked, about 1.7 m long, 2.5-7 cm broad; petioles to 8 cm long; rachis to 2 m long with 20 leaflets per side; leaflets sessile, light green, with numerous parallel veins, broadly linear to falcate, praemorsed, uppermost leaflets confluent.

Inflorescence
Pendulous or erect, with few distichous branches, 4-7 which borne below the crownshaft; peduncle about 4-10 cm long; flowers and fruits arranged in 2 opposite rows along the flowering branches, flowering branches 4-5, simple, rigid, compressed, densely


Female inflorescence

covered with flower clusters; flowers in triads of two males and a central female; male flowers pinkish in colour.

Fruit
Oblong to ellipsoid, reddish colour, dry, fibrous, 1.5-2 x 1.0 cm; endosperm ruminate.

Flowering August-September.
Fruiting February-March.
Status Least Concern.
Uses Seeds chewed as a substitute for betel nut.
Synonyms *Areca dicksonii* Roxb., *Ptychosperma dicksonii* (Roxb.) Mart., *Seaforthia dicksonii* (Roxb.) Mart.


Male and female inflorescences

description and species level keys are also included. The species distribution maps are included for each species using GPS co-ordinates taken during the field surveys and for each geographical area separate map is provided. Almost all the species are provided with more than four photographs relevant to the identification point of view.

KFRI Research Report No. 439

Species recovery plan for *Semecarpus kathalekanensis:* a critically endangered fresh-water swamp species of the Western Ghats. (PV Nair, RC Pandalai).

Species recovery plan for *Semecarpus kathalekanensis:* a critically endangered fresh water swamp species of Western Ghats was taken up as subproject in the species recovery project. A related species *Semecarpus travancoricumis* is found in Kerala. These two species are very similar and are physically indistinguishable from one another. Various silvicultural parameters such as vegetative propagation, germination, growth and survival were recorded. As part of the project seedlings from Sirsi forests supplied by the Co-ordinator were planted in KFRI Peechi campus and field at Kulathupuzha. The results of planting trials, growth and other details are described.

KFRI Research Report No. 440

Development of bamboo sector in Kerala: resource enhancement.
(KK Seethalakshmi, EM Muralidharan, S Sankar, RC Pandalai, VP Raveendran).

Government of India has launched integrated projects which are implemented through two missions viz. National Mission for Bamboo Applications (NMBA) under Ministry of Science and Technology and National Bamboo Mission (NBM) under Ministry of Agriculture and Cooperation for development of bamboo sector. KFRI distributed the planting materials to panchayaths, had undertaken the responsibilities for identification of potential planters and establishment of plantations. A technical seminar was organized on 'Integrated Development of Bamboo Sector in Kerala' during Kerala bamboo fest. About one kilometer length was planted with seven bamboo species and preliminary observations revealed that behind the salt tolerant species like Casuarina, bamboo can be planted. Technical seminars and

interaction meetings increased the awareness about bamboo plantations, harvest and post-harvest techniques and value addition among public. The details of flowering, post-flowering behaviour and status of natural regeneration in the areas where flowering occurred could be documented for future reference.

KFRI Research Report No. 441

Transfer of technology of biological control of the teak defoliator pest to the Kerala Forest Department for field implementation and entrepreneurs for commercial production.

(VV Sudheendrakumar, TV Sajeev, RV Varma, Bindu K Jose).

The teak defoliator *Hyblaea puera* is recognized as the most important pest of teak *(Tectona grandis)*. The larvae of this insect feed on the foliage of the teak at all age classes. Repeated outbreak of this pest in teak plantations is a common occurrence with high negative impact on volume increment. KFRI has succeeded in developing a bacculovirus based biopesticide (*Hyblaea puera* Nucleopolyhedro virus-HpNPV) in managing this pest of economic importance. A wettable powder formulation of this biopesticide had been tested in the field and efficacy established. The HpNPV tehnology developed by KFRI is highly target specific and ecofriendly.

KFRI Research Report No. 442

A Compendium of project profiles and a digital archive of project records in KFRI. (K Swarupanandan, KH Hussain, KV Bhat, PG Ragi).

The Virtual Office KFRI (VOK) contains three modules: (i) The Digital Archive (per se), (ii) the User Tools, and (iii) the External Links. Mod. A search engine (search box) enables quick search of records in each of the Arch-Sects and Arch-Subsects. Res. Management: Review Bodies (RC, IRG), Projects Lists, Project Records, Res. Management (per se), Academic Progs (MSc., PhD.), Training Progs, Extension Progs, and Future Progs. Primary Data: Image Bank, Map Bank, Primary Data (from projects), and Power Points. Utilities: Forms & Formats, Calendar, Staff profiles, and Other Utilities. VOK is a multi-user office management system specifically designed for KFRI.

KFRI Research Report No. 443

Strengthening of floristic diversity in the KFRI sub centre campus through planting and weed management.

(UM Chandrashekara).

A taxonomic survey was carried out to assess the diversity of angiosperm taxa in the campus of Kerala Forest Research Institute Sub Centre at Nilambur. A total of 1643 taxa belonging to 152 families were recorded in which 1452 taxa represented species (sub species and natural varieties included) and the rest represented cultivars and hybrids. Orchidaceae, Euphorbiaceae and Acanthaceae were families having highest number of taxa, 131, 92 and 71 respectively. Increasing anthropogenic influences on the environment, especially urbanization have caused negative changes in natural ecosystems in and around Nilambur. The campus is visited by students of several schools and colleges, staff of Forest Department

and members of non-governmental organizations and they familiarize with the rich bioresource in the campus. Strategies to enhance flowering and non-flowering plant populations and their diversity in the campus are also discussed in the report.

KFRI Research Report No.444

Field performance of micro and macro propagated planting stock of five commercially important bamboo species. (KK Seethalakshmi, UN Nandakumar, EM Muralidharan, KK Unni, CM Jijeesh).

Kerala Forest Research Institute was selected as a nodal agency to implement this programme in Southern India along with the Institute of Wood Science and Technology, Bangalore and Institute of Forest Genetics and Tree Breeding, Coimbatore as partners. The KFRI component was to evaluate the field performance of micro and macro propagated planting stock of five commercially important species, viz. *Bambusa bambos, Dendrocalamus strictus, Dendrocalamus asper, Dendrocalamus stocksii (Pseudoxy - tenanthera stocksii)* and *Ochlandra travancorica*. Since micro-propagated planting stock of *O. travancorica* was not available, *Bambusa balcooa* was included in the plantation trials. A trial plantation of 41.19 hectare was established at Moolagangal, Attappadi, Palakkad District and 2 ha at Puthenkurizu, Ernakulam District in collaboration with private planters. Totally five species viz.*Bambusa balcooa, B. bambos, Dendrocalamus asper, D. strictus* and *D. stocksii* were planted. The experimental plots of 3 hectares each were laid out for *B. balcooa* and *D. asper* with macro and micro propagated planting stock. Both the planting stocks were found to perform similarly.

KFRI Research Report No. 445

Major invasive alien weeds in India: Biology and control. (KV Sankaran, TA Suresh, TV Sajeev).

A detailed description of five important invasive alien species of India, *Chromolaena odorata, Lantana camara, Mikania micrantha, Parthenium hysterophorus* and *Mimosa diplotricha* (*Mimosa invisa*) is provided. Its taxonomic descriptions, origin, growth and habitat, seed dispersal, ecology and distribution, utilization, environmental problems and methods of physical, chemical and biological control are discussed in this book. This book will be very

useful to the farmers, forest officials and researchers.

KFRI Research Report No. 446.

Handbook on invasive plants of Kerala. (KV Sankaran, TA Suresh, TV Sajeev).

This book, for the first time, brings out a concise list of invasive alien plant species recorded from the State of Kerala. It, however, does not list these alien species since left to themselves they are seldom invasive and they do not spread unaided. The objective was a qualitative appraisal of the invasive alien species scenario in the State. Each observation point was selected on the basis of visual observations on the presence of plants and their characteristic invasive

behavior. All species thus listed were vetted against the checklist of the native flora of Kerala. Eighty two species remained, which were subjected to Invasive Species Risk Assessment based on internationally tested procedures.

KFRI Research Report No. 447

Needs assessment and formulation of technical co-operation programme (TCP) project for forest invasive species (FIS) in South India, Sri Lanka, and Maldives. (KV Sankaran, TV Sajeev).

The needs assessment and formulation of technical co-operation programme (TCP) project for forest invasive species (FIS) in South India was formalized through a workshop on Alien lnvasive Species Invasions into Forests of South lndia organized at KFRI. The Workshop listed the current out breaking invasive species (twenty nine species of alien invasives were listed in both South India and Sri Lanka and 23 species were listed for Maldives); identified probable immediate invasive species threat to forests, model sites, training requirements and listed stakeholders in the respective countries.

KFRI Research Report No. 448

Standardisation of plantation techniques of mahogany with particular reference to soil nutrition and shoot borer incidence. (TP Thomas, K Mohanadas, P Rugmini).

In spite of excellent growth potential and adaptability to a wide range of conditions including degraded sites, the tree is susceptible to shoot borer attack by Hypsipyla species. Trials conducted in many countries to control the pest met with little success. The experiment was laid out in split plot design with spacing as the main plot factor and manuring as the sub plot factor. Two spacing levels of 2x2m and 3x3m were provided and the manuring treatments consisted of cow dung, compost, sterameal and NPK at 3 levels each along with control. Results conclusively proved the benefit of lateral shade provided through closer spacing in improving the growth as also in reducing shoot borer incidence. *S. mahogany* was found to be

extremely slow growing and with greater susceptibility to the shoot borer when compared with *S. macrophylla.*

KFRI Research Report No. 449

A field study to evaluate the efficacy of lemon grass in controlling runoff and soil erosion. (TP Thomas, S Sankar, KK Unni).

Cymbopogon albescens and *Vetiveria zizanioides* were planted in contour strips to control runoff and soil erosion. *V. zizanioides* was more effective during this period; it reduced the runoff loss to 13 per cent of the rainfall (286 mm) received. Runoff loss during the same period from control plots was 42 per cent in June, 92 per cent in July, 45 per cent in August and 77 per cent in September. *C. flexousus* permitted 21 per cent runoff loss while *C. albescens* plots lost 32 per cent and *V. zizanioides* plots lost 12 per cent; the loss from control plots was to the tune of the 77 per cent. Soil loss as suspended sediment from the runoff plots was also effectively reduced by *C.*

flexuosus. Annual soil loss from the plots was 1.43, 3.83 and 1.01.Ol tons/ hectare from *C. jlexuosus, C. albescens* and *V. zizanioides* plots compared to 5.37 tons/hectare from the control plots. Lemon grass, especially *C. jlexuosus* could control runoff and soil loss very effectively; it produced enough shoots and roots to achieve this performance.

KFRI Research Report No. 450

Indexing contents of the back volume collections of KFRI Library.

(N Sarojam, KH Hussain, KF George).

A number of core journals in forestry and allied subjects are subscribed in KFRI Library since 1975. Back volumes of these journals are kept bound and a separate collection of these volumes is maintained in the library. An index to the contents of these volumes was highly essential to fetch the contents of these volumes for use. The project envisaged developing a database of the contents of each journal and makes it available for searching by author, subject and title. Procedures that followed for developing a specialized information system for the collection are described in this report. The index to KFRI back volume collection is created and uploaded for online search.

KFRI Research Report No. 451

Establishment of a taxonomic garden in the KFRI sub centre campus.

(UM Chandrashekara).

Live models that display the scientific classification of plants are referred to as taxonomic garden. These gardens are highly effective in providing opportunities for comparing similarities and differences within taxonomic groupings. The Garden, covering about 2 hectare land is located adjoining the Teak Museum and Bioresource Nature Park Complex. For each family, a separate bed (family bed) was prepared and planted with one to five species. In front of each family bed a signboard depicting characteristic features of the family, general floral formula, number of general and species reported from Kerala, number of species belonging to different conservation status, and

names of species planted in the family bed is provided. The purpose of the taxonomic garden is mainly educational. Strategies for using the garden to promote teaching, research and capacity building in the field of taxonomy and allied subjects are also discussed.

KFRI Research Report No.452

Processing, storage and supply of seeds of teak and miscellaneous forest tree species through KFSC.

(RC Pandalai).

Teak *(Tectona grandis)* seeds were collected from different Teak Seed Production Areas (TSPA's) identified by the Kerala Forest Department (KFD) from all over the State and were transported to Kerala Forest Seed Centre (KFSC) for cleaning / processing and quality testing viability and germination, during the reporting period (2006-2010). The seed processing included mainly cleaning by winnowing, drying and grading. Viability tests included rapid viability test (cutting test) and conventional test (germination test) were carried out in order to facilitate and ensure uniform germination percentage of teak seeds supplied from KFSC. The results confirmed that seven days of alternate wetting and drying will be the optimum duration for the pre-treatment of teak seeds for maximum seed germination. Seeds of about 70 species were collected, processed and viable seeds were stored in different containers at appropriate storage conditions (ambient; cold storage at 16°C and 4°C at 45 percentage

humidity conditions) based on the seed physiological nature of a particular species. Brochures in Malayalam giving information on seed processing were brought out.

KFRI Research Report No. 453

Management and monitoring of growth of coppice crop in the experimental plantations of *Eucalyptus tereticornis* (Kayampoovam and Punnala) and *E. grandis* (Surianelli and Vattavada). (PK Chandrasekhara Pillai, KV Sankaran, RC Pandalai).

Experimental plantations of eucalypts were established at four sites in Kerala during 1998 as a part of an India-Australia collaborative project aimed at enhancing productivity through site management practices. These included a plantation of *Eucalyptus tereticornis* established at Punnala in Kollam district and *E.grandis* at Surianelli in Idukki district. The treatments applied included addition of N fertilizer and weed management which resulted in enhanced productivity of both the species. The plantations were harvested in 2005 at the age of 6.5 years. The second rotation coppice crop was managed in

the above plantations to analyze whether there was any residual effect of the treatments that was applied in the first rotation. All these details are presented in the report.

KFRI Research Report No.454

Digitization of Indian forest records, forest bulletins and forest leaflets. (N Sarojam, KH Hussain, KF George).

Very old documents of Indian forest records, forest bulletins, forest leaflets, among others published by Forest Research Institute (FRI), Dehra Dun, available in the KFRI library are brittle posing serious problems in preserving the printed copies. Hence, digitization of these publications will render proper documentation and higher circulation among the practicing foresters and researchers. All the procedures adopted in bringing it into an integrated searchable database is described herewith in the report.

KFRI Research Report No.455

Enrichment of microbial culture collection at KFRI. (EJM Florence, GE Mallikarjuna Swamy, C Mohanan).

Microbial culture collections are crucial resources providing microorganisms for research, references and industrial use. They act as repositories for microbial strains as part of patent deposits, confidential service to store key organisms for research, industry and society. The sources of microorganisms cited in scientific papers can also be confirmed and further studies can be undertaken making use of these collections. Microbial culture collections are considered as libraries, but instead of books they hold microorganisms. In the microbial culture collection of KFRI there are about 1696 species of fungal isolates, belonging to 51 genera. Periodic sub-culturing of the specimens was done at 4-6 months intervals to maintain the virulence of the organisms. Most of the fungi in the collection

were collected from different forest ecosystems of Kerala part of Western Ghats.

KFRI Research Report No.456

Livelihood improvement of marginal bamboo dependants: Artisans and farmers of selected clusters.

(KK Seethalakshmi, S Sankar, RC Pandalai, EM Muralidharan, TK Damodharan, VP Raveendran).

The project is mainly envisaged to improve the livelihood of traditional bamboo artisans through strategic interventions. With the project intervention, an enhancement of awareness on potential of bamboo and possibility of value addition, skill development for manufacture of premium products, development of small and simple tools that are hand operated to reduce the workload, exposure to market, technology transfer in nursery and plantation technology for bamboos, and establishment of plantation for demonstration purpose in collaboration with farmers were accomplished. The study highlights the major constraints faced by the bamboo dependent communities and has put forth suggestions for an improved and better functioning of the bamboo sector in the State.

KFRI Research Report No. 457

Micropropagation of superior clones of teaks for the Western Ghats of Kerala.

(EM Muralidharan)

Rapid micropropagation of selected six clones derived from the plus trees of teak plantations of Kerala was carried out successfully. Shoot cultures were induced by culture of shoot tips of epicormic shoots that sprouted from branch cuttings maintained in the mist chamber. The best combination of hormones was found to be 1.5 mg/ l BAP and 1.5 mg/ l Kin for multiple shoot regeneration. Shoot cultures were maintained through subculture carried out at 4-6 week intervals. *Ex vitro* rooting was successful in microshoots treated with 4000 mg/l IBA and transferred to the hardening chamber. 95 per cent of the plantlets were hardened. Upto 500 plantlets each of the selected clones were produced through the above method. Shoot cultures did not perform well in liquid media even when Polyurethane (PU) foam supports were provided or when the cultures were agitated on shaker. Attempts to maintain teak shoot cultures for long periods without subculture did not give promising results. Cultures on minimal media could be sustained only for eight weeks whereas with a mineral oil overlay cultures could last upto 5 weeks. Only shoot cultures maintained in the dark at 4°C in the refrigerator could be maintained for up to 6 months and rejuvenated to give normal shoot cultures.

Ongoing Research Projects

1. Maintenance of provenance trial plots of eucalypts and acacia and development of new clones for establishment of Clonal Multiplication Area (CMA)
(Principal Investigator - Dr. Maria Florence EJ)
2. Participatory Forest Management and Ecodevelopment alternatives: Initiatives and challenges in Kerala (Dr. Mammen Chundamannil)
3. Capability development in instrumental methods of analysis (Dr. Muralidharan EM)
4. Digital Library in Forestry (Dr. Sarojam N)
5. Establishment of a Bamboo Technical Support Group for South Zone under National Bamboo Mission (Dr. Pandalai R C)
6. Optimizing management of bamboo stands using growth simulation models
(Dr. Jayaraman K)
7. Quality improvement of organic manures for reducing soil health hazards
(Dr. Sujatha MP)
8. Phylogeny and generic classification of the woody bamboos (Poaceae: Bambusoideae: Bambuseae) Collaborative project with Clark Lynn G, IOWA State Univ USA
(Dr. Muktheshkumar MS)
9. Developing appropriate technology and establishing a plant for activated carbon production from coconut shells for community based organizations (Dr. Dhamodaran TK)
10. Impact of Industrial activities on soil and water qualities in Koratty Panchayat area
(Dr. Sandeep S)
11. Kerala Forestry Statistical Database Data Mining and Information Dissemination
(Dr. Sivaram M)
12. Technology for low-cost micro-propagation for *Bambusa balcooa* and *Thyrostachys oliverii*
(Dr. Muralidharan EM)
13. Evaluation of *Ochlandra* germplasm mass propagation and field trials of elites
(Dr. Thulasidas PK)
14. Computerisation of KFRI Herbarium (Dr. Sreekumar VB)

15. Standardisation of bamboo cultivation practices for homesteads of Kerala Phase II (Dr. Nandakumar UN)
16. A Compendium of project profiles and a digital archive of project records in KFRI (Dr. Balagopalan M)
17. Development of a prophylactic control strategy for managing the mahagony shoot borer *Hypsyphyla robusta* in trial plantations (Dr. Mohanadas K)
18. Establishment of tree health helpline for the State of Kerala (Dr. Sajeev T V)
19. Storage practices in recalcitrant tropical forest seeds of Western Ghats (Dr. Chandrasekhara Pillai PK)
20. Spatial distribution and invasion dynamics of invasive alien weed *Mimosa diplotricha* in the Kerala part of Western Ghats (Dr. Sajeev TV)
21. Standardization for enhanced production of antagonistic principle by *Bacillus subtil*is and *Streptomycese* for the control of sapstain on rubber wood (Dr. Maria Florence EJ)
22. Use management and nutritive value of edible non-crop plants in agroforestry and tribal landscapes of Kerala (Dr. Chandrashekara UM)
23. Testing of viability and germination percentage of stored seeds and assessment of planting stock quality (Dr. Pandalai RC)
24. Seed handling in selected forest tree species and medicinal herbs of Kerala (Dr. Pandalai RC)
25. Analysis of soil samples from kanor tree crops and agroforestry systems of Thrissur District Kerala (Dr. Sujatha MP)
26. A decision support system for monitoring and forecasting timber prices of Kerala State (Dr. Sandeep S)
27. Conservation through restoration of two endemic endangered trees of Western Ghats of Kerala (Dr. Jose PA)
28. Preparation of a wetland atlas of Kerala (Dr. Vijayakumaran Nair P)
29. Population evaluation and development of propagation protocol for three Rare Endangered and Threatened (RET) trees from Kerala part of Western Ghats (Dr. Somen CK)
30. Detection and eradication of the giant African snail (*Achatina fulica*) in Kerala (Dr. Sajeev TV)
31. Growth model for *Acacia auriculiformis* in relation to soil conditions in Kerala (Dr. Pandalai R C)
32. Genetic diversity and conservation of Teak Phase II (Dr. Thulasidas P K)
33. Large scale propagation of *Embelia ribes* and *Embelia tsjeriam-cottam-two* important threatened medicinal plants through in *vitro / in vivo* techniques and repopulating the forests with participation of tribal groups (Dr. Raghu AV)
34. Tree flora of Kerala (Dr. Sasidaran N)
35. Development of institutional capability for DNA barcoding of life forms (Dr. Muralidharan EM)

36. Pilot scale micro-propagation of important forestry species (Dr. Muralidharan EM)
37. Vetiver system technology for river bank stablilisation (Dr. Sandeep S)
38. Population ecology of the Lion tailed Macaque in Silent Valley National Park its buffer zones and Muthikulam High Value Biodiversity Area (Dr. Sreekumar V B)
39. Appraisal of Forest Rights Act 2006-Implementation among the particularly vulnerable tribal groups (PVTGs) in Kerala (Dr. Anitha V)
40. Development experiences of selected groups of Scheduled Tribes in the Kerala part of Western Ghats (Dr. Amruth M)
41. Taxonomic manual on Indian Palms (Dr. Sreekumar VB)
42. Development of seed handling technologies for selected bamboo species (Dr. Pillai PKC)
43. Biosystematics and conservation biology of the genus *Cinnamomum* in the Western Ghats (Dr. Hrideek TK)
44. Genetic status and livelihood trajectories of Cholanaickan Tribal Women with reference to Sickle Cell Anaemia (Dr. Suma TB)
45. Reinvestigating study plots established by KFRI during 1975-2010 to measure forest migration range shifts of species and compositional changes in the context of climate change (Dr. Sreejith KA)
46. Establishment of permanent plots in all forest types along the elevation gradient for continous monitoring of climate change induced variations (Dr. Sreekumar VB)
47. Seed ecological and regeneration studies on key stone species of the evergreen and moist decidous forest ecosystems (Dr. Chandrasekhara Pillai PK)
48. Preparation of protocols for availing carbon finances for forests of Kerala (Sajeev TV)
49. Long term studies on climate change (Dr. Sajeev TV)
50. Population structure carbon sequestration litter dynamics propagation economics and livelihood potential of *Pseudoxyanthera ritcheyi* and *Ochlanra setigara*-Two rare bamboo species of Kerala (Mr. Kuruvilla Thomas)
51. DNA Barcoding of selected bamboo species of India (Dr. Suma TB)
52. Mass production of *Bacillus subtilis* for biocontrol of sapstain on rubber wood (Dr. Suma TB)
53. Environmental impact of Pesticide application in Cardamom Hill Reserves (CHR) of southern Western Ghats (Dr. Jayaraj R)
54. Establishment of herbal gardens in selected 100 schools of Palakkad and Malappuram districts of Kerala (Dr. P. Sujanapal)
55. Rehabilitation of two industrially important and endangered species, Santalam album L. (Chandanam) and Saraca asoca (Roxb.) De Wilde (Asokam) in homesteads of Palakkad and Malappuram districts of Kerala (Dr. P. Sujanapal)
56. Handbook on mangroves and mangrove associates of Kerala (Dr. P. Sujanapal)
57. Tree flora of Kerala – ver.2.0 (Dr. P. Sujanapal)

Ongoing Extension Projects

1. Conservation awareness programme for the Madayi hills, Kannur District (Principal Investigator Dr.Mammen Chundamannil)
2. Systematic of the swallowtail butterflies (*Lepidoptera papilionidae)* of Kerala, India (Ms. V S Revathy)
3. Strengthening the collection of traditional teak wood articles at the teak museum and preparation of a handbook (Smt. Sani Lookose)
4. Strengthening the *ex-situ* Conservatory at FRC Velupadam with RET tree species of Western Ghats (Dr. Sujanapal)
5. Building full text retrieval system for bamboo literature collection in KFRI Library (Mr. K. H Hussain)
6. Interactive sessions with forestry experts, Policy makers and public figures (Dr. A V Raghu)
7. Developing an oral history archive as part of establishing a resource center for policy research (Dr. M Amruth)
8. Preparing a digital library of rare documents (P Vijayakumaran Nair)
9. Habitat enrichment in the butterfly garden at KFRI campus, Peechi (Dr. T V Sajeev)
10. Enrichment of the insect collections of KFRI (Dr. T V Sajeev)
11. Workshop on 'Medicinal Plants and Conservation' for the school teachers of Kerala (Dr. A V Raghu)
12. Environmental impact assessment (EIS) of road from Nelliampathy to Parambikulam tiger reserve (Dr. S Sankar)
13. Two day induction training on 'Modern trends in forestry research' (Dr. R C Pandalai)
14. Enrichment of microbial culture collection at KFRI (Dr. Mallikarjuna Swamy GE)
15. Workshop on Academic Writings skills (Dr. R C Pandalai)
16. KSCSTE- National Green Corps State level workshop to select best NGC Ecoclubs (Dr. R C Pandalai)

17. Management and monitoring of tree species trial plots in the KFRI sub centre campus (Dr. Chandrashekara UM)
18. Development of forest nursery at Kottappara and Devikulam (Dr. PKC Pillai)
19. Strengthening and enriching the palmetum (Dr. V.B.Sreekumar)
20. Production of teak clones and maintenance of clonal multiplication area (Dr. T K Hrideek)
21. Organizing educational programmes at teak museum, KFRI Sub center (Smt. Sani Lookose)
22. Maintenance and enrichment of medicinal plant garden at Peechi campus (Dr. P A Jose)
23. Improving yield and reducing the rotation age of teak plantations through superior clonal teak (Dr. T K Hrideek)
24. Negotiating for conservation: An action research programme for preparing a joint proposal to establish community reserve at Kammadam kavu, Kasargod district (Dr. M Amruth)
25. Maintenance of *Dalbergia* plot established under DBT network project at Nilambur and Velupadam (Dr. Sujatha MP)
26. Recording of weather data at different centers of KFRI (Dr. C K Soman)
27. Establishment of a field gene-bank for RET tree species in the KFRI sub centre campus, Nilambur (PI-Dr. Chandrashekara UM)
28. Digitalization of selected books in KFRI library (Dr. George K F)
29. Strengthening and maintenance of Institute bambusetum (V.B.Sreekumar)
30. Strengthening and maintenance of Institute Arboretum (V.B.Sreekumar)
31. Indian forestry abstracting and indexing service (K H Hussain)
32. Strengthening and enriching Institute central nursery (Dr. Sujanapal P)
33. Improvement of butterfly garden in the KFRI sub center (Dr. U M Chandrasekhara)
34. A consultative workshop on animal products in Ayurveda and other traditional systems (Dr. P S Easa)
35. Statistical analysis of wild elephant census of Kerala 2012 (Dr. M Sivaram)
36. Training programme on cultivation and management of bamboos (Mr. V.P.Ravindran)
37. Training programme on 'Aerobic weed composting and exposure visit' (Dr. Sujatha M P)
38. Training programme on 'Office Administration and Development for NGO' (Dr. R C Pandalai)
39. Strengthening and continuation of the Tree Health Helpline for the State of Kerala (Dr. Sajeev TV)
40. Forestry extension education training programme for the staff of social forestry wing, central region, Ernakulam (Dr. R C Pandalai)
41. Database on fungi of India and fungi recorded on eucalyptus (Dr. G E Mallikarjuna Swamy)

42. Inventory of volume and biomass tree allometric equation for south Asia (Dr. S Sandeep)
43. Forest nursery management & planting stock production (Dr. R C Pandalai)
44. Seed testing and certification in forestry (Dr. R C Pandalai)
45. Conservation and development of medicinal plants and its benefit sharing with local communities (Dr. R C Pandalai)
46. Preparing brochures on forestry aspects (Dr. A V Raghu)
47. KFRI occasional papers (Dr. M Amruth)
48. Isolation and characterization of fungal endophytes from certain medicinal plants and RET species in Western Ghats & their therapeutic potentials (Dr. Thulasi G Pillai)
49. Management of tropical forest – issues and challenges (Dr. R C Pandalai)
50. MS (Wildlife)course, KVASU, Classes, disbursal of honorarium to faculty members (Dr. E A Jayson)
51. Capacity building of field staff of Kerala Forest Department in forestry & forest management (Dr. R C Pandalai)
52. Cultivation and management of bamboos for state of Tamil Nadu (PI-Dr. R C Pandalai)
53. Cultivation and management of bamboos for the state of Maharashtra (Dr. R C Pandalai)
54. Improvement of facilities in the teak museum for enriching its eco- tourism values (Dr. U M Chandrasekhara)
55. Training programme on cultivation and management of bamboos for the state of Tamil Nadu (Mr. V.P.Ravindran)
56. Strengthening the ex-situ conservatory at FRC, Palappilly (Dr. P. Sujanapal)
57. Strengthening and enriching Institute central nursery (Dr. P. Sujanapal)
58. Enriching live collections of wild orchids and ferns (Dr. P. Sujanapal)

Publications

a) Books

C. Renuka and V.B.Sreekumar. A Field Guide to the Palms of India. KFRI publication

Muktesh Kumar, Bamboo Diversity & Taxonomical Keys, KFRI Handbook No.28. KFRI publication

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b) Journals

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c) Proceedings

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d) Popular Articles

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Suma ArunDev, Sreekanth PM, Renee M. Borges, Balasundaran M. A peep into the genetic diversity of trees in the Western Ghats. Evergreen Newsletter 71:6-8. 2013

AWARDS

Dr. C Chandrasekharan Memorial Award

Dr. K S Anoop Das is the recipient of the Dr. C Chandrasekharan Memorial Award-2012-13. The award was given by Dr. Chand Basha IFS (Retd. Former Director of KFRI). Dr. Anoop Das a researcher worked on the *'Bird community structure along the altitudinal gradient in Silent Valley National Park' (SVNP)* at Salim Ali Centre for Ornithology and Natural History, Coimbatore; contributed to building baseline data on the least known taxa, methodological revision in the field of conservation ecology, knowledge on ecosystem responses, evaluation of ephemeral systems in the tropics and research on climate change. Subsequently he worked on the responses of butterflies on natural tree falls in SVNP. Apart from the characterization of butterfly guilds in each of the forest types, his study was aimed at identifying indicator species of butterflies for the specific habitat types. A novel study by Dr. Anoop Das is on one of the least attended issues of the lesser known dynamics of the aquatic insect fauna of natural tree holes and its artificial analogues, in the Western Ghats. His current involvement include evaluation of insects as bio-indicators, conservation of sacred groves, impact of pesticides on fishes, evaluation of ecosystem services and climate change effects on temperate and tropical montane bird communities. Dr.Anoop Das to his credit has many publications in various national and international journals. He has also had international exposure by presenting his work in the conference at the Cambridge University. He also represented India, in the United Nations Environment Program - EPLC's Asia Pacific Environment Forum, Kangwon National University, South Korea in 2011.

AWARDS

Dr. KM Bhat Memorial Award

Dr. P.M. Sreekanth, Associate Professor, Department of Biotechnology, Bangalore City College is the recipient of the 4th Dr. K. M. Bhat Memorial award. His doctoral work on *"Population genetic structuring and gene flow estimates of teak from the Western Ghats of Southern India using AFLP markers"* was adjudged as the best and worthy of the award. The unique contributions of Dr. Sreekanth observed by the Committee were: describing the genetic diversity of teak from the Kerala, Karnataka and Tamil Nadu part of Western Ghats and he showed through DNA fingerprinting that the genetic diversity of teak was higher for populations from Kerala; especially the Nilambur population is unique and is separated from other natural teak populations. The Endowment was instituted by the family of late Dr. K. M. Bhat for the best emerging Research Scholar of KFRI. The award was presented to him on 2nd January 2013 in a function organised at KFRI coinciding with 4th death anniversary of Dr. K. M. Bhat. The Endowment Lecture was delivered by Dr. KC Chacko, Retd. Scientist & Programme Coordinator, Extension & Training Division, KFRI.

EXTENSION AND TRAINING ACTIVITIES

ORGANISATION AND PARTICIPATION IN SEMINARS/SYMPOSIA/WORKSHOPS

TRAINING PROGRAMMES CONDUCTED

KFRI has organized 14 training programmes on different aspects related to tropical forestry in the year 2012-13. The beneficiaries of this training programme are IFS officials, Forest Department staff of Kerala, Maharashtra, Tamil Nadu and Uttrakhand, National Bamboo Mission, National Green Club Corps Ecoclubs, local body representatives, self-help groups, school teachers, bamboo cultivators and the community. The Institute received financial support from different National and State level agencies, namely, Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India; National Bamboo Mission; National Medicinal Plants Board; Forest Departments of Kerala, Tamil Nadu, Maharashtra and Uttrakhand; Kerala State Council for Science Technology and Environment; Kerala State Land Use Board and State Medicinal Plants Board.

1. Modern trends in forestry research. (Course & Training Coordinator- Dr. R. C. Pandalai)

2. State level workshop to select best National Green Corps Ecoclubs. (Course & Training Coordinator-Dr. Kamalakshan Kokkal & Dr. R. C. Pandalai)

3. Vetiver system technology for river bank stabilization. (Course & Training Coordinator- Dr. A. V. Raghu & Dr. R. C. Pandalai)

4. Kauvery: Hydrogels for moisture management and soil conditioning. (Course & Training Coordinator- Dr. A. V. Raghu)

5. Aerobic weed composting and exposure visit. (Course & Training Coordinator- Dr. M.P.Sujatha, Dr. K. Mohandas & Dr. R. C. Pandalai)

6. Office administration and development for NGO. (Course & Training Coordinator- Dr. R. C. Pandalai)

7. Priority species, resource estimation, plantation development, post harvest technology and socio-economics livelihood potential of bamboos .(Course & Training Coordinator-Dr. K. K. Seethalakshmi & Dr. R. C. Pandalai) - Three trainings.

8. Forestry extension education training programme for the staff of Social Forestry Wing, Central Region, Ernakulam. (Course & Training Coordinator- Dr. R. C. Pandalai)

9. Workshop on Medicinal Plants and Conservation for the School Teachers of Kerala. (Course & Training Coordinator- Dr. A. V. Raghu & Dr. R. C. Pandalai)

10. Forest nursery management and planting stock production. (Course & Training Coordinator-Dr. R. C. Pandalai & Dr. P.K.C.Pillai)

11. Seed testing and certification in Forestry. Dr. R. C. Pandalai(Course & Training Coordinator- Dr. R. C. Pandalai)

12. Conservation and Development of Medicinal Plants and Benefit Sharing with Local Communities. (Course & Training Coordinator- Dr. N. Sasidharan & Dr. R. C. Pandalai)

13. Workshop on Medicinal Plants & conservation for the school teachers of Kerala. (Course & Training Coordinator- Dr. A. V. Raghu & Dr. R. C. Pandalai)

14. One Week Compulsory Training Course on Management of Tropical Forests – Issues and Challenges. (Course & Training Coordinator-Dr. R. C. Pandalai & Dr. K. Mohanadas)

KFRI in Exhibitions

As part of outreach programmes, KFRI regularly participates in exhibitions related to science and technology areas in general and forestry in particular. Through this, the message of nature conservation and its importance for the existence of man is spread. Different study materials, research activities and the results of work carried out by KFRI were disseminated to the public through these kind of programmes. During 2012-13, KFRI participated in Emerging Kerala 2012, International Cooperative Expo 2012, Swasraya Bharat 2012 – Science & Technology Expo, Kerala Bamboo Fest 2012, 2nd Indian Biodiversity Congress & Expo, National Biodiversity Congress & Expo 2012, 100th Indian Science Congress, 25th Kerala Science Congress, Agri – food – Flower – Fest and Tree Growers Mela 2013 spread across the state.

Visitors to KFRI

KFRI, being one of the prominent Institutes with a long legacy in forestry research, is always a destination for those who are on the hunt for information on tropical forest, young stakeholders varied from the local schools to Expert Scientists from different parts of the World. Dissemination of information is the major success of any Institute of this kind. There were a total of 2048 visitors to KFRI during 2012-13 and KFRI Scientists were more than happy to share their experiences and knowledge.

KFRI ACADEMIC PROGRAMMES

KFRI academic activities include Doctoral and MSc attachment programmes. KFRI is an approved Research Centre for the Forest Research Institute University, Dehradun, Cochin University for Science and Technology and the Calicut University.

Doctoral Degree awarded

1. Mr.Suganthasakthivel. *Ecology and behaviour of selected arboreal mammals in the Southern Western Ghats, India*. Forest Research Institute, Dehradun .April 2012. (Dr.K.K.Ramachandran –Supervising Guide)

2. Mrs.Bindhu.K. Jose. *Diet and dietary requirements of Teak Defoliators Hyblaea purea and Eutectona machaeralis.* Forest Research Institute, Dehradun .April 2012. (Dr.V.V.Sudeendra kumar –Supervising Guide)

Thesis submitted

1. Mr.Nishad V.M. *Effect of cover crops, mulching and organic manure on below ground microbial diversity in different land use systems in the Kerala part of the Nilgiri Biosphere Reserve.* (Dr. M. Balasundaran-Supervising Guide)

2. Mrs.Smitha K John. *Impact of organic matter management strategies on sequestration of soil carbon and productivity of teak plantations on Ultisols in Kerala*. (Dr. M. P.Sujatha-Supervising Guide)

M.sc. Attachment Programme

1. Hridya.K.P. *Molecular cloning and characterization of two housekeeping genes (ACTII & GAPDH) from Bambusa bamboo.* (Supervising Guide: Dr.T.B.Suma).

2. Viji PS. *Phytochemical profiling of Cinnamomum wild species*. (Supervising Guide: Dr. TK Hrideek).

3. Asha C. *Effect of application of fertilizers and pesticides in soil microbial dehydrogenase activity*. . (Supervising Guide: Dr. R Jayaraj).

4. Arya Sukumaran. *Tolerance of teak seedlings in degraded soils of Kerala*. (Supervising Guide: Dr. M.P.Sujatha).

5. Reshma J. *Environmental impact assessment of Granite quarry at Pananchery*. (Supervising Guide: Dr. T.V.Sajeev).

6. Dhanasree Moneyraj. *Plant tissue culture. (Supervising Guide*: Dr. EM Muralidharan).

7. NimishaVijayan. *PCR and RFLP for molecular diagnosis of sickle cell anaemia*. (Supervising Guide: Dr. T.B.Suma).

8. Reshma Premkumar. *Plant tissue culture*. (Supervising Guide: Dr. EM Muralidharan).

9. Prathibha PS. *Tracking of sandal wood adulterants using DNA barcoding*. (Supervising Guide: Dr. T.B.Suma).

Kerala Forest Research Institute, Peechi Thrissur

(An Institute of Kerala State Council for Science, Technology and Environment, Govt. of Kerala)

BALANCE SHEET AS AT 31 ST MARCH 2013

Liabilities	Sch No.	As at 31/03/2013	As at 31.03.2012	Assets	Sch No.	As at 31/03/2013	As at 31.03.2012
Reserves & Surplus	1	16,21,98,265	15,10,32,417	Fixed Assets	4	12,47,46,653	11,24,39,363
Current Liabilities	2	2,32,76,561	81,53,268	Current Assets	5	8,40,05,509	5,98,58,256
Unspent Balance	3	2,88,13,200	1,90,07,243	Loans& Advances	6	55,35,864	58,95,309
Total		21,42,88,025	17,81,92,928	Total		21,42,88,025	17,81,92,928

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31 ST MARCH, 2013

Expenditure	Sch No.	Year ended 31.03.2013	Year ended 31.03.2012	Income	Sch No.	Year ended 31/03/2013	Year ended 31/03/2012
To Infrastructure (Non Plan)	10	1,05,79,494	95,71,665	By Grant from Government of Kerala	7	9,36,50,658	6,01,37,352
To Salaries and Allowances (Non Plan)	11	12,72,00,669	7,90,33,147	By Other Receipts	8	4,41,29,505	2,84,67,459
To Depreciation	4	1,45,59,254	1,39,46,579	By Depreciation written back	4	1,45,59,254	1,39,46,579
To Other Project Expenses		1,56,01,226	72,88,832	By Income from Other Projects	9	1,56,01,226	72,88,832
To Project Expenses under Plan scheme		4,75,57,136	3,77,61,151	By Income from Plan Projects		4,75,57,136	3,77,61,151
		21,54,97,779	14,76,01,373			21,54,97,779	14,76,01,373

Internal Committees

To implement various programmes and activities in the institute the following committees have been constituted as follows.

RESEARCH COUNCIL (RC)

The Research Council (RC) comprising eminent scientists of the country advices in matters concerning research policies and monitors the quality of research undertaken at the Institute.

Chairman

Prof. JS Singh
Professor Emeritus,
Department of Botany.
Banaras Hindu University,Varanasi,
UTTAR PRADESH - 221 005
Ph: Res: 0452 2369093,
Mob: 9335178355
Email: singh.js1@gmail.com

Members

Dr. K Gurumurthy
62-4, Block 2, II Floor,
Leela Apartments,
Ponnaiyarajapuram,
COIMBATORE 641 001
Ph: 080 64501102,
Res: 0422-2479083,
Mob: 09363107627
Email: krishguru11@rediffmail.com

Dr. Gopal K Kadekodi
Honorary Professor
Centre for Multidisciplinary -
Development Research
Dr. BR Ambedkar Nagar,
DHARWAD 580 004, Karnataka
Ph: 0836-240453, 240472,
Res, 0836-2472827,
Mob: 09845147633
Email: gkkadekodi@hotmail.com

Dr. Kailash Paliwal
Director, School of Biological -
Sciences & Biotechnology
Institute of Advance Research
Institutional Area, Koba,
Gandhi Nagar – 382007, Gujarat
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Fax: 07930514110
Mob: 9426658440.
Email: kpecol@yahoo.com

Dr. MP Nayar
Director (Rtd.),
Botanical Survey of India,
'THE GREENS' 19/315,
Vattavila, Thirumala PO
Thiruvananthapuram – 695 006
Ph: 0471- 2353185,
Mob: 9447389332
Email: nayarmp@yahoo.com

Dr. VS Vijayan
Salim Ali Foundation,
Aiswarya, TC31/1441,
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Kanimangalam PO
Thrissur – 680 027
Ph: 0471- 2740240 (KSBB),
Mob: 9446372880
Email: vsvijayan@yahoo.com

Shri. KJ Varughese, IFS
Chief Conservator of Forests (ABP)
Forest Headquarters, Vazhuthacaud,
Thiruvananthapuram
Ph: 0471- 2321847
Mob: 9447979007
Email: ccf-abp@forest.kerala.gov.in

Member & Ex-Officio Convener

Dr. KV Sankaran
Director, Kerala Forest -
Research Institute
Peechi – 680 653
Ph:0487- 2690110
Mob: 9447625066
Email: sankaran@kfri.org

Permanent Invitee

Dr. KK Ramachandran
Member Secretary
Kerala State Council for Science,
Technology & Environment,
Sasthra bhavan, Pattom,
Thiruvananthapuram – 695 004
Ph: 0471- 2548220, Mob: 9447102199
Email: kkramans@gmail.com

MANAGEMENT COMMITTEE

The Management Committee looks after the administrative functions of the institute. Under the Chairmanship of Director, committee takes care of the proper execution of administrative rules, smooth conduct of research activities and welfare of employees

Director, KFRI	.. Chairman
Shri K.B. Santhosh Kumar Addl. Secretary I & Joint Chief Protocol Officer General Administration Department THIRUVANANTHAPURAM –	.. Member
Member Secretary, KSCSTE	.. Member
The Executive Director CWRDM PO Kunnamangalam Kozhikode	.. Member
Dr. K.K. Seethalakshmi Scientist F, KFRI	.. Member
Registrar, KFRI	.. Convener

1. CONSULTATIVE GROUP FORFORESTRY RESEARCH MANAGEMENT
(PROGRAMME ADVISORY GROUP)

(Vide Council (M) Order No. 45/2003/KSCSTE, Thiruvananthapuram, dated 12-11-2003 & Council (M) Order No.104/06/KSCSTE, Thiruvananthapuram, dated 15-3-2006 – Modified here).

1.	The Principal Chief Conservator of Forests & Head of Forest Forces	…Chairman
2.	The Additional Principal Chief Conservator of Forests (Wildlife)	…Member
3.	The Additional Principal Chief Conservator of Forests (Social Forestry)	…Member
4.	The Additional Principal Chief Conservator of Forests (E & TW)	…Member
5.	The Additional Principal Chief Conservator of Forests (D & P)	…Member
6.	The Additional Principal Chief Conservator of Forests (Planning)	…Member
7.	The Additional Principal Chief Conservator of Forests (Development)	…Member
8.	The Additional Principal Chief Conservator of Forests (WP & R)	…Member
9.	The Chief Conservator of Forests(BDC), Thiruvananthapuram	…Member
10.	The Chief Conservator of Forests (FMlS) Thiruvananthapuram	…Member
11.	The Chief Conservator of Forests (CC) Thrissur	…Member
12.	The Chief Conservator of Forests (SF) Ernakulam	…Member
13.	The Chief Conservator of Forests (ABP)Thiruvananthapuram	…Member
14.	The Regional Chief Conservator of Forests (North)	…Member
15.	The Regional Chief Conservator of Forests (South)	…Member
16.	The Deputy Conservator of Forests (Research) North	…Member
17.	The Deputy Conservator of Forests (Research) South	…Member
18.	The Managing Director, Kerala Forest Development Corporation	…Member
19.	The Associate Dean, Forestry Faculty, Kerala Agricultural University	…Member
20.	The Director, Tropical Botanic Garden & Research Institute, Palode	…Member
21.	The Director, Institute of Forest Genetics & Tree Breeding, Coimbatore	…Member
22.	The Managing Director, Oushadi, Thrissur	…Member
23.	The Director, Center for Earth Science Studies, Thiruvananthapuram	…Member
24.	The Director, Center for Water Resources Development and Management	…Member
25.	The Director, Medicinal Plant Research Center, Arya Vaidya Sala, Kottakkal	…Member
26.	The Managing Director, Hindustan Newsprint Ltd., Kottayam	…Member
27.	The Managing Director, Kerala State Bamboo Corporation Ltd.	…Member
28.	The Director, Salim Ali Center for Ornithology and Natural History, Coimbatore	…Member
29.	Director, Kerala Forest Research Institute, Peechi	…Member
30.	Joint Director (Science & Technology Promotion), KSCSTE, Thiruvananthapuram	…Member
31.	Research Coordinator, KFRI, Peechi	…Member
32.	All Scientists of KFRI	…Invitees
33.	Programme Co-coordinator, Training & Extension Division, KFRI	…Convener

2. INTERNAL RESEARCH GROUP (IRG)

(Vide Proceedings G.53/KFRI/79 dated 13 January 2009– Modified here).

1. Director … Chairman
2. Dr. EA Jayson … Convener
3. Dr. TB Suma … Associate Convener
4. All scientific staff … Member

3. PROJECT EVALUATION & MONITORING COMMITTEE

1. Dr. UN Nandakumar … Chairman
2. Dr. RC Pandalai … Member
3. Dr. Thomas P Thomas … Member
4. Dr. M Sivaram … Convener

4. Ph.D. & M. Sc. STUDENTS ATTACHMENT PROGRAMME ADVISORY COMMITTEE

(Vide 6. G.53/KFRI/79 dated 6 May 2006)

1. Dr. EA Jayson … Chairman
2. Dr. EJM Florence … Member
3. Dr. TV Sajeev … Member
4. Dr.MP Sujatha … Member
5. Respective Research Guide(s) … Invitees

5. EQUIPMENT/INFRASTRUCTURE DEVELOPMENT COMMITTEE

1. Dr. EM Muralidharan … Chairman
2. Dr. S. Sandeep … Member
3. Dr. R. Jayaraj … Member

6. PURCHASE COMMITTEE

(Vide Council (M) Order No. 37/2003/KSCSTE
Thiruvananthapuram, dated 29-10-2003)

1. One Scientist F or above : Dr. KK Seethalakshmi … Chairman
2. One Scientist nominated by the Director : Dr. M. Sivaram … Member
3. Registrar … Convener

7. INTELLECTUAL PROPERTY RIGHTS AND PATENT ADVISORY COMMITTEE

1. Dr. KK Seethalakshmi … Chairman
2. Dr. TK Hrideek … Member
3. Dr. PKC Pillai … Convener

8. PUBLIC RELATIONS COMMITTEE

1. Dr. TV Sajeev … Chairman
2. Dr. UN Nandakumar … Member
3. Dr. K Mohandas … Member

4. Mr. VP Raveendran … Member
5. Dr. AV Raghu … Member

9. LIBRARY & INFORMATION NETWORKING ADVISORY COMMITTEE

(Vide 6. G.53/KFRI/79 dated 19 July 2008)

1. Smt. N Sarojam … Chairman
2. Dr. N. Sasidharan … Member
3. Mr. KF George … Member
4. Dr. S Sandeep … Member
5. Mr. KH Hussain … Convener
6. K. Ravindran … Invitee
   (Retired Librarian, MG University)

10. WEBSITE AND SOFTWARE COMMITTEE

(Vide 6. G.53/KFRI/79 dated 13 October 2008)

1. Dr. M Amruth … Chairman
2. Mr. KH Hussain … Member
3. Shri AR Rajan … Member
4. Dr. M. Sivaram … Convener

11. OFFICE AUTOMATION COMMITTEE

(Vide Proceedings G.53/KFRI/79 dated 13 October 2008)

1. Mr.AR Rajan … Chairman
2. Mr. K. Kamalakaran … Member
3. Smt. Ricy Eliner Varkey … Member
4. Smt. Anupa Vasu … Member
5. Smt. VK Leela ... Convener

12. KERALA FOREST SEED CENTRE ADVISORY COMMITTEE

(Vide Proceedings G.53/KFRI/79 dated 11 February 2004– Modified here)

1. Director … Chairman
2. Additional Principal Chief Conservator of Forests (Working Plan & Research), KFD … Member
3. Conservator of Forests (Central Circle), KFD … Member
4. Research Coordinator, KFRI … Member
5. Silvicultural Research Officer (North), KFD … Member
6. Silvicultural Research Officer (South), KFD … Member
7. Silviculturist, KFRI … Member
8. Scientist-in-Charge, KFSC … Convener

13. TEAK MUSEUM AND NATURE TRAIL ADVISORY COMMITTEE

1. Dr. UM Chandrasekhara … Chairman
2. Dr. RC Pandalai … Member
3. Dr. TK Dhamodaran … Member

4. Dr. P Sujanapal … Member
5. Smt. Sani Lookose, Teak Museum Curator … Convener

14. CAMPUS DEVELOPMENT COMMITTEE

1. Dr. EM Muralidharan … Chairman
2. Dr. RC Pandalai … Member
3. Dr. PA Jose … Member
4. Smt. MK Raji (Engineering) … Member
5. Dr. VB Sreekumar … Member
6. Dr. P. Sujanapal … Convener

15. EDITORIAL COMMITTEE FOR THE JOURNAL OF BAMBOO AND RATTAN

(Vide 6. G.53/KFRI/79 dated 19 July 2008)

1. Dr. EM Muralidharan … Chief editor
2. Dr. KK Seethalakshmi … Associate Editor
3. Dr. PK Thulasidas … Associate Editor

16. ANNUAL REPORT COMMITTEE

1. Dr. KV Bhat … Chairman
2. Dr. V Anitha … Member
3. Dy. Registrar (Accounts, i/c) … Member
4. Dr. KK Ramachandran … Convener

17. NEWSLETTER COMMITTEE

1. Dr. R Jayaraj … Editor
2. Dr. M Amruth … Associate Editor
3. Dr. TB Suma … Associate Editor

18. STORES COMMITTEE

1. Dr. N Sasidharan … Chairman
2. Dr. PK Thulasidas … Member
3. Dr. GE MallikarjunaSwamy … Member
4. Mr. KP Manoj … Convener

19. SPORTS COMMITTEE

1. Mr. VP Raveendran … Chairman
2. Dr. K Mohandas … Member
3. Mr. PI Shereef … Member

20. COMMITTEE FOR TRANSFORMATION OF OFFICIAL LANGUAGE TOMALAYALAM

(Vide KSCSTE letter no. 38/C6/09 dated 10 Feb. 2009)

1. Mr. KH Hussain … Chairman
2. Dr. KK Ramachandran … Member
3. Dr. TV Sajeev … Convener

21. EXHIBITION ADVISORY COMMITTEE

(Vide 6. G.53/KFRI/79 dated 13 October 2008)

1. Dr. K Mohandas … Chairman
2. Dr. UM Chandrasekhara … Member
3. Dr. CK Soman … Member
4. Dr. PA Jose … Member
5. Dr. AV Raghu … Member
6. Mr. VP Raveendran … Member
7. Dr. RC Pandalai … Convener

22. SEMINAR COMMITTEE

1. Dr. AV Raghu … Chairman
2. Dr. KA Sreejith … Member
3. Mr. KH Hussain … Convener

23. COMMITTEE TO PREVENT SEXUAL HARASSMENT ON WOMEN

(Vide No.1763/B6/03/KSCSTE dated 5-12-2003)

1. Dr. P Rugmini … Chairman
2. Dr. Mammen Chundamannil … Member
3. Dr. MP Sujatha … Member
4. Smt. Seetha Sadanandan … Member
   (C/o Kudumbasree State Poverty
   Eradication Mission, Ward 16, Cheenikkadavu,
   Kannara, Pananchery Panchayath, Trichur Dist.)
5. Smt. ShirlyIsac ...Convener

24. HOSTEL ADVISORY COMMITTEE

1. Dr. K Mohanadas … Chairman
2. Registrar … Member
3. Smt. MK Raji … Member
4. Dr. R. Jayaraj … Convener

25. CAFETERIA COMMITTEE

1. Dr. KK Seethalakshmi … Chairman
2. Dr. TK Dhamodran … Member
3. Mrs. VK Leela … Member
4. Mr. PI Shereef … Convener

26. BUILDING COMMITTEE

(Vide Note No. G 53/KFRI/Estt/79 dated 12 April 2010)

1. Dr. UN Nandakumar … Chairman
2. Dr. EM Muralidharan … Member
3. Dr. PK Thulasidas … Member
4. Dr. VB Sreekumar … Convener

27. VEHICLE ADVISORY COMMITTEE

(Constituted here)

1.	Dr. RC Pandalai	… Chairman
2.	Dr. KV Bhat	… Member
3.	Mr. Krishna unni	… Member

28. INFORMATION ARCHIVAL ADVISORY COMMITTEE

(Constituted here)

1.	Mr. K.H. Hudssain	… Chairman
2.	Dr. K. Swarupanandan	… Member
3.	Dr. M. Amruth	… Convener

29. DIGITAL LIBRARY COMMITTEE

(Constituted here)

Director	... Chairman
Shri. K.H. Hussain (System Professional)	... Member
Dr. P. Vijayakumaran Nair	... Member
Dr. Mammen Chundamannil	... Member
Dr. K. Swarupanandan	... Member
Dr. N. Sasidharan	... Member
Dr. E.M. Muralidharan	... Member
Mrs. Ricy Eliner Varkey	... Special Invitee
Mrs. N. Sarojam	... Convener

SCIENTIFIC STAFF

Sl No	Name	Designation	Date of Joining
1	Dr.KV Sankaran	Director (Superannuated on 31-10-2012)	21-May-82
2	Dr. VN Rajashekhara Pillai	Director (In-charge)	-
Research Monitoring & Evaluation Unit			
2	Dr.K Swarupanandan	Scientist F& Research Coordinator (Superannuated on 31-10-2012)	20-Jul-79
5	Dr. M Balagopalan	Scientist F& Research Coordinator	14-Mar-78
3	Dr.KV Bhat	Scientist F(Superannuated on 30-09-2012)	31-May-82
Sustainable Forest Management			
4	Dr.K K Seethalakshmi	Scientist F & Programme Coordinator	13-Mar-79
6	Dr.Thomas P Thomas	Scientist F & Head, Soil Science Department (Superannuated on 30-09-2012)	31-Dec-79
7	Dr. RC Pandalai	Scientist F& Head, Silviculture Department	14-Mar-83
8	Dr. UN Nandakumar	Scientist F	23-Mar-83
9	Dr. MP Sujatha	Scientist-E-II, Head, Soil Science Department	11-Dec-87
10	Dr. CK Soman	Scientist-EI	6-Dec-78
11	Dr.PK Chandrasekhara Pillai	Scientist-C	18-Oct-83
12	Shri. VP Ravindran	Scientist-C	25-Feb-93
13	Dr. P Sujanapal	Scientist-B	09-Dec-10
14	Dr. S Sandeep	Scientist-B	09-Mar-11
Forest Genetics & Biotechnology			
15	Dr.EP Indira	Scientist F & Programme Coordinator (Superannuated on 31-07-2012)	28-Feb-79
16	Dr. EM Muraleedharan	Scientist-E-II& Head Biotechnology Department	27-May-91
17	Dr. TB Suma	Scientist-B	08-Dec-10
18	Dr. TK Hrideek	Scientist-B	08-Dec-10
Forest Ecology and Biodiversity Conservation			
19	Dr.N.Sasidharan	Scientist F&Programme Coordinator (Superannuated on 31-08-2012)	25-Feb-77
20	Dr.KK Ramachandran	Scientist-F & Programme Coordinator Head, Wildlife Department	17-Aug-78
21	Dr.EA Jayson	Scientist-F	16-Dec-81
22	Dr.PS Easa	Scientist-E-II	16-Aug-78
23	Dr. UM Chandrashekara	Scientist-E-II & In-charge Sub Centre, Nilambur	15-Jul-92
24	Dr.KV Muhammed Kunhi	Scientist-E-I(On deputation)	24-Oct-94
25	Dr. PA Jose	Scientist -C (On deputation from JNTBGRI)	-
26	Dr. VB Sreekumar	Scientist-B	01-Mar-11
27	Dr. KA Sreejith	Scientist-B, KFRI Sub Centre, Nilambur	01-Mar-11
28	Dr. R Jayaraj	Scientist-B	28-Mar-11

Forest Health			
29	Dr. TV Sajeev	Scientist-E-I & Head, Entomology Department	06-Feb-97
30	Dr. GE Mallikarjunana Swamy	Scientist-B	20-Dec-10
Wood Science & Technology			
31	Dr.TK Dhamodaran	Scientist-F & Head, Wood Science & Technology Department	02-Aug-82
32	Dr. PK Thulasidas	Scientist-C	28-Jun-84
Forestry and Human Dimensions			
33	Dr.S Sankar	Scientist- F & Programme Coordinator (Superannuated on 31-08-2012)	19-Sep-81
34	Dr. Mammen Chundamannil	Scientist-F & Head, Forest Economics Department	29-May-82
35	Dr.V Anitha	Scientist-EI	07-Sep-98
36	Dr. M Amruth	Scientist-B	01-Mar-11
Forest Management Information System			
37	Dr.K Jayaraman	Scientist-F & Programme Coordinator (Superannuated on 31-05-2012)	2-May-84
38	Dr.P Vijayakumaran Nair	Scientist F & Head, GIS and Remote Sensing Department (Superannuated on 30-01-2012)	1-Nov-80
39	Dr. P Rugmini	Scientist-F & Head, Forest Statistics Department	17-Nov-78
40	Dr.CN Krishnankutty,	Scientist-F, (Superannuated on 31-05-2012)	24-Sep-81
41	Dr M Sivaram	Scientist-E-I	12-Apr-98
Extension & Training			
42	Dr. EJ Maria Florence	Scientist-F&Programme Coordinator (Superannuated on 31-12-2012)	22-Sep-80
43	Dr. K Mohanadas,	Scientist-F & Head, Extension Department	01-Jun-82
44	Smt. Sani Lookose	Scientist–C, Teak Museum Curator, KFRI Sub Centre, Nilambur	07-Aug-02
45	Dr. AV Raghu	Scientist-B	07-Dec-10
Library & Information			
46	Shri.AR Rajan	Scientist-E-II	01-Dec-78
47	Smt.N Sarojam	Scientist-C- Librarian (i/c)	06-Jul-81
48	Shri.KH Hussain	Scientist-C	28-Dec-81
49	Shri.KF George	Scientist-C	23-Dec-94
ADMINISTRATIVE STAFF			
Sl. No	**Name**	**Designation**	**DOJ**
1	Dr.VV Sudheendrakumar	Scientist-F, Registrar (i/c)	19-Feb-79
2	Dr.K Thulaseedharan Nair	Registrar (On deputation to KSCSTE)	15-Mar-02
3	Shri.TK Antony	Dy. Registrar, Administration (Deputation from Secretariat)	- -
4	Shri.K Venugopal	Dy.RegistrarAdministration (On deputation)	27-May-08

5	Smt.VK Leela	Asst.Registrar	2-Jul-79
6	Smt.Mary Kuruvilla	Section Officer	7-Jul-80
7	Smt.Sabitha Balakrishnan	Section Officer	3-Sep-99
8	Smt.Shirly Issac	Section Officer	16-Sep-03
9	Smt.K Annapoorni	P A to Registrar	12-Jul-82
10	Smt.Grace Andrews	PA to Director	27-Jan-87
11	Shri. K Kamalakaran	Office Assist	10-Dec-09
12	Smt.Sindhumol C K	Office Assist	19-Aug-10
13	Shri.Krishnanunni V S	Office Assist	28-Aug-10
14	Smt. RajinaVV	Office Assist	17-Aug-10
15	Smt.Anupa Vasu P	Office Assist	1-Oct-11
16	Smt.Anuja Prasannan	Office Assist	17-Oct-11
17	Smt.Keerthy K.	Office Assist	6-Jan-12
18	Shri. PM Venugopalan	Sr.Spl.Gr.Typist	22-May-78
19	Shri.KP Manoj	Spl.Gr.Typist	28-Aug-92
20	Shri.TM Abdul Vahab	Spl.Gr.Word Processing Assistant	27-Jan-89
21	Shri.P Rajeesh	Clerical Assistant	14-Jun-00
22	Smt.Ricy Eliner Varkey	Computer LAN Assistant	1-Mar-06
23	Shri.TC Paul	Spl.Gr.Driver	1-Jul-94
24	Shri. VC Chandran	Spl.Gr. Driver	1-Jul-94
25	Shri.PK Rajendran	Driver	7-Jan-12
26	Shri.EO Mathai	Driver	7-Jan-12
27	Shri.CH Herald Wilson	Driver	24-Feb-12
28	Shri.MC Mohandas	Senior Attendant	24-Oct-77
29	Shri.PA Sankarankutty	Senior Attendant	30-Jan-78
30	Shri.TP Padmanabhan	Spl.Gr.Cook Cum Attendant	17-Dec-91
31	Smt.N Baby	Attendant	24-Nov-95
32	Smt.KK Vanaja	Helper	26-Aug-03
33	Smt.K Aparna	Helper	23-Aug-04
34	Smt.AM Lalitha	Helper Gr.IV	1-Aug-86
35	Smt.TG Chandrika	Helper Gr.III	1-Mar-88
36	Shri. VK Mohandas	Helper Gr.III	1-Jan-92
37	Shri.NI Thankappan	Helper Gr.III	1-Jan-92
38	Shri. EP Ulahannan	Helper Gr.III	1-Jan-92
39	Smt.AK Ammini	Helper Gr.III	3-Nov-86
40	Smt.EV Thanka	Helper Gr.III	3-Nov-86
41	Shri. CP Shoukathali	Helper Gr.III	1-Jan-92
42	Shri.K Mohammed	Helper Gr.III	1-Jan-92
43	Shri.KK Mohammed	Helper Gr.III	5-Jul-94
44	Smt. P Deepa	Helper	6-Aug-09
45	Shri.IO Thomas	Helper	11-Jun-10

46	Shri. TP Valsan	Helper	11-Jun-10
47	Smt. S Ashamole	Helper	19-Aug-10
48	Shri. E Hamsa	Helper	19-Aug-10
49	Shri. K Abdul Jaleel	Helper	16-Aug-10
50	Smt. C Sujatha	Helper	21-Aug-10
51	Smt. S Sheeja	Helper (On deputation to JNTBGRI)	8/17/2010
52	Shri.AV Chamy	Helper	27-Oct-10
53	Smt.C Rugmini	Helper	29-May-12
54	Shri. PV Santhosh Kumar	Helper	29-May-12
55	Shri. TS Prakash	Helper	29-May-12
56	Shri. MS Santhosh Kumar	Helper	29-May-12
57	Shri.K Krishnadasan	Helper	29-May-12
58	Shri.N Rajan	Helper	30-May-12
59	Shri.TO Simon	Helper	29-May-12
60	Shri. CP Ummer	Helper	31-May-12
61	Smt. PS Kadeeja	Helper	29-May-12
62	Smt.VL Alphonsa	Helper	29-May-12
63	Shri.MK Suresh	Helper	29-May-12
64	Shri.KA Thankachan	Helper	29-May-12
65	Shri. CB Sajy	Helper	29-May-12
66	Shri.TP John	Helper	29-May-12
67	Shri.N K Rajan	Nuresry Man	31-Jul-07
68	Smt.S Padmavathy	Nuresry Man	27-Sep-08
69	Shri. K Rajan	Nursery Man	29-Sep-08

TECHNICAL STAFF

Sl. No	Name	Designation	DOJ
1	Shri.PP Sunny	Senior Special Grade Technical Officer I	23-Apr-79
2	Shri.UY John	Sr. Special Grade Technical Officer	9-Jan-81
3	Shri.D Skariah	Sr.SpecialGradeTechnical Assistant	1-Sep-83
4	Shri.KC Subramanian	Sr.Special Grade Technical Assistant	22-Jul-85
5	Shri.MR Anilkumar	Sr.Special Grade Technical Assistant	30-Jan-89
6	Shri.PB Sajeeva Rao	Sr.Special Grade Technical Assistant	30-Jan-89
7	Shri.PI Shereef	Technical Officer (Electrical)	10-Aug-10
8	Smt. MK Raji	Technical Officer (Civil)	18-Aug-10
9	Shri. OP Ranjith	Technical Assistant (Binder)	3-Oct-11