

Kerala Forest Research Institute

**ANNUAL REPORT
1998 -'99**

**Kerala Forest Research Institute
Peechi - 680 653, Thrissur, Kerala, India**

1. INTRODUCTION

The Kerala Forest Research Institute (KFRI) was established by the Government of Kerala as an autonomous Institute and registered in July 1975 under the Travancore-Cochin Literary, Scientific and Charitable Societies Act 1955. The main objective of the Institute is to undertake research on all aspects of forestry, wildlife management and wood science & technology. The Institute is situated at Peechi, 19 km east of Thrissur town, in an area of 28 ha within the Peechi Forest Range. The Institute has a sub-centre at Nilambur in North Kerala with 43 ha of forest land and a Field Research Centre at Velupadam in Central Kerala with 38 ha of land.

The control, administration and management of the Institute are vested with the Governing Body (GB) appointed by the Government of Kerala, with 6 members of the GB forming the Executive Committee. The Director, appointed by the Government, is the Head of the Institute.

The Institute is organized into structural units called Divisions. There are 14 discipline-based Research Divisions, viz., Agroforestry, Botany, Ecology, Economics, Entomology, Genetics, Non-wood Forest Products, Pathology, Physiology, Silviculture, Soil Science, Statistics, Wildlife and Wood Science. In addition, there is a Library and an Administration Division with separate Finance and Engineering Units.

During the year, Dr. K.S.S. Nair served as Director. He superannuated in August 1998 but was asked by the Government to continue till the time new Director is appointed. List of staff as on 31.3.1999 is given in Appendix II. Appendix III and IV show the members of the Governing Body and Executive Committee, respectively, as on 31.3.1999.

2. FINANCE

During the year, the Institute received a grant-in-aid of Rs.186 lakhs (Rs.26 lakhs under non-Plan and Rs.160 lakhs under Plan) from the State Government and Rs.10 lakhs as contribution from the Forest Department. The Institute generated an internal revenue of Rs.12.85 lakhs and Rs.27.02 lakhs was realized through project overheads and consultancies. Thus the total receipt was Rs.235.87 lakhs.

The total expenditure for the year was Rs.236.47 lakhs causing a deficit of Rs.0.60 lakhs for the year.

In respect of externally aided research projects, the Institute received Rs.228.74 lakhs during the year and Rs.192.51 lakhs was incurred as expenditure on these projects.

A Financial statement for the year 1998-99 (to be audited) is given in Appendix 1.

3. RESEARCH HIGHLIGHTS

During the year, final reports of 24 research projects were brought out. There were 87 ongoing research projects and 35 new projects initiated. Research support was received from the following agencies.

- State : Kerala Forest Department
Science, Technology and Environment Dept.
- National : Indian Council of Forestry Research & Education
Department of Environment, Govt. of India
Indian Council of Agricultural Research
National Remote Sensing Agency

Brief highlights of some of the research projects completed during the year are given below.

Development and dissemination of low cost techniques for micropropagation of *Kaempferia galanga* (Kacholam)

Cost reduction and simplification of conventional tissue culture procedures were applied for the micropropagation of *Kaempferia galanga*. It was demonstrated that routine plant tissue culture procedures can be carried out by undergraduates with proper training. Ten selected undergraduate trainee were also given a one-week training course at the end of the project to disseminate the techniques developed in the project.

Studies on the Shola forests of Kerala

Studies conducted in Shola forests of Manavan shola and Eravikulam National Park revealed a total of 543 plant species belonging to Pteridophytes and Angiosperms, comprising nearly one fifth of the taxa (109 spp.) endemic, and one fourth (128 spp.) rare; 26 spp. belonged to threatened category with one new record to Kerala. The dominant tree species in the community were: *Cinnamomum wightii*, *Litsea* sp., *Mastixia arborea*, *Hydnocarpus alpina*, *Isonandra candolleana*, *Persea macrantha*, *Syzygium* sp. and *Gomphandra cariacea*. Species richness of trees showed a decreasing trend with increasing elevation. The basal area of the stand increased (av. 114.5 m²ha⁻¹) upto 1950 m msl, thereafter decreasing drastically (av. 56.2 m²ha⁻¹).

Tracing the epicentres of teak defoliato outbreaks in Kerala

The study shows that teak plantations in all areas are not equally prone to defoliator attack. Incidence of outbreak appears to be strongly correlated with orographic features of the planked area.

Interpretation of the spatial and temporal sequence of outbreaks revealed that in large teak plantation areas, *Hyblaea puera* outbreaks begin in comparatively small epicentres of 0.6 to 12 ha in area. These epicentres are not constant over the years and do not represent highly favourable local environments.

Diversity of selected group of insects in the Parambikulam Wildlife Sanctuary

Altogether 1049 species of insects belonging to 13 orders and 106 families were identified in the Sanctuary. The overall diversity index (DI) for the study area was 4.763. In general, the DI was significantly higher in moist-deciduous forest than in teak plantation. Species richness index for evergreen forest was the highest (6.82) followed by moist deciduous (5.33) and teak plantation (4.5). Coleoptera was the most dominant group in moist-deciduous forest as well as teak plantation whereas in evergreen it was Lepidoptera.

Enhancement of productivity of eucalypts through fertilizer inputs and other cost effective treatments

Among the various silvicultural treatments, 3m x 3m spacing, 20cm x 20cm pit size and line skinned treatment was found to be the best in terms of volume, relative treatment effectiveness (RTE) and relative economic effectiveness (REE) values. Among the different nutrient combinations, $N_2P_2K_1$ i.e., application of 30g N, 30g P, and 15g K/tree or 65g urea, 150g Mussoorie rock phosphate and 29g of Muriate of potash/tree, was found to be the best in the first year for *Eucalyptes grandis* and *E. tereticornis* for increasing the productivity.

Timber price trends in Kerala

The study examined the long-term trend in prices obtained in timber auctions in the Kerala Forest Department depots, and predict future prices for teak, angily, irul, jack, maruthu, thembavu, vengam and ventek. The rate of increase of timber was quite high during the period 1977-78 and 1983-94 for all the timbers. In the period from 1984-85 to 1993-94, while prices of teak logs in all girth-classes continued to increase, prices of other timbers showed a decline, except that of anjily and irul. Future average prices of teak logs in girth classes 1,2,3 predicted for the years upto 2015-16, were 90,000 per m^3 , 71,000 per m^3 and 67,000 per m^3 , respectively.

Establishment of permanent plots to demonstrate the effect of protecting teak plantations from the teak defoliator

Observations recorded during the 5-year period in 1993 teak plantation indicate that in the plot protected against the defoliator there was 45 per cent increase in mean height and 19 per cent increase in GBH over the control unprotected plot.

Biodiversity in tropical moist forests - a study of sustainable use of non-wood forest products in the Western Ghats, Kerala

Study conducted in Wayanad and Nilambur forests indicated that these forests are rich in NWFPs which are being collected by the tribal people, mainly during August-December every year. The density, distribution and biomass patterns of some of the important NWFP's from plants such as *Asparagus racemosus*, *Costus speciosus*, *Curcuma aromatica*, *Desmodium veletinum*, *Dioscorea pentaphylla*, *Hemidesmus indicus*, *Phyllanthus amarus*, *Pseudarthria iscida*, *Sida rhanbifolia*, *Solanum indicum* and *S. viarum* were studied. Most of the NWFPs, having medicinal properties, are consumed by the pharmaceutical companies and other traditional users. Based on their demand, nine medicinal plants were selected for enrichment planting in the study area. An attempt was also made to update the data relating to socio-economic aspects of collection, marketing and living conditions of selected tribes.

Vegetation mapping of Peppara Wildlife Sanctuary

Vegetation of Peppara Wildlife Sanctuary was mapped using remote sensing techniques. Maps were prepared in 1:15,000 scale using B/W aerial photographs and 1:25,000 scale using IRS IB geocoded satellite imagery. A set of supplementary maps viz. physical, digital, drainage, slope, digital elevation were also prepared. Vegetation analysis of the area was carried out and structural data supplemented.

Genetic diversity and conservation of certain species of rattans in Andamans and Nicobar islands and Southern India

Genetic and phenotypic variations were studied in *Calamus andamanicus*, *C. thwaitesii* and *C. palustris*. Phenotypic variations were observed in stem diameter, leaflet arrangement, leaf sheath and fruit size. Provenances of these species differed significantly with regard to seedling height which had high heritability. The chromosome number was 26 in *C. andamanicus* and 28 in *C. palustris*.

Ecological and social importance of conservation of sacred groves in Kerala

Three sacred groves, viz. Ollur Kavmu, SN Puram Kavmu and Iringole Kavmu representing the different category of management system such as individual families, group of families and statutory bodies for temple management (Devaswom Board) were studied for their tree species composition, vegetation structures, biomass production and nutrient cycling pattern. Strength and weaknesses of the present management systems and role of different stake holder groups in conserving the sacred groves were also studied. Of the three sacred groves Ollur Kavmu was the highly disturbed one with high 'RISQ'. Comparison of Iringole Kavmu and SN Puram Kavmu with natural forests showed that density, basal area and species diversity values were

within the range obtained for other forests. Certain strategies were identified for effective management of sacred groves for the conservation of socio-cultural and biological diversity existing in these sacred groves.

Survey of reptiles and amphibians in Kerala part of Nilgiri Biosphere Researve

Thirty species of amphibians and 62 species of reptiles were recorded. The reptiles, *Mabuya allapallensis* and *Aspideretes leithe* were new records to Kerala and, amphibians, *Ansonia subigina*, *Micrixalus thampii* and reptile *Uraeoptylus menoi* were record for the area. Highest diversity was found in deciduous forests.

4. HIGHLIGHTS OF OTHER ACTIVITIES

Training imparted

Wildlife Division organised a Training Programme on Biodiversity for the benefit of twenty three school teachers of Pananchery Panchayath during March 4th to 6th, 1998.

Silviculture Division organised a Training Programme on "Nursery and Plantation Practices of Forestry Species" was organised for 24 officials of Plantation Corporation of Kerala Ltd., Kottayam during 10-11 June 1998 and a training in Nursery and plantation practices was organised for 24 newly recruited Field Assistants (up to Managers) of Plantation Corporation of Kerala Ltd., Kottayam from 11-13 August 1998. Scientists from various Divisions acted as Resource Persons.

Forest Maps

A Forest Map of Kerala was prepared in 1:6,00,000 scale showing the current status of natural forest (degraded and dense), plantations, protected areas (national parks, sanctuaries and biological parks) forest division boundaries and their head quarters. Copies of this map was presented to the Forest Minister, Forest Secretary and Principal Chief Conservator of Forests (General) of Kerala Forest Department by the Director. This was also exhibited in the Governing Body meeting held at KFRI., Peechi, in August 1998 (Shri U.N. Nandakumar).

Newsletter

During the reporting period September 1998 issue of KFRI Newsletter Evergreen was published.

Books/Handbook

One Handbook entitled "A Field Guide to Animal Signs" and five Books (i) Basic Readings in Forest Economics (ii) Conserving the Sacred Groves for Biodiversity Management (iii) Bamboos of India - A Compendium (iv) Diseases of Bamboos in Asia and (v) Insect pests of bamboos in Asia: An illustrated Manual were published.

5. RESEARCH PROJECTS

5.1 RESEARCH PROJECTS COMPLETED

During the year under report, the following 24 Research Projects were completed and Final Reports were published/submitted to the sponsoring agencies.

KFRI 140/92 - **Management of the Teak Defoliator using NPV**
 Investigators : K.S.S. Nair
 R.V. Varma
 V.V. Sudheendrakumar
 K. Mohanadas

KFRI Research Report No. 151

KFRI 143/92 - **Enhancement of productivity in *E. grandis* through fertiliser inputs and other cost effective treatments**
 Investigators : M. Balagopalan
 P. Rugmini

KFRI Research Report No.153

KFRI 156/92 - **Habitat utilisation of animals in Parambikulam Wildlife Sanctuary with special reference to Gaur**
 Investigators : P.S. Easa
 A.R.R. Menon

KFRI Research Report No. 155

KFRI 159/92 - **Studies on the ecology and population dynamics of endangered primates in Silent Valley National Park**
 Investigator : K.K. Ramachandran

KFRI Research Report No. 143

KFRI 165/92 - **Vegetation mapping of Peppara Wildlife Sanctuary**
 Principal Investigator : A.R.R. Menon

KFRI Research Report No. 161

KFRI 168/92 - Vegetation dynamics of the grassland - forest ecosystem in the Western Ghats of Kerala
 Principal Investigator : Director
 Investigators : K. Swarupanandan
 S. Sankar
 N. Sasidharan
 M. Balagopalan

KFRI 175/93 - Tracing epicentres of teak defoliator outbreak in Kerala
 K. S. S. Nair
 K. Mohanadas
 V. V. Sudheendrakumar
 R. V. Varma
 Santhosh K. John

KFRI Research Report No.147

KFRI 177/93 - Establishment of permanent plots to demonstrate the effect of protecting teak plantations from the teak defoliators
 Investigators : R. V. Varma
 V. V. Sudheendrakumar
 K. S. S. Nair
 K. Mohanadas
 Santhosh K. John

KFRI Research Report No.163

KFRI 179/93 - Studies on the flora of Periyar Tiger Reserve
 Investigator : N. Sasidharan

KFRI Research Report No.150

KFRI 181/93 - Teak Plantation in Nilambur
 Investigator : Mammen Chundamanni

KFRI Research Report No.144

KFRI 193/93 - Analysis of data from long term trials
 Investigators : P. Rugmini
 K. Jayaraman

KFRI Research Report No.149

KFRI 201/93 - Timber price trends in Kerala
Investigator : C.N. Krishnankutty
KFRI Research Report No. 160

KFRI 204/93 - Studies on the fern flora of Kerala with special refer-
ence to Sylvan Valley, Munnar
Investigator : M.S. Muktesh Kumar
KFRI Research Report No.145

KFRI 207/93 - Mass rearing of selected butterflies for possible
reintroduction in conservation programme
Investigator : George Mathew
KFRI Research Report No.146

KFRI 211/93 - A Survey of reptiles and amphibians in Kerala part of
Nilgiri Biosphere Reserve
Investigator : P.S. Easa
KFRI Research Report No.148

KFRI 215/94 - Socio-economic and the ecological aspects of developing
bamboo resources of Kerala
Investigator : CN Krishnankutty
KFRI Research Report No.125 (Part II)

KFRI 220/94 - Studies on the Shola Forests of Kerala
Principal Investigator : Director
Investigators: K. Swarupanandan
N. Sasidharan
U.N. Nandakumar
K.C. Chacko
KFRI Research Report No.158

KFRI 221/94 - Studies on the diversity of selected group of insects
in the Parambikulam Wildlife Sanctuary
Investigators : V.V. Sudheendrakumar
George Mathew
KFRI Research Report No.165

KFRI 225/94 - Evaluating plant diversity in different forest types of Kerala by laying out permanent sample plots
 Investigators : U.M. Chandrasekhara
 A.R.R. Menon
 K.K.N. Nair
 N. Sasidharan
 K. Swarupanandan

KFRI Research Report No.156

KFRI 230/94 - Biodiversity in tropical moist forests: A study of sustainable use of non-wood forest products in the Western Ghats, Kerala
 Investigators : P.K. Muraleedharan
 N. Sasidharan
 K.K. Seethalakshmi

KFRI Research Report No.162

KFRI 232/94 - Rhizome and root morphology of rattans
 Investigators : C. Renuka
 K.K. Unni

KFRI Research Report No.164

KFRI 243/95 - Genetic diversity and conservation of rattans
 Investigators : C. Renuka
 E.M. Muralidharan
 E.P. Indira

KFRI Research Report No.157

KFRI 254/96 - Development and dissemination of low cost micropropagation techniques for Kaempferia galanga (Kacholam)
 Investigators : E.M. Muraleedharan
 U.M. Chandrashekhara
 (Science Technology & Environment Committee, Kerala)

KFRI Research Report No.159

KFRI 265/97 - Ecological and social importance of the Sacred Groves in Kerala
 Investigators : U.M.Chandrashekhara
 S. Sankar
 (UNESCO, New Delhi)

KFRI Research Report No.152

5.2 ONGOING RESEARCH PROJECTS

During the year under report, 86 research projects were under operation in the following broad areas.

Plantation Forestry

- KFRI 104/87 - Tree improvement of *Eucalyptus* for disease resistance and higher productivity
Investigators : J.K. Sharma
E.J.M. Florence
M. Balasundaran
E.P. Indira
K.M. Bhat
T. Surendran
- KFRI 151/92 - Soil nutrient management for teak plantations in Kerala
Investigators : M. Balagopalan
P. Rugmini
- KFRI 158/92 - Green belt development at Cochin Refineries Ltd.
Investigator : K.C. Chacko
- KFRI 194/93 - Underplanting rattans in rubber plantations
Investigator : R.C. Pandalai
- KFRI 199/93 - Growth of teak in successive rotations in relation to soil condition
Investigator : M. Balagopalan
- KFRI 216/94 - Management of the shoot borer *Hypsipyla robusta* in Mahogany plantations
Investigator : K. Mohanadas
- KFRI 227/94 - Provenance trial in *Acacia*
Investigator : E.P. Indira
- KFRI 228/94 - Status of *Acacia mangium* in Kerala
Investigators : T.K. Dhamodaran
K.C. Chacko
- KFRI 236/95 - Generation and transfer of silviculture and harvesting technology of selected medicinal plants
Investigators : K.K.N. Nair
U.M. Chandrasekhara
R.C. Pandalai
E.M. Muralidharan
- KFRI 239/95 - Atlas of teak soils in Kerala
Investigators : M. Balagopalan
S. Sankar

- KFRI 242/95 - Tissue culture of rattans (canes) for clonal propagation
Investigators : E.M. Muralidharan
R.C. Pandalai
- KFRI 245/95 - Use of baculovirus control agents within an integrated pest management strategy against the teak defoliator, *Hyblaea puera* in India
Investigators : K.S.S. Nair
V.V. Sudheendrakumar
R.V. Varma
K. Mohanandas
- KFRI 247/96 - Development of spike disease resistant sandal seedlings through biotechnology involving ELISA technique and tissue culture
Investigators : M. Balasundaran
E.M. Muralidharan
- KFRI 255/96 - Seed handling and nursery practices for selected forest trees of Kerala
Investigators : K.C. Chacko
K.K. Seethalakshmy
C. Mohanan
George Mathew
- KFRI 257/96 - Improvement of productivity of pulpwood species
Investigators : J.K. Sharma
M. Balasundaran
E.J. Maria Florence
T. Surendran
M. Balagopalan
- KFRI 259/96 - Developing a GIS based management information system for forest plantations - a case study of Trichur Forest Division. Wildlife Sanctuary
Investigator : U.N. Nandakumar
- KFRI 263/96 - Improvement of productivity of eucalypts through fertilizer inputs and Silvicultural treatments
Investigators : M. Balagopalan
P. Rugmini
- KFRI 264/96 - Establishment of a pilot scale bamboo stand for edible shoot production in Kerala
Investigator : M.S. Mukteshkumar
- KFRI 268/97 - Investigations into heartwood formation in intensively managed teak plantations in STM teak plantations
Investigators : K.S.S. Nair
K.M. Bhat
Jose Kallarackal
K.C. Chacko

- KFR 269/97 - Modelling the growth of teak and real-time monitoring of tree health in STM teak plantations
Investigators : K.S.S. Nair
K. Jayaraman
K.C. Chacko
P. Vijayakumaran Nair
- KFRI 270/97 - Assessment of pest problems in intensively managed STEM teak plantations
Investigators : K.S.S. Nair
R.V. Varma
V.V. Sudheendrakumar
T.V. Sajeev
- KFRI 271/97 - Ecophysiology of host - parasite relationship in teak
Investigators : Jose Kallarackal
K.C. Chacko
- KFRI 274/97 - Conservation and genetic Improvement of Reed Bamboo (*Ochlandra* sp.)
Investigator : K.K. Seethalakshmi
- KFRI 275/97 - Biological control of Damping-off in Forest Nurseries in Kerala
Investigator : C. Mohanan
- KFRI 279/97 - Development of Technology for collection, processing and testing seeds of five important tree species of Kerala
Investigators : K.C. Chacko
C. Mohanan
- KFRI 280/97 - Establishment of a semi-permanent Field Clonal Propagation Unit for *Eucalyptus*
Investigators : J.K. Sharma
M. Balasundaran
E.J. Maria Florence
- KFRI 281/97 - Improving and maintaining productivity of eucalypt plantations in India and Australia
Investigators : K.V. Sankaran
M. Balagopalan
S. Sankar
Jose Kallarackal
C.K. Soman
J.K. Sharma
K.C. Chacko
R.C. Pandala
M. Balasundaran
C.N. Krishnankutty

- KFRI 282/97 - Testing and developing Criteria and Indicators for Sustainable Management of Tropical Plantation Forests in India
Investigator : S. Sankar
- KFRI 287/97 - Maintenance of the permanent plots to demonstrate the effect of protecting teak plantations from the teak defoliator
Investigators : T.V. Sajeev
R.V. Varma
V.V. Sudheendrakumar
K. Mohanandas
- KFRI 288/97 - Termite control in clonally propagated root trainer raised planting stock
Investigator : R.V. Varma
- KFRI 289/97 - Maintenance of seed stands and species trial plots of rattans
Investigator : C. Renuka
- KFRI 290/97 - Studies on clonal propagation of plus trees of teak (*Tectona grandis* L.f) for identifying superior trees for plantation programme
Investigator : T. Surendran
- KFRI 291/97 - Maintenance and growth observations in multilocational provenance trial plots of Eucalypts
Investigators : M. Balasundaran
E.J.M. Florence
J.K. Sharma
- KFRI 292/97 - Pollination Ecology of teak in Kerala
Investigators : K. Mohanadas
George Mathew
E.P. Indira
- KFRI 295/97 - Raising planting stock of Eucalyptus clones for the Kerala Forest Department
Investigators : J.K. Sharma
M. Balasundaran
E.J.M. Florence
- KFRI 296/97 - Fungal pathogens as a potential threat to tropical acacias - Phase 2
Investigators : J.K. Sharma
E.J.M. Florence

Natural Forests

- KFRI 146/92 - Macrofungi flora of Peechi-Vazhani Wildlife Sanctuary
Investigators : E.J.M. Florence
K. Yesodharan

- KFRI 163/92 - Studies on the flora of Shendurney Wildlife Sanctuary with emphasis on endemic species
Investigator : N. Sasidharan
- KFRI 166/92 - Vegetation mapping of Aralam Wildlife Sanctuary
Principal Investigator : A.R.R. Menon
- KFRI 167/92 - Vegetation mapping of Eravikulam National Park
Principal Investigator : A.R.R. Menon
- KFRI 172/92 - Harvesting and regeneration techniques of reeds
Investigator : R.C. Pandalai
- KFRI 174/93 - Ecological and environmental assessment of forest cover of Kerala with special reference to soil, vegetation and wildlife
Investigator : S. Sankar
- KFRI 217/94 - Effect of fire on forest soil and vegetation
Principal Investigator : Director
Investigators : K. Swarupanandan
T. Surendran
K.V. Sankaran
Thomas P. Thomas
- KFRI 223/94 - Soil microflora of shola forests of Eravikulam National Park
Investigators : K.V. Sankaran
M. Balasundaran
- KFRI 237/94 - Conservation, management and sustainable utilization of non-timber forest products in Southern Western Ghats, Kerala, India
Investigator : S. Sankar
- KFRI 241/95 - Eco-restoration of a degraded watershed in Attappady
Investigator : R.C. Pandalai
- KFRI 244/95 - Biodiversity conservation potential and ecosystem rehabilitation using traditional knowledge at Chinnar Wildlife Sanctuary, the Western Ghats, Kerala, South India
Investigator : S. Sankar
- KFRI 246/95 - Fire related ecosystem dynamics in the moist deciduous forests of the Western Ghats
Investigators : K. Swarupanandan
K.V. Sankaran
T. Surendran
Thomas P. Thomas
- KFRI 260/96 - Vegetation Mapping and Analysis of Neyyar Wildlife Sanctuary using Remote Sensing Techniques
Investigators : A.R.R. Menon
Assistant Wildlife Warden, Neyyar

- KFRI 262/96 - Prospects of reed bamboo (*Ochlandra travancorica*) for soil conservation in degraded sites
Investigators : M.P. Sujatha
Thomas.P.Thomas
S. Sankar
- KFRI 272/97 - Survey and estimation of Bamboo Resources of Kerala
Investigators : A.R.R. Menon
P.V.K. Nair
K. Jayaraman
- KFRI 273/97 - Lichen (Macrolichen) Flora of Kerala part of Western Ghats
Investigator : M.S. Muktesh Kumar
- KFRI 276/97 - Studies on the Biodiversity of New Amarambalam Reserved Forests of Nilgiri Biosphere Reserve
Investigators : K.S.S. Nair
K.K. Ramachandran
K.K.N. Nair
K. Yeshodharan
George Mathew
K. Mohanadas
E.A. Jayson
P.V.K. Nair
- KFRI 278/97 - Germplasm collection and growth studies of selected bamboo species suitable for the region (Western Ghats)
Investigators : R.C. Pandalai
M.S. Muktesh Kumar
K.V. Bhat
- KFRI 283/97 - Integrated management of the alien invasive weed *Mikania micrantha* in the Western Ghats
Investigator : K.V. Sankaran
E.J.M. Florence
P.K. Muraleedharan

Wildlife

- KFRI 153/92 - Survey of small mammals in Kerala with special reference to endangered species and wildlife census in Chinnar Wildlife Sanctuary
Investigators : P.S. Easa
P. Padmanabhan
James Zacharias
- KFRI 162/92 - Status, habitat utilisation and movement pattern of larger mammals in Wayanad Wildlife Sanctuary
Investigator : P.S. Easa

- KFRI 178/93 - A field guide for identification of wild animals based on indirect evidences
Investigator : E.A. Jayson
- KFRI 183/93 - Studies on crop damage by wild animals in Kerala and evaluation of control measures
Investigator : E.A. Jayson
- KFRI 209/93 - Patterns and processes of fish assemblages in Periyar Lake-Valley System
Investigator : L.K. Arun
- KFRI 214/94 - Study on man-wildlife interaction in Wayanad Wildlife Sanctuary, Kerala
Investigators : P.S. Easa
S. Sankar
- KFRI 222/94 - Studies on the flora of Chinnar Wildlife Sanctuary
Investigators : N. Sasidharan
Asst. Wildlife Warden,
Chinnar Sanctuary
- KFRI 224/94 - Ecological studies on Sloth Bear (*Melursus ursinus*) in Parambikulam Wildlife Sanctuary
Investigator : P.S. Easa
- KFRI 226/94 - Status and distribution of rare and endangered animals of Kerala and publication of a Booklet
Investigator : E.A. Jayson
- KFRI 240/95 - Ecology and behaviour of gaur (*Bos gaurus*) in Periyar Tiger Reserve, Kerala
Investigator : P.S. Easa
- KFRI 267/97 - Elephant population in Periyar and adjacent areas - a demographic study
Investigator : P.S. Easa
- KFRI 294/97 - Conservation of Invertebrates through Captive breeding
Investigator : George Mathew

Wood Science & Technology

- KFRI 195/93 - Bee keeping - Use of unconventional timbers for hives
Investigator : R.V. Varma
- KFRI 248/96 - Protection of rubber wood from insect borers
Investigators : George Mathew
R. Gnanaharan

- KFRI 258/96 - Evaluation of high input management on growth and timber production in teak
Investigators : K.M.Bhat
K.C. Chacko
M. Balagopalan
- KFRI 266/97 - Development of appropriate tools for harvesting reed bamboos
Investigators : K.V. Bhat
R.C. Pandalai
- KFRI 286/97 - Introducing mechanical slivering technique in traditional reed industry - A techno-economic study
Investigators : R. Gnanaharan
Mammen Chundamannil
A.K. Kurian (Kerala State Bamboo Corpn.)

General & Environmental Studies

- KFRI 206/93 - Mushroom cultivation using forest litter and waste wood
Investigators : E.J.M. Florence
J.K. Sharma
M. Balasundaran
- KFRI 235/94 - Harvesting trials on bamboos
Investigator : R.C. Pandalai
- KFRI 252/96 - Weather data acquisition from selected Wildlife Sanctuaries in Kerala
Investigators : Jose Kallarackal
C.K. Somen
- KFRI 277/97 - Carrying capacity based developmental planning for Greater Kochi Region (KFRI Component of a collaborative project)
Investigator : S. Sankar
- KFRI 284/97 - Employment, landuse and intercultural ecoscope: Forest-plantation transformation in the Kerala Highranges
Investigator : S. Sankar
- KFRI 285/97 - Forest Atlas of Kerala
Investigators : A.R.R. Menon
P.V.K. Nair
- KFRI 293/97 - Revisionary studies on four genera of Indian Bamboos
Investigator : M.S. Muktesh Kumar

Medicinal Plants & Tissue Culture

- KFRI 253/96 - Micro propagation of Important, Rare and Endangered Tree Species of Western Ghats
Investigator : E.M. Muraleedharan
- KFRI 256/96 - Assessment of field performance of micropropagated teak and eucalypts
Investigators : E.M. Muraleedharan
R.C. Pandalai
- KFRI 261/96 - Micropropagation of three valuable timber species in Bay Islands
Investigators : E.M. Muraleedharan
A.B.T.Mandal-CARI

Socio-Economics

- KFRI 189/93 - Economics of forest plantations in Kerala
Investigator : Mammen Chundamannil
- KFRI 249/96 - Study of private sector involvement in Forestry Research in India
Investigators : K.S.S. Nair
Mammen Chundamannil
K.C. Chacko

Action Research Programmes

- KFRI 192/93 - Greening of Ayyampilly Hills - Participatory Action Research Programme
Investigator : S. Sankar
- KFRI 197/93 - Ecorestoration of a degraded watershed in Mukundapuram Taluk of Thrissur District
Investigator : S. Sankar

5.3 NEW RESEARCH PROJECTS

During the year under report, the following 35 research projects were initiated.

- KFRI 297/98 - Insect fauna of the shola forests of Munnar and Wayanad
Investigator : George Mathew
[Kerala Forest Department (Dev.)]
- KFRI 298/98 - Inventory of macro-invertebrate fauna of the shola forests of Kerala
Investigator : KK Ramachandran
[Kerala Forest Department (Dev.)]

- KFRI 299/98 - Generation of basic data on variability of rubber wood in Kerala and formulation of grading rules
Investigator : R Gnanaharan
[Science Technology and Environment Committee]
- KFRI 300/98 - Preparation of Bio-diversity Register - A model study in Panancherry Panchayat in Thrissur District of Kerala
Investigator : PS Easa
[Science Technology and Environment Committee]
- KFRI 301/98 - Floristic studies in Parambikulam Wildlife Sanctuary
Investigator : N Sasidharan
[Kerala Forest Department (W.L.)]
- KFRI 302/98 - Survey on the Commercial Exploitation of Medicinal Plants in the Drug Industry of Northern Kerala
Investigator : N Sasidharan
[Kerala Forest Department (W.L.)]
- KFRI 303/98 - Ecology of wetland birds in the Kole lands of Kerala
Investigator : EA Jayson
[Kerala Forest Department (W.L.)]
- KFRI 304/98 - Documentation of invertebrate fauna in Mangalavanam mangrove area
Investigator : PS Easa
[Kerala Forest Department (Social Forestry Wing)]
- KFRI 305/98 - Transfer of some wood processing technologies developed by ICFRE to wood using industries in Kerala
Investigator : R Gnanaharan
[Indian Council for Forestry Research and Education, Dehra Dun]
- KFRI 306/98 - Mass multiplication of selected bamboo by macropropagation
Investigator : KK Seethalakshmi
[Indian Council for Forestry Research and Education, Dehra Dun]
- KFRI 307/98 - Diagnosis of micronutrient deficiencies in Teak seedlings
Investigator : MP Sujatha
[Kerala Forest Department (Dev.)]
- KFRI 308/98 - Teak defoliator management by controlling epicentre populations - A case study
Investigator : VV Sudheendrakumar
[Kerala Forest Department (Dev.)]
- KFRI 309/98 - Anatomical changes associated with culm maturation in *Bambusa bambos* and *Dendrocalamus strictus*
Investigator : KV Bhat
[Kerala Forest Department (Dev.)]

- KFRI 310/98 - Mycorrhizas in Forest Plantations - Association, Diversity and Exploitation in Planting Stock Improvement
Investigator : C Mohanan
[Kerala Forest Department (Dev.)]
- KFRI 311/98 - Studies on disturbed shola forests for evolving strategies for the conservation and management
Investigator : UM Chandrashekara
[Kerala Forest Department (Shola Forests)]
- KFRI 312/98 - Role of shola forests in maintaining watercourses in the High Range of the Western Ghats of Kerala
Investigator : S Sankar
[Kerala Forest Department (Shola Forests)]
- KFRI 313/98 - Evaluation of the population, regeneration and invasion status of selected tree endemics in the shola forests of Kerala
Investigator : KKN Nair
[Kerala Forest Department (Shola Forests)]
- KFRI 314/99 - Biodiversity mapping of Shola Forests through remote sensing and GIS techniques
Investigator : P.Vijayakumaran Nair
[Kerala Forest Department (Shola Forests)]
- KFRI 315/99 - Microbial diversity in the grassland shola forests of Wayanad and Munnar
Investigator : E.J. Maria Florence
[Kerala Forest Department (Shola Forests)]
- KFRI 316/99 - Biodiversity Documentation for Kerala
Investigator : P.S. Easa
[Kerala Biodiversity Committee]
- KFRI 317/99 - A study of wood boring beetles in the Kerala part of Nilgiri Biosphere Reserve
Investigator : George Mathew
[Department of Environment, New Delhi]
- KFRI 318/99 - Rehabilitation of degraded forests through landscape level participatory action programme
Project Coordinator : Jose Kallarackal
Principal Investigator : UN Chandrashekara
[AusAid (Supportive Training Programme)]
- KFRI 319/99 - Genetic improvement of Teak
Investigator : E.P. Indira
[Kerala Forest Department (Dev.)]

- KFRI 320/99 - Testing an alternative thinning schedule for teak plantations based on a simulation model
Investigator : K. Jayaraman
[Kerala Forest Department (Dev.)]
- KFRI 321/99 - Management of soils of teak plantations for sustainable productivity
Investigator : M. Balagopalan
[Kerala Forest Department (Dev.)]
- KFRI 322/99 - Screening of sandal provenances for spike disease resistance using molecular markers
Investigator : M. Balasundaran
[Kerala Forest Department (Dev.)]
- KFRI 323/99 - Studies on forest seeds of Kerala
Investigator : K.C. Chacko
[Kerala Forest Department (Dev.)]
- KFRI 324/99 - Investigations on Non-wood Forest Produce plants of Kerala
Investigator : K.K.N. Nair
[Kerala Forest Department (Dev.)]
- KFRI 325/99 - Studies on Composting
Investigator : M. Balasundaran
[Kerala Forest Department (Dev.)]
- KFRI 326/99 - Studies on Root Trainer Technology for raising seedlings of forest tree species
Investigator : J.K. Sharma
[Kerala Forest Department (Dev.)]
- KFRI 327/99 - Developing a field identification key for rattans of Kerala
Investigator : C. Renuka
[Kerala Forest Department (Dev.)]
- KFRI 328/99 - Influence of tree canopy Architecture and management regimes on growth and yield of under-crop in home garden Agroforestry system in Kerala
Investigators : U.M. Chandrasekhara and
S. Sankar
[Indian Council of Agricultural Research, New Delhi]
- KFRI 329/99 - Biodiversity characterisation at Landscape Level using satellite remote sensing in Kerala
Principal Investigators : A.R.R. Menon and
N. Sasidharan
[National Remote Sensing Agency, Hyderabad]

Action Research Programme

- KBC - STEC - Biodiversity action programme for Kerala
Project Leader : KSS Nair
[State Committee on Science Technology & Environment]
- KFRI Ext.01/98 - Establishment of an arboretum at the Field Research Centre, Palappilly
Project Executive : KK Unni
[Kerala Forest Research Institute]

6. OTHER ACTIVITIES

6.1 CONSULTANCY SERVICES

The following consultancy projects were completed taken up during the period.

Completed:

- KFRI Cons 13/96 - Establishment of Interpretation Centre at Parambikulam and Wayanad Wildlife Sanctuaries
Investigators : P.S.Easa, V.V.Sudheendrakumar
[Kerala Forest Department (Wildlife Wing)]
- KFRI Cons 15/97 - Survey of pests and disease problems in intensively managed teak plantations of Sterling Tree Magnum
Coordinator : R.V. Varma
Investigators: All scientists in Pathology and Entomology
[Sterling Tree Magnum (India) Ltd.]
- KFRI Cons 16/97 - Status and distribution of Masheer in selected streams and reservoirs in Kerala
Investigator : P.S. Easa
[Indo-German Reservoir Fisheries Development Project, Kerala]
- KFRI Cons 21/97 - Production and supply of propagules of ten bamboo species
Coordinator : R.C. Pandalai
[Kerala Forest Department and Tamil Nadu Forest Department]
- KFRI Cons 23/98- Publishing a comprehensive volume on Silent Valley National Park
Collaboratory Editor : P.S. Easa
[Kerala Forest Department (Wildlife Wing)]
- KFRI Cons 24/98 - Training in teak defoliator management to two TNAU Scientists
Coordinator : R.V. Varma
[IHRD Programme, Tamil Nadu Agricultural University]

- KFRI Cons 25/98 - Printing of brochures on Nilagiri Biosphere Reserve
Principal Investigator : P.S. Easa
[Kerala Forest Department (Wildlife Wing)]
- KFRI Cons 26/98 - Environmental impact assessment of Thenmala Eco-Tourism Project
Coordinator : S. Sankar
[Kerala State Tourism Department]
- KFRI Cons 27/98 - Statistical analysis of data on fertilizer trial in *Eucalyptus tereticornis*
Investigators : P. Rugmini
K. Jayaraman
[Kerala Forest Department]
- KFRI Cons 28/98 - Training programme on nursery and plantation practices of forest species for the Officers of the Plantation Corporation of Kerala Ltd. (PCKL), Kottayam
Coordinator : K.C. Chacko
[Plantation Corporation of Kerala Ltd., Kottayam]
- KFRI Cons 29/98 - Mass scale production of seedlings of selected important rattans (*Calamus thwaitzii*, *C. rotang*, *C. hookerianus* and *C. andamanicus*)
Investigator : C. Renuka
[Kerala Forest Department]
- KFRI Cons 31/98 - Analysis of power transmission network data of Kallyasseri Panchayat
Investigator : P. Vijayakumaran Nair
[Integrated Rural Technology Centre, Palghat]
- KFRI Cons 32/98 - Study visit of forestry professionals from Costa Rica on teak management
Coordinator : K.M. Bhat
[Empresas Ecos, S.A. Costa Rica]
- KFRI Cons 33/98 - Training programme in plantation forestry for the Field Assistants of the Plantation Corporation of Kerala Ltd. (PCKL), Kottayam
Coordinator : K.C. Chacko
[Plantation Corporation of Kerala Ltd., Kottayam]
- KFRI Cons 34/98 - Training Programme for the Jr. Research Fellows of the Plantation Corporation of Kerala Ltd. (PCKL), Kottayam
Coordinator : P.K. Muraleedharan
[Plantation Corporation of Kerala Ltd., Kottayam]
- KFRI Cons 35/98 - Preparation of a model action plan for DU-10 in Attappadi
Coordinator : S. Sankar
[The Attappady Hill Area Development Society (AHADS), Agali]

- KFRI Cons 36/98 - Preparation of illustrations of 40 species for CABI Forestry Compendium Project
Coordinator : K.C. Chacko
[CAB International, Wallingford, Oxon, UK]
- KFRI Cons 37/98 - Supply of forest map covering Chimmony and Peechi Reservoir areas
Coordinator : A.R.R. Menon
[Irrigation Department, Thiruvananthapuram]
- KFRI Cons 40/99 - Training programme on plantation forestry practices and forest operations for field staff of Hindustan Newsprint Ltd., Velloor)
Coordinator : K.C. Chacko
[Hindustan Newsprint Ltd., Velloor]
- KFRI Cons 43/99 - Supply of planting materials of bamboo
Investigator : K.K. Seethalakshmy
[The State Silviculturist, Regional Research Centre, Rajamundry, Andhra Pradesh Forest Dept.]

Ongoing/New Consultancies

- KFRI Cons 30/98 - Establishment of a new seismological observatory in the shield area - at Peechi, Thrissur
Investigators : Kusala Rajendran (CESS), (PI)
C.P. Rajendran (")
C.M. Harish (")
V. Muraleedharan (")
Jose Kallarackal, KFRI
[Department of Science & Technology, Govt. of India]
- KFRI Cons 38/99 - Training programme for biodiversity assessment
Coordinator - P.S. Easa
[Ministry of Environment and Forests, Govt. of India]
- KFRI Cons 39/99 - Biodiversity education
Coordinator - P.S. Easa
[Science Technology and Environment Committee]
- KFRI Cons 41/99 - Raising seedlings of commercially important rattan species for the Kerala Forest Dept.
Investigator : C. Renuka
[Kerala Forest Department (Kothamangalam Forest Divn., Nelliampathy Forest Range, Nilambur Forest Range)]
- KFRI Cons 42/99 - Preparation and printing of handbooks on ecology forest and wildlife, and environment and conservation of Peechi and Vazhani Wildlife Sanctuary
Investigator : K.V. Muhammed Kunhi
[Kerala Forest Department (Wildlife Wing) Peechi]

6.2 Training

Dr. J.K. Sharma ((RME) visited CSIRO Division of Forestry & Forest Products, Australia during June-July 1998 for 1-month hands-on training on Molecular Markers. His visit was supported by ITTO Fellowship.

Mr. P.K. Thulasidas (Wood Science) attended the Wood Bending and Forming Training Course conducted by ICFRE at Dehra Dun during 5-16 October 1998.

The Wildlife Division organized a Training Programme on Biodiversity for the benefit of twenty three school teachers of Pananchery Panchayath during March 4th to 6th, 1998:

Dr. P.S. Easa (Wildlife) organised Biodiversity Education Training for the benefit of college teachers and students. The Training Programme was organised with the intention of introducing various aspects of biodiversity including methods of measuring and monitoring to the biology teachers and postgraduate students of colleges in Kerala. The programme was conducted in five batches and a total of 103 (including 21 students) participated. The course were conducted during April-May, 1999.

6.3 Exhibitions/Training Programmes/Extension works undertaken

Exhibition

Dr. P.S. Easa (Wildlife) participated in the All India Aquarium Show and Exhibition 1999 (Matsyalankar) held at Calicut from Feb. 12 to 17 February and have won the Second Prize in the best collection of indigenous fishes.

Agroforestry Division organized: Exhibition during Diamond Jubilee Science Festival at Govt. Woman's College, Thiruvananthapuram (University of Kerala - 27th August 1998 to 16th Sept. 1998); Class and Exhibition-Eco-Folklore Workshop at Sree Kerala Varma College, Trichur (19th September 1998); Exhibition-National Seminar on Medicinal plants at 'Oushadhi', Trichur (17th October 1998); Participation and Exhibition NEAC at Vimala College, Trichur (6-8 November 1998); Exhibition at Teak museum, Nilambur (13-23 November 1998); Exhibition - Malayala Manorama 'Karshakasree' Exhibition at Collectorate ground Kannur (18-22 Novemebr 1998); Exhibition-at Adarsha Vidyalaya CBSE school at Paravoor (10th Jan. 1999); Exhibition-Unifest 1999 at Police stadium, Kannur Organised by Kannur University and Kannur Dt. Panchayat (20th February-20th March 1999).

Training Programme

Dr. P.K. Muraleedharan (Economics) organised one month training programme on Research Methodology and Forest Economics to Junior Research Fellows of plantation Corporation Kerala Limited.

The Silviculture Division organized (i) A training programme on "Nursery and Plantation Practices of Forestry Species" was organised for 24 officials of Plantation Corporation of Kerala Ltd., Kottayam during 10-11 June 1998 (ii) training in Nursery and plantation practices was organised for 24 newly recruited Field Assistants (up to Managers) of Plantation Corporation of Kerala Ltd., Kottayam from 11-13 August 1998. Scientists from various Divisions acted as Resource Persons.

Mr. K.C. Chacko (Silviculture) coordinated an attachment training programme of Mr. P. Pugazhendi IFS (Probationer) allotted to Kerala Cadre, at KFRI during 12-13 November 1998. He also coordinated the study visit of IFS probationers (1997-2000) from IGNFA, Dehradun, 4-13 Nov. 1998.

Extension

Dr. P.S. Easa (Wildlife) organised (i) a meeting of the volunteers in connection with the Preparation of Biodiversity Register for Pananchery Panchayat, Thrissur on 1st October, 1998; (ii) awareness programmes for the students of selected schools in Pananchery Panchayath in connection with the World Environment Day during June 15-22, 1998.

Agroforestry Division organized: Classes for Rubber farmers Society Mangalam at KFRI (29th May 1998); National Environment Awareness Campaign, at Velloor School, Chamakkavu, Payyannur. Kannur District.(7th June 1998); and Familiarisation workshop on bamboo for the officials of the Fisheries Department of Kerala at KFRI, Peechi (4th August 1998).

Dr. N. Sasidharan (NWFP) delivered a lecture on Endemism with reference to Western Ghats to the participants of refresher course in Botany (College teachers) organised by Directorate of Collegiate Education at Government Victoria College, Palakkad on 10 March 1999.

Dr. N. Sasidharan (NWFP) provided a report on the status of sandal regeneration and associated plants in the Nelluvaikandam area of Wadakkanchery forest range to the Silviculture Research Officer, Trivandrum on (July 1998).

Dr. N. Sasidharan (NWFP) estimated the age of a tree as desired by the Forest Tribunal, Palakkad, trees was provided after studying the trees in the property.

Dr. N. Sasidharan (NWFP) identified and confirmed the Botanical identity of raw drugs referred by the Range Forest Officer, Flying Squad, Thrissur (29th Jan. 1999); by Ms. James Research Laboratory, Nellore, P.O. 680 305, Thrissur Dist. by Ms. Trinity Pharmaceutical (India) Private Ltd., Thrissur, was provided after examining the raw drugs.

Dr. N. Sasidharan (NWFP) identified the trees in the Kizhakkambalam Plantations, Bhavani estate at Agali, in connection with a High Court case - OP 19122/97 referred to the institute.

Dr. N. Sasidharan (NWFP) delivered lecture on Habitat and species diversity of medicinal plants with reference to Wayanad and field identification of medicinal plants to the participants of Trainers Training Programme during 3rd and 4th November, 1998, organised by M. S. Swaminathan Research Foundation, Kalpetta .

Dr. N. Sasidharan (NWFP) identified the plants referred from the Forest Department; from S.N.M. College, Maliankara, Cochin; Sri Krishna College, Guruvayur; Govt. College, Pattambi; Vyasa College, Wadakkanchery were provided.

Dr. E.M. Muralidharan (Genetics) delivered a lecture on Intellectual Property Rights and Patenting of Life forms ' as resource person for the Refresher Course in Botany held at the Govt. Victoria College on 26 February, 1999.

Dr. R.C. Pandalai and Shri. U.N. Nandakumar (Silviculture) coordinated the visit of the Range Forest Officer trainees of Gujarat Forest Rangers College to the Institute and explained about the research activities of the Institute.

Dr. R.C. Pandalai (Silviculture) coordinated the study tour and field visits of 35th batch Forest Guard trainees from Kerala Forest School, Arippa (17 Feb. 1999).

Shri K.C. Chacko (Silviculture) and Dr. M. Balasundaran (Pathology) Field visit in connection with the dying of eucalypts in 1998 plantation at Agali Range, Mannarkkad Forest Division, and recommendations provided.

Dr. M. Balagopalan (Soil Science) carried out a consultancy work on Soil Status in the captive Plantations of HNL, Velloor and submitted a preliminary observation report.

Dr. M. Balagopalan (Soil Science) attended to several queries of Kerala Forest Department and Kerala Forest Development Corporation with respect to application of fertilizers and other soil management measures and recommendations were given wherever necessary.

Dr. P.S. Easa (Wildlife) gave Popular Lectures on biodiversity conservation to the students of several schools and colleges in Kerala. He also gave a guest lecture on Environmental aspects of Western Ghats with reference to the fauna in the Orientation Course for college teachers organised by Academic Staff College, Calicut University.

6.4 Seminars/Symposia/ Workshops/Meetings attended

International

Dr. R. Gnanaharan (Wood Science) attended the Bamboo Building Code meeting held in San Jose, Costa Rica during 30-31 October 1998.

Dr. R. Gnanaharan (Wood Science) participated in the VI International Bamboo Workshop held in San Jose, Costa Rica during 2-6 November, 1998 and presented a paper, "Verification of the model for predicting bending strength of bamboo" and chaired two technical sessions. He also visited various academic and research institutions in the field of wood science in the UK during November 1998.

Dr. Mammen Chundamannil (Economics) attended the International Seminar on site, Technology and Productivity of Teak Plantation organised by FAO at the Chiang Mai University, Thailand during January 26-29, 1999. Presented an invited paper "Teak Plantation in Kerala: An Economic Review". Dr. Mammen Chundamannil was a Co-author of a country paper ' Site Technology and Productivity of Teak plantations in India and presented by Subramanian, K., Mandal, A.K., Rambabu, N., Chundamannil, M. and Nagarajan, B.

Dr. J.K. Sharma (RME) and Dr. E.J.M. Florence (Pathology) participated in the International Conference on Plant Protection in the Tropics organised by Malaysian Plant Protection Association, Kuala Lumpur, Malaysia during 15-18, March, 1999. They presented the following papers: (1) "Increasing the productivity of eucalypts in Kerala through selection for disease resistance, higher growth, and clonal technology" (2) "Analysis of chemical properties of rubber wood stained by *Botryodiplodia theobromae*". Dr. Sharma also attended the Acacia Disease Group Meeting and an Expert Group Meeting to initiate action on Guidelines for the movement of *Acacia* germplasm.

Dr. K.K. Seethalakshmi (Physiology) participated in the International Conference on conservation of tropical species, communities and ecosystems at Techno park Thiruvananthapuram from 2 to 6 December, 1998 and presented a paper on "Distribution, flowering, seed characteristics and vegetative propagation of selected rare bamboos of Southern India".

Dr. P.S. Easa (Wildlife) attended the International Conference on Medicinal Plants organised by Centre for Ecological Sciences, Indian Institute of Science from 16 to 19 February, 1998.

Dr. P.S. Easa (Wildlife) attended the Symposium on Finding Solution to Human-elephant Conflict in Asia, held at Macquarie University, Sydney, Australia from 13 to 16 July, 1998 and presented a paper on Man-wildlife Conflict in Wayanad, South India: A study of crop raiding pattern, effectiveness of protection measures and people's attitude.

Dr. P.S. Easa (Wildlife) attended the 6th World Wilderness Congress in Bangalore from 24th to 29th October, 1998.

National

Dr. J. Kallarackal and Dr. C.K. Somen (Physiology) participated in the initiation Workshop on improving and maintaining productivity of eucalypt plantations in India and Australia held at KFRI during 20-21 April, 1998 and presented a status paper entitled "Ecophysiological studies of eucalyptus in Kerala."

Dr. P.S. Easa (Wildlife) attended the Biodiversity Conservation Seminar organised by the Forest department on 14th March, 1998; the Mahseer Workshop organised by the Fisheries Department and Indo-German Reservoir Fisheries Programme from 21-22 April, 1998 and presented the details of the work done on Mahseer status.

Dr. U.M. Chandrashekara (Agroforestry) attended the Workshop on Setting Research Priorities for ICFRE in Forestry Research in Kerala from 4-6 May 1998 at Thiruvananthapuram.

Dr. E.M. Muralidharan (Genetics) attended a one day Work shop on Patents- Intellectual Property Rights at the Sree Chitra Thirunal Institute for Medical Sciences and Technology, Thiruvananthapuram on 12 th May, 1998.

Shri. K.C. Chacko (Silviculture) attended the Workshop on "Setting Research Priorities for ICFRE in Forestry Research in Kerala" on 4-5 May 1998 at Thiruvananthapuram. He also attended a Seminar on "Role of Forest Education in Conservation of Natural Resources" on 22 May 1998 at Coimbatore.

Dr. K.M. Bhat (Wood Science) participated in the National Conference on Teak held at Jabalpur during 25-26 May 1998 and presented an invited paper, 'Tree breeding for improved wood quality of teak'.

Dr. R. Gnanaharan (Wood Science) and Dr. K.M. Bhat attended the National Seminar on Processing and Utilization of Plantation Timbers and Bamboo held in Bangalore during 23-24 July 1998. They presented the following papers: Potential industrial uses of bamboo by R. Gnanaharan; Properties and utilization of small timber resource of teak plantations by K.M. Bhat.

Dr. P.S. Easa (Wildlife) participated in a seminar on Ecological Application of the Remote Sensing from 8th to 11th of June, 1998, Bangalore; National Seminar on Wildlife Conservation, Research and Management organised by Wildlife Institute of India, Dehra Dun from 10th to 13th August, 1998.

Dr. J.K. Sharma (RME), Dr. S. Sankar (Agroforestry) and Mr. K.C. Chacko (Silviculture), Dr. P.S. easa (Wildlife) participated in the Launching Workshop of the World Bank Kerala Forestry Project on 20-21 August 1998 in Thiruvananthapuram.

Mr. P. Padmanabhan (Wildlife) participated in the Workshop on Sustainable bee-keeping development on August 1, 1998 at Dharward, Karnataka and presented a paper on Development of bee-keeping in Forestry and Agroforestry plantations in India.

Dr. P.S. Easa (Wildlife) attended a three-day Workshop for journalists, focussing on the forest and wildlife conservation issues in Kerala from 9 to 11 September, 1998 at Thekkady. He gave a lecture on biodiversity conservation issues in Kerala. He also attended a Workshop on Monitoring Poaching of elephants and trade in ivory in Centre for Ecological Sciences, IISc, Bangalore organised by the Asian Elephant Specialist Group from 22 to 23 October, 1998; and a Review Meeting of the Expert Groups on Eastern and Western Ghats at Bhuvaneshwar from 12th to 17th October.

Dr. U.M. Chandrashekara (Agroforestry) participated in the International Conference on Conservation of Tropical Species, Communities and Ecosystems in Thiruvananthapuram during 2-6 December 1998 and presented a paper entitled Impact of repeated natural disturbances on the regeneration of trees in a sacred grove at Iringole, Kerala".

Dr. J. Kallarackal (Physiology) co-ordinated a training cum Project Initiation Workshop in KFRI under the AUSAID support programme for Rehabilitation of degraded forests through landscape ecology concepts and a participatory management approach. Prof. Ian Ferguson, Dr. David Flinn, Dr. E.K.S. Nambiar and Mr. Peter Stephen led the workshop and training.

Dr. K.M. Bhat (Wood Science) participated in the National Workshop on Rattan (Canes) held in Bangalore during 4-5 February 1999 and presented the following papers: Characterization and industrial utilization of Indian rattan resource - a state of knowledge report by K.M. Bhat and T.K. Dhamodaran; Translation of rattan research into action in the context of sustainable utilization of non-wood forest products (NWPS) by K.M. Bhat.

Dr. E.M. Muralidharan (Genetics) participated in the ANERT National Conference 'Renewable energy 1999' 11-12 February 1999 at Thiruvananthapuram.

Dr. R.V. Varma (Entomology) participated in the 11th Kerala Science Congress held at CPCRI, Kasargode from 27 Feb. - 1 March, 1999 and chaired two sessions on Life Science.

Dr. R. Gnanaharan (Wood Science) attended the Indian Rubberwood Task Force meeting held at Kottayam on 3 June and 14 September 1998.

Dr. K. K. Seethalakshmi (Physiology) participated in the National Congress on Medicinal plants at Trichur held on 17 October, 1998,

Dr. K.K. Seethalakshmi (Physiology) participated in the National Workshop on Rattans (Canes) at Institute of Wood Science and technology, Bangalore from 4-5 February 1999 and presented a paper on Enrichment planting of four Rattan species in Natural Forests.

6.5 Resource Persons for Workshops/Meetings

Shri. K.C. Chacko (Silviculture) attended a preliminary meeting of the Mattathur Grama Panchayat Advisory Committee on 10 June 1998 and provided inputs for developing Forestry and Agroforestry projects for the coming year.

Mr. T.Surendran (Physiology) served as a resource person for the training programme on Plantation Forestry for Field staff of the Kerala Plantation Corporation Ltd. (PCK), during 11-13 August, 1998 held at KFRI. He also served as a resource person for the training programme on Nursery and Plantation Practices of Forestry species for the officers of the Plantation Corporation Ltd., Kottayam (PCKL), during 10-11 June, 1998 held at KFRI.

Mr. K.C. Chacko (Silviculture) acted as a resource person in the workshop - Combined Training programme for the Guards, Forests and Range officers in charge of MPCAs of Kerala on 9 November 1998, organised by FRLHT, Bangalore. He gave a talk on diversity of medicinal plants in the Medicinal Plant Conservation Areas in Kerala - threats to them and their rare, endangered and threatened status.

Dr. R. Gnanaharan (Wood Science) attended the Bureau of Indian Standards (BIS) subcommittee meeting CED 9:3 held at Dehra Dun on 20 May 1999. He also attended the BIS sectional committee meeting CED 9 held in Bangalore on 22 July 1998.

Dr. R.C. Pandalai (Silviculture) took a class on "Softwood species for cultivation and management at Ollur" during Seminar on "Wood Industry - Problems and Prospects" by the District Panchayat Office, Thrissur at Ollur on 24-26 July 1998. He also took a class on "Bamboo Silviculture" in the Familiarisation Workshop on Bamboos for the officers of Indo-German Reservoir Fisheries Development Project, Malampuzha at KFRI, Peechi on 4 August 1998.

Dr. R. Gnanaharan was one of the Resource Persons at the Familiarization Workshop on Bamboo to the Officers of the Fisheries Department conducted at KFRI on 04 August 1998. He was also one of the Resource Persons at the Training Programme on "Plantation Forestry Practices and Forest Operations" for the staff of Hindustan Newsprint Ltd, Velloor held at KFRI during 04-06 February 1999.

Dr. Seethalakshmi, K.K. (Physiology) served as a Resource Person for the Training programme on Plantation Forestry Practices and Forest Operations for the Field staff of Hindustan Newsprint

Limited, Vellore and took a class on clonal propagation of bamboos on 6th February, 1999 held at KFRI. She also served as a Resource person for Refresher course in Botany for College Teachers at Govt. Victoria College, Palakkad and gave a lecture on "DNA fingerprinting and its application in Biology" on 5th March 1999.

6.6 Visitors

Forestry professionals from Costa Rica visited different Divisions and teak plantations at Nilambur. 11-12 August 1998.

Mr. P.S Enos IAS, Additional Director of Industries & Commerce, Government of Kerala. 28 January 1999. In connection with the assessment of the requirement of wood for the paper, plywood and other industries.

Dr. Jacob Mathew and Dr. R. Krishna Kumar, Scientists of the Rubber Research Institute of India, Kottayam, visited on 11 and 12 June 1998, and collected details on project implementation and monitoring at KFRI.

Mr. K.C. Pathak, Research Officer, Institute of Rain and Moist Deciduous Forest Research, Jorhat, Assam, during 20-24 July 1998, to study about bamboo and cane silviculture and systematics.

Dr. L.E.L. Rasmussen, Associate Professor, Dept. of Chemistry, Biochemistry and Molecular Biology from Oregon Graduate Institute, Beaverton.

Dr. Ajith Kumar and Dr. Arun Venkataraman from SACON,

Dr.V.S. Vijayan, Director, SACON

Dr. Krishnamurthy, Veterinary Surgeon, Forest Department

Dr. Ravichellam, Wildlife Institute of India

7. PUBLICATIONS

7.1 Research Reports

Socio-economic and the ecological aspects of developing bamboo resources of Kerala. KFRI Research Report No.125 (Part II). (CN Krishnankutty)

Studies on the ecology and population dynamics of endangered primates in Silent Valley National Park. KFRI Research Report No. 143. (K.K. Ramachandran, 1998).

Teak Plantation in Nilambur. KFRI Research Report No.144. (Mammen Chundamannil, 1998).

- Studies on the fern flora of Kerala with special reference to Sylvan Valley, Munnar. KFRI Research Report No.145. (M.S. Muktesh Kumar, 1998).
- Mass rearing of selected butterflies for possible reintroduction in conservation programme. KFRI Research Report No.146. (George Mathew, 1998).
- Tracing epicentres of teak defoliator outbreak in Kerala. KFRI Research Report No.147. (K.S.S. Nair, K. Mohanadas, V.V. Sudheendrakumar, R.V. Varma and Santhosh K. John, 1998).
- A Survey of reptiles and amphibians in Kerala part of Nilgiri Biosphere Reserve. KFRI Research Report No.148. (P.S. Easa, 1998).
- Analysis of data from long term trials. KFRI Research Report No.149. (P. Rugmini and K. Jayaraman, 1998).
- Studies on the flora of Periyar Tiger Reserve. KFRI Research Report No.150. (N. Sasidharan, 1998).
- Management of the Teak Defoliator using NPV. KFRI Research Report No. 151. (K.S.S. Nair, R.V. Varma, V.V. Sudheendrakumar and K. Mohanadas, 1998).
- Ecological and social importance of the Sacred Groves in Kerala. KFRI Research Report No.152. (U.M. Chandrashekhara and S. Sankar, 1998).
- Enhancement of productivity in *E. grandis* through fertiliser inputs and other cost effective treatments. KFRI Research Report No.153. (M. Balagopalan and P. Rugmini, 1998).
- Vegetation dynamics of the grassland - forest ecosystem in the Western Ghats of Kerala. KFRI Research Report No. 154. (Director, K. Swarupanandan, S. Sankar, N. Sasidharan, M. Balagopalan, 1998).
- Habitat utilisation of animals in Parambikulam Wildlife Sanctuary with special reference to Gaur. KFRI Research Report No. 155. (P.S. Easa and A.R.R. Menon, 1998).
- Evaluating plant diversity in different forest types of Kerala by laying out permanent sample plots. KFRI Research Report No.156. (U.M. Chandrasekhara, A.R.R. Menon, K.K.N. Nair, N. Sasidharan and K. Swarupanandan, 1998).
- Genetic diversity and conservation of rattans. KFRI Research Report No.157. (C. Renuka, E.M. Muralidharan and E.P. Indira, 1998).
- Studies on the Shola Forests of Kerala. KFRI Research Report No.158. (Director, K. Swarupanandan, N. Sasidharan, U.N. Nandakumar and K.C. Chacko, 1998).

- Development and dissemination of low cost micropropagation techniques for *Kaempferia galanga* (Kacholam). KPRI Research Report No.159. (E.M. Muraleedharan and U.M. Chandrashekara, 1998).
- Timber price trends in Kerala. KPRI Research Report No. 160. (C.N. Krishnankutty, 1998).
- Vegetation mapping of Peppara Wildlife Sanctuary. KPRI Research Report No. 161. (A.R.R. Menon, 1999).
- Biodiversity in tropical moist forests: A study of sustainable use of non-wood forest products in the Western Ghats, Kerala. KPRI Research Report No.162. (P.K. Muraleedharan, N. Sasidharan and K.K. Seethalakshmi, 1999).
- Establishment of permanent plots to demonstrate the effect of protecting teak plantations from the teak defoliators. KPRI Research Report No.163. (R.V. Varma, V.V. Sudheendrakumar, K.S.S. Nair, K. Mohanadas and Santhosh K. John, 1999).
- Rhizome and root morphology of rattans. KPRI Research Report No.164. (C. Renuka and K.K. Unni, 1999).
- Studies on the diversity of selected group of insects in the Parambikulam Wildlife Sanctuary. KPRI Research Report No.165. (V.V. Sudheendrakumar and George Mathew, 1999).

7.2 Scientific Papers

Agroforestry

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- Chandrashekara, U.M. and Sankar, S. 1998. Ecology and Management of Sacred Groves in Kerala, India. *Forest Ecology and Management*, 112: 165-177.
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- Chandrashekara, U.M. and Sankar, S. 1998. Tribals and conservation: Chinnar Wildlife Sanctuary, India. In: Communities and Conservation: Natural Resource Management in South and Central Asia. (Eds. Ashish Kothari, R.V. Anuradha, Neema Pathak and Bansuri Taneja) Sage Publications, New Delhi. pp. 467-480.
- Chandrashekara, U.M. 1999. Architecture and growth patterns of trees of agroforestry systems in Kerala. In: Proceedings of the 11th Kerala Science Congress, Kasarakode. (Ed. M.R. Das). Kerala State Committee on Science, Technology and Environment, Thiruvananthapuram. Pp.312-315.

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- Schabel, G.H; Hilje, L; Nair, K.S.S and Varma, R.V. 1999. Economic entomology in tropical forest plantations : an update. J. Tropical Forest Science 11(1) : 303-315.

Genetics

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Silviculture

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General

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7.3 Book/Handbook

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Jayson, E.A. and Easa, P.S. 1998. *A field guide to animal signs*. KFRI Hand book No.4. Kerala Forest Research Institute.

Jayson, E.A. 1998. *Avifauna of Kerala*. In: *The Natural Resources of Kerala*, WWF, Trivandrum.

7.4 Consultancy Report

Sankar, S. (Agroforestry) completed a consultancy on *Environmental Impact Assessment of Thenmala Eco-Development Project*. Consultancy Report was Submitted to the Department of Tourism, Government of Kerala.

Easa, P.S. and Jayaraman, K. 1998. Population estimation of major mammals in the forests of Kerala - 1997. A report submitted to the Kerala Forest Department. KFRI Consultancy Report. Kerala Forest Research Institute, Peechi.

7.5 Popular articles

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Surendran, T. 1998 Vegetative propagation of Asoka (*Saraca asoka*) *Evergreen*, 41:4

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8. ANY OTHER MATTER OF INTEREST

Shri K.C. Chacko (Silviculture) prepared a report on "Trees liable to be felled in private estate in Attappady" as per the directions received from the High Court.

From 1999 onwards KFRI is conducting a Coursework for 3 months (January to March) for the Ph.D students working in KFRI. The course comprises Computer application, Basic Statistics as compulsory courses and Basic Silviculture and other courses as recommended by the Research Advisory Committee. Eight students were admitted for the first batch in January 1999 and all of them passed out.

Dr. K. Jayaraman (Silviculture) was involved in the preparation of a Statistical Manual for forestry research for a period of four months on request from FAO of the United Nations.

Dr. K. Jayaraman (Silviculture) spent three months in the Finnish Forest Research Institute, Finland on a collaborative programme to derive stand specific prediction equations for predicting height of teak trees based on random parameter models.

With the financial assistance from ACIAR, Australia Dr. M. Balagoplan established a soil chemistry laboratory in the Institute. The laboratory has the following sophisticated instruments:

- Atomic absorption spectrophotometer
- Auto analyser
- UV-Vis. spectrophotometer
- Basic sample preparation units
- Block digester
- Sample diluter
- Sample dispenser
- Sample mixer
- Deioniser

9. LIBRARY

Continued the activity of computerisation of library books.

As in the past, Monthly Additions' to the Library have been circulated among the Scientists.

Bibliographic Services, Reprographic Services, Art and Photographic Services were rendered to the Scientists.

E-mail services were carried out satisfactorily.

Bamboos of India: A Compendium was published under the Bamboo Information Centre - India.

The library facilities were also extended to a large number of users within and outside the Country.

The Current holdings in the Library are shown below.

Books

Total number of books in the beginning of the year	13,601
Addition during the year	194

Journals

Total number of back volumes in the beginning of the year	6,315
Addition during the year	145
Number of Journals currently subscribed	70

Reprints

Total number of reprints at the beginning of the year	7,719
Number of reprints acquired during the year	280

Appendix 1

FINANCIAL STATEMENT FOR 1998-99

Expenditure

Heads	Approved outlay for 1998-99 (Rs.)	Actual expenditure for 1998-99 (Rs.)
A. <u>Non-Plan</u>		
1. Staff salaries and benefits ..	1,05,00,000	1,00,71,000
2. Office expenses ..	15,00,000	14,19,000
3. General utilities ..	10,00,000	10,93,000
Total Non-Plan ..	1,30,00,000	1,25,83,000
B. <u>Plan</u>		
4. Civil works ..	30,00,000	5,54,000
5. Capital assets (laboratory Equipments and furniture) ..	5,00,000	2,41,000
6. Library ..	10,00,000	2,44,000
7. Research projects including staff salaries for research activities ..	1,15,00,000	1,00,25,000
Total Plan ..	1,60,00,000	1,10,64,000
Grand Total ..	2,90,00,000	2,36,47,000

Receipts

Head	Actual receipts 1998-99 (Rs.)
A. Internal Receipts	
1. House rent for quarters	.. 1,41,000
2. Hire charges of vehicles	.. 30,000
3. Rent from Guest House and Rest House	.. 25,000
4. Photocopying charges	.. 1,02,000
5. Sale of books	.. 52,000
6. Sale of seedlings etc.	.. 3,72,000
7. Gate fee from Teak Museum, Ph.D. Course fee etc.	.. 1,05,000
8. Miscellaneous	.. 4,58,000
Total (A)	.. <u>12,85,000</u>
B. Grant from Government of Kerala	.. 1,86,00,000
C. Contribution from Forest Department	.. 10,00,000
D. Overheads from external projects and consultancies	.. 27,02,000
Total	.. <u><u>2,35,87,000</u></u>

EXTERNAL PROJECT'S EXPENDITURE 1998-99

Project	Title	Funded by	Expenditure
104/87	Tree Improvement of Eucalyptus for Disease Resistance and Higher Productivity.	KFD(D)	369.00
143/92	Enhancement of Productivity in Eucalyptus grandis through Fertilizer Inputs and other Cost Effective Treatments.	KFD(D)	17703.00
146/92	Macrofungal flora of Peechi Vazhani Wildlife Sanctuary	STEC	2254.00
147/92	Structural Dynamics of teak stands in Kerala.	KFD(D)	710.00
151/92	Soil Nutrient Management for Teak Plantations in Kerala.	KFD(D)	500.00
153/92	Survey of small Mammals in Kerala with Special Reference to Endangered Species and Wildlife Census in Chinnar Wildlife Sanctuary	KFD(WL)	30363.00
154/92	Status and Food and Feeding Habits of Larger Mammals in Idukki Wildlife Sanctuary	KFD(WL)	940.00
156/92	Habitat Utilization of animals in Parambikulam Wildlife Sanctuary with special reference to Gaur	KFD(WL)	3190.00
158/92	Green Belt Development at Cochin Refineries Limited.	CRL	1161.00
161/92	Studies on Man-Wildlife Conflict in Peppara Wildlife Sanctuary and adjacent areas	KFD(WL)	1700.00
164/92	Vegetation mapping and analysis of Chimmony Wildlife Sanctuary using Remote Sensing Techniques.	KFD(WL)	-3406.00
165/92	Vegetation mapping and analysis of Peppara Wildlife Sanctuary using Remote Sensing Techniques.	KFD(WL)	19309.00

Project	Title	Funderdby	Expenditure
167/92	Vegetation mapping and analysis of Eravikulam Wildlife Sanctuary using Remote Sensing Techniques.	KFD(WL)	-34706.00
168/92	Vegetation dynamics of the grassland forest ecosystem in Western Ghats of Kerala for afforestation programme.	ME&F-GOI	276.00
170/92	Quantification of Soil and Water Loss from Teak and Eucalypt Plantations.	KFD(D)	3444.00
175/92	Tracing the epicentres of teak defoliator outbreaks in Kerala	KFD(D)	2975.00
176/92	Evaluation of parasites for biological control of the Teak Defoliator.	KFD(D)	595.00
177/92	Establishment of permanent plots to demonstrate the effect of protecting Teak Plantations from the Teak Defoliator.	KFD(D)	595.00
178/93	Standardisation of indirect evidences of wild animals for field identification and preparation of a field guide.	KFD(WL)	45968.00
179/93	Studies on the Flora of Periyar Tiger Reserve.	KFD(WL)	21034.00
181/93	Teak Plantations in Nilambur: An economic review.	KFD(D)	4820.00
182/93	Effects of faster growth on quality of teak.	KFD(D)	879.00
184/93	Studies on the epiphytic flora in the tropical forests ecosystem of Western Ghats with special reference to Nilgiri Biosphere.	KFD(WL)	69872.00
188/93	Expert system for designing experiments in forestry.	STEC	2258.00
189/93	Economics of Forest Plantations in Kerala.	KFD(D)	216.00

Project	Title	Funderdby	Expenditure
190/93	Evaluation of newer termiticides including plant products for forest plantation establishment.	KFD(D)	28.00
195/93	Bee-keeping - Use of unconventional timbers for Bee Hives.	STEC	4880.00
203/93	Cambial activity and Juvenial Wood Formation in Teak.	DST	1611.00
204/93	Studies on the fern flora of Kerala with special reference to sylvan valley.	KFD	8170.00
206/93	Mushroom cultivation using forest litter and Wast wood.	STEC	10618.00
211/94	A survey of the reptiles and amphibians in the Kerala part of Nilgiri Biosphere Reserve.	GOI	22309.00
213/94	Palm resources of Kerala and their utilization.	STEC	315.00
214/94	Study on Man Wildlife Interaction in Wynad Wildlife senctuary, Kerala.	DOEF	445.00
215/94	Socio-economic and ecological aspects of developing Bamboo resources in homesteads of Kerala	NRI,UK	2292.00
218/94	Insect Biodiversity in Disturbed and undisturbed forests in the Kerala part of Western Ghats.	WWFN	-6340.00
219/94	Evaluation of methods for estimating the abundance of herbivores in the forest of Kerala.	KFD(WL)	5570.00
220/94	Studies on the Shola forests of Kerala.	KFD(WL)	2756.00
221/94	Studies on the Diversity of selected groups of insects in Parambikulam Wildlife Sanctuary.	KFD(WL)	2055.00
223/94	Soil Microflora of Shola Forests of Eravikulam National Park.	KFD(WL)	3615.00

Project	Title	Funderdby	Expenditure
224/94	Ecological studies on Sloth Bear in Parambikulam Wildlife Sanctuary.	KFD(WL)	70981.00
225/94	Evaluating plant diversity in different forest types of Kerala by laying out permanent sample plots.	WWFN-India	223817.00
230/94	Biodiversity in Tropical Moist Forests: A study of Sustainable use of non-wood Forest products in the Western Ghats, Kerala.	Ford Fund.	-119790.00
236/95	Generation and transfer of Silviculture & Harvesting Technology of selected Medicinal plants for sustained utilization of the Waste lands of Kerala	DWD(RD)-GOI	83033.00
238/95	Fungal pathogens as a potential threat to tropical Acacias - case study of India	CIFOR	18255.00
239/95	Atlas of Teak Soils in Kerala	KFD	14798.00
240/95	Ecology and behaviour of Gaur (Bos gaurus) in Periyar Tiger Reserve, Kerala	KFD(WL)	97550.00
241/95	Ecorestoration of a degradedd Watershed in Attappady.	DWD(RD)-GOI	139.00
242/95	Tissue culture of Rattans (Canes) for Clonal Propagation.	DBT	33959.00
243/95	Genetic diversity and conservation of Rattans.	IPGRI	6541.00
244/95	Biodiversity Conservation potential and Ecosystem Rehabilitation using Traditional knowledge at Chinnar Wildlife Sanctuary.	Mac Arther, UNESCO	310259.00
245/95	Use of baculovirus control agents within an integrated pest management strategy against teak defoliator Hyblaea puera in India	ODA/FCRD	373191.00
246/95	Fire related ecosystem dynamics in the moist-deciduous forests of the Western Ghats.	DOEF	169400.00

Project	Title	Funderdby	Expenditure
247/96	Development of spike-disease resistant sandal	DBT	206874.00
248/96	Protection of rubberwood from insect borers	STEC	2271.00
249/96	Study of Private Sector involvement in forestry research in India	FORSPA	438.00
250/96	Consultancy of productivity of teak and Eucalyptus Plantations	KFD-(Projects-W B)	-282469.00
251/96	Consultancy for monitoring degraded forests	KFD-(Projects-W B)	-194610.00
252/96	Weather data acquisition from selected Wildlife Sanctuaries in Kerala	KFD(WL)	78665.00
253/96	Micro propagation of Important Rare and Endangered Tree Species of Western Ghats	KFD(WL)	202300.00
254/96	Development and dissemination of Low Cost micropropagation techniques for Kaempferia galanga (Kacholam)	STEC	5864.00
255/96	Seed handling and nursery practices for selected forest trees of Kerala	ICFRE	319581.00
256/96	Assessment of field performance of micropropagated teak and eucalypts	ICFRE	45379.00
257/96	Improvement of productivity of pulpwood species.	ICFRE	293822.00
258/96	Evaluation of high input management on growth and timber production in teak	ICFRE	105635.00
259/96	Developing a GIS based management information system for forest plantations - a case study of Trichur Forest Division.	ICFRE	148950.00
260/96	Vegetation Mapping and Analysis of Neyyar Wildlife Sanctuary using Remote Sensing Techniques.	KFD(WL)	302870.00
261/96	Micropropagation of valuable timber species in Bay islands	DBT	464814.00

Project	Title	Funderdby	Expenditure
262/96	Prospects of reed bamboo (<i>Ochlandra travancorica</i>) for soil conservation in degraded sites	STEC	40666.00
263/96	Improvement of productivity of eucalypts through fertilizer inputs and Silvicultural treatments	KFD(D)	145180.00
264/96	Establishment of a pilot scale bamboo stand for edible short production in Kerala	KFD	50789.00
265/96	Ecological and social importance of the Sacred Groves in Kerala	UNESCO, New Delhi	8913.00
266/97	Development of appropriate tools for harvesting reed bamboos	KFD(D)	17204.00
267/97	Elephant Population in Periyar and adjacent areas	AECC	24799.00
268/97	Investigations into heartwood formation in intensively managed teak plantations health in STM teak plantations	STM Madras	96161.00
269/97	Modelling the growth of teak and real-time monitoring of tree health in STM teak plantations.	STM Madras	87342.00
270/97	Assessment of pest problems in intensively managed STEM teak plantations	STM Madras	16033.00
271/97	Ecophysiology of host-parasite relationship in teak	DST, GOI	109860.00
272/97	Survey and Estimation of Bamboo Resources of Kerala	KFD(W&R)	385444.00
273/97	Lichen (Macrolichen) Flora of Kerala part of Western Ghats	ICFRE	129009.00
274/97	Conservation and Genetic Improvement of Reed Bamboo (<i>Ochlandra</i> species)	ICFRE	231701.00
275/97	Damping-off in Forest Nurseries in Kerala	ICFRE	121090.00
276/97	Studies on the Biodiversity of New Amarambalam Reserved Forests of Nilgiri Biosphere Reserve	MEF-GOI	319690.00

Project	Title	Funderby	Expenditure
277/97	Carrying capacity based developmental planning for Greater Kochi Region (KFRI Component of a collaborative project)	MEF-GOI	528019.00
278/97	Germplasm collection and growth studies of selected bamboo species suitable for the region (Western Ghats)	ICFRE	304809.00
279/97	Development of Technology for collection, processing and testing seeds of five important tree species of Kerala	ICFRE	282290.00
280/97	Establishment of a semi-permanent Field Clonal Propagation Unit for Eucalyptus	ICFRE	77078.00
281/97	Improving and maintaining productivity of Eucalypt plantations in India and Australia	ACIAR, Australia	3818393.00
282/97	Testing and developing Criteria and Indicators for Sustainable Management of Tropical Plantation Forests in India	CIFOR	331951.00
283/97	Integrated management of the alien invasive weed <i>Mikania micrantha</i> in the Western Ghats	DID, U.K.	332986.00
284/97	Employment, Ec. and Intellectual ^{land use and} intercultural ecoscope	ICSSR	185626.00
285/98	Forest Atlas of Kerala	KFD(D)	339034.00
286/98	Introducing mechanical slivering technique in traditional reed ind. Tech. study	KFD(D)	72260.00
287/98	Maint. of the permanent plots to demo. the effect of protective teak plantation	KFD(D)	97747.00
288/98	Termite control in clonally propagated root trainer raised planting stock	KFD(D)	33096.00
289/98	Maint. of seed stands and species trial plots of rattans	KFD(D)	153200.00

Project	Title	Funderdby	Expenditure
290/98	Studies on clonal prop. of plus trees of teak for iden. sup. plant. programe	KFD(D)	353189.00
291/98	Maint. and growth obs. in multiloc. provenance trail plots of Eucalypts	KFD(D)	130870.00
292/98	Pollination Ecology of teak in Kerala	KFD(D)	61552.00
293/98	Revisionary studies on four genera of Indian Bamboos	Dept.of Science & Tec.	86354.00
294/98	Conservation of Invertebrates through captive breeding	Ministry of Envi &Fore	43800.00
295/98	Raising planting stock of eucalyptus clones for the Kerala Forest Department	KFD(D)	102423.00
296/98	Fungal pathogens as a potential threat to tropical acacias - phase 2	CIFOR-Indonesia	400.00
297/98	Insect fauna of the shola forests of Munnar and Wayanad	KFD(D)	102670.00
298/98	Inventory of macro - invertebrate fauna of the shola forests of Kerala	KFD(D)	45782.00
299/98	Generation of basic data on variability of rubber wood in Kerala and formulation of grading rules	STEC	4576.00
300/98	Preparation of Biodivesity Reg.- A model study in Pananchery panchayath in Thrissur dist., Kerala	STEC	109789.00
301/98	Floristic studies in Parambikulam in Wildlife sanctuary.	KFD(WL)	81923.00
302/98	Survey on the Commercial Exploitation of Medicinal Plants in the Drug Industry of Northern Kerala.	KFD(WL)	19878.00
303/98	Ecology of wetland birds in the Kole lands of Kerala.	KFD(WL)	77807.00

Project	Title	Funderdby	Expenditure
304/98	Documentation of Invertebrate fauna in Mangalavanam mangrove area.	KFD(SF)	67288.00
305/98	Transfer of Some Wood processing Technologies Developed by ICFRE to Wood using Industries in Kerala.	ICFRE-DEHRADUN	183062.00
306/98	Mass Multiplication of selected Bamboos by Macro Propagation	ICFRE-DEHRADUN	58341.00
307/98	Diagnosis of micronutrient deficiencies in Teak seedlings	KFD(D)	21011.00
308/98	Teak defoliator management by controlling epicentrepopulations - case study	KFD(D)	37902.00
309/98	Anatomical changes associated with culm maturation in Bambusa bambos and Dendroclamus strictus	KFD(D)	40356.00
310/98	Mycorrhizas in Forest Plantations - Association, Diversity and Exploitation in Planting Stock Improvement	KFD(D)	38304.00
311/98	Studies on Disturbed Shola Forests for Evolving Strategies for the Conservation and Management	KFD(Shola Forests)	82250.00
312/98	Role of Shola Forests in maintaining water courses in the High Range of the Western Ghats of Kerala	KFD(Shola Forests)	43575.00
313/98	Evaluation of the population, regeneration and invasion status of selected tree endemics in the Shola Forests of Kerala	KFD(Shola Forests)	87837.00
314/99	Biodiversity mapping of Sholar forest through remote sensing and GIS techniques	KFD(Shola Forests)	42768.00
315/99	Microbial diversity in the grassland shola forest of Wayanad & Munnar	KFD(Shola Forests)	42870.00
316/99	Biodiversity documentation for Kerala	KBC	500000.00

Project	Title	Funderdby	Expenditure
317/99	A study of wood boring beetles in the Kerala part of Nilgiri Biosphere Reserve	Dep. of Envi., Delhi	26310.00
318/99	Rehabilitation of dgraded forests through landscape level participatory action programme.	KFD & KFRI, 7&1/2 LAKHS	41080.00
319/99	Genetic Improvement of Teak.	KFD(D)	60965.00
320/99	Testing an Alternative Thinning Schedule for Teak Plantations based on a simulation model.	KFD(D)	16200.00
321/99	Management of Soils of Teak Plantation for sustainable productivity.	KFD(D)	20000.00
322/99	Screening of Sandal provenances for Spike disease resistance using molecular markers.	KFD(D)	14490.00
323/99	Studies on Forest seeds of Kerala.	KFD(D)	35000.00
324/99	Investigation on Non-wood Forest Produce Plants of Kerala.	KFD(D)	35000.00
325/99	Studies on Composting.	KFD(D)	25000.00
326/99	Studies on Root Trainer Technology for raising seedlings of forest tree species.	KFD(D)	25000.00
327/99	Developing a field identification key for rattans of Kerala.	KFD(D)	36400.00
B.I.C.	Compendium on Bamboos of India	IDRC	-1827.00
Bamboo Awareness			5000.00
Brochure on Elephant			230.00
C.S.I.R.		C.S.I.R.	274500.00
Cons 09/95	<i>Fellowships</i> Vegetation mapping of Pamba river basin	CEDT	-3007.00
Cons 10/96	Minimising the deterioration of outdoor stored pulpwood	HNL-KTM	10407.00

Project	Title	Funderdby	Expenditure
Cons 13/96	Establishment of Interpretation centre at Parambikulam and Wayanad Wildlife Sanctuaries	KFD(WL)	277500.00
Cons 15/97	Insect pests and disease problems in intensively managed teak plantations in STM	STM Madras	55892.00
Cons 16/97	Status and distribution of Masheer in selected streams and reservoirs in Kerala.	IRFDP, KERALA	97612.00
Cons 18/97	Data sheet on Teak (<i>Tectona grandis</i>) for the CABI Electronic Compendium Project.	CAB International, UK	-2627.00
Cons 19/97	Wildlife Census Kerala - 1997	KFD(WL)	57681.00
Cons 20/97	Mahout Training Programme	IDRC	14532.00
Cons 21/97	Production and supply of propagules of ten bamboo species.	KFD(D)	27418.00
Cons 22/97	Data Sheet on <i>atanthes trathyr</i> s , for the CABI Electronic Comp. projrct	CAB International, UK	146077.00
Cons 23/98	Publishing a comprehensive volume on Silient Valley National Park	KFD(WL)	587224.00
Cons 24/98	Training in Teak defoliator manngement to two TNAU Scientists.	IHRD Tamilnadu Uni.	59240.00
Cons 25/98	Printing of brochures on Protected Areas of Kerala.	KFD(WL)	41886.00
Cons 26/98	Environmental Impact Assessment of Thenmala Ecotourism Project.	KTDC	900000.00
Cons 27/98	Statistical Analysis of data on fertilizer trail in eucalyptus <i>tereticornis</i> .	KFD	10200.00
Cons 28/98	Plantation Corporation of Kerala, Kottayam	Plantati. Co., Kottayam	14236.00
Cons 29/98	Mass scale production of seedlings of selected important rattans	KFD	30418.00
Cons 30/98	Establishment of a new seismological observatory in the shield area-at Peechi	DST, Govt. of India.	143474.00

Project	Title	Funderdby	Expenditure
Cons 31/98	Analysis of Power Transmission net work data of Kallyasserri Panchayat	IRTC-Palghat	21000.00
Cons 32/98	Study visit of forestry professionals from Costa Rica on teak management.	E Ecos, S.A, Costa Ric	3193.00
Cons 33/98	Training Programme in Plantation Forestry for the Field Assistants of the Plant.corp.of Kerala Ltd Kottayam	PCK-KOTTAYAM	24003.00
Cons 35/98	Preparation of a model action plan for DU-10 in Attappady	AHADS,AGALI	8210.00
Cons 39/99	Biodiversty Education	STEC	30.00
Cons 40/99	Training Programme on Plantation Forestry practices and Forest Operations for Field staff of Hindustan news print Ltd, Vellur.	HNL - Vellur	7725.00
			1721844.00
OTHERS			73342.00
TEAK MUSIUM DEV.			166541.00
TEAK SYMPOSIAM PRO.			19099.00
TRADA			83955.00
WORLD BANK-NETWORK			19251260.00
*** Total ***			

APPENDIX - 2

LIST OF STAFF AS ON 31-3-1998

DIRECTOR : Dr. K.S.S. Nair

ADMINISTRATION DIVISION

REGISTRAR : Shri P. Aravindakshan

Administration Unit

1.	Shri K.K. Bhagianadh	Dy. Registrar (Admn)
2.	Shri P. Achuthankutty	PS to Director
3.	Smt. K.N. Rajamma	Superintendent
4.	Shri M.K. Aravindakshan	"
5.	" T.J. Alfred Headisjis	PA to Registrar
6.	Smt. K. Annapoorni	Stenographer
7.	Shri E.V. Eshac	Office Assistant
8.	Smt. Mary Kuruvila	Receptionist
9.	" M. Cherukunhan Nair	Typist
10.	" K.S. Karunakaran	Clerical Assistant
11.	" T. Chandran	Driver
12.	" K. Dhorairaj	"
13.	" V.D. Johny	" (on leave)
14.	" Kurien Mathew	Attender
15.	" M.C. Mohandas	"
16.	" P.V. Subramanian,	"
17.	" K.R. Sevaraman	"
18.	" P.A. Sankarankutty	"
19.	" V.N. Balakrishnan	Watcher
20.	" K. Said Mohammed	"
21.	" K. Nanu	Field Worker
22.	" V.K. Mohandas	"
23.	" P.K. Thankamani	"
24.	" A.K. Ammini	"
25.	" K.C. Mary	"
26.	" E.V. Thanka	"
27.	" K.V. Bharathy	"

Accounts Unit

28. Smt. V.K. Leela
 29. Shri K.K. Thomas
 30. " V.K. Mohanan
 31. Smt. K.M. Suseela
 32. " M. Kamamma
 33. Shri K.A. Gopalan
 34. " B.P. Sreedharan

Superintendent
 Office Assistant
 "
 "
 "
 "
 Attender

Engineering Unit

35. Shri K.R. Mukundan
 36. " P.P. Sunny
 37. " U.Y. John
 38. Smt. T.V. Chandrika
 39. Shri D. Skariah
 40. " K.C. Subramanian
 41. " K.M. Velayudhan
 42. " P.B. Sajeeva Rao
 43. " M.R. Anilkumar
 44. " K.K. Ahammed

Engineer
 Overseer
 Overseer
 Typist
 Pump Operator
 "
 "
 "
 "
 Attender

Nilambur Sub Centre

45. Shri N.C. Induchoodan
 46. " T.V. Sajeev
 47. " K. Rajendran
 48. " K.P. Manoj
 49. " K. Mohanan
 50. " V. Mohammed Ali
 51. Smt. A.V. Thankam
 52. Shri P. Mohammed
 53. " C.P. Shoukathali
 54. " E.T. Narayanan
 55. " K. Muhammed
 56. " K.K. Mohammed
 57. " T.P. Padmanabhan

Scientist-in-Charge
 Scientist
 Office Assistant
 Typist
 Ticket Vendor
 Field Worker
 "
 "
 "
 "
 "
 "
 "
 Cook

Field Research Centre, Palappilly

58. Shri K.K. Unni
 59. " E.P. Ulahannan
 60. " C.J. John

Field Assistant
 Field Worker
 Field Worker

RESEARCH DIVISIONSResearch Monitoring and Evaluation Unit

61. Dr. J.K. Sharma
 62. Shri A.R. Rajan
 63. " M.S. Sukumaran
 64. " V. Asokan
 65. " A. Ramakrishnan
 66. " K. Chandran

Research Coordinator
 Programmer
 Superintendent
 Faircopy Superintendent
 PA to Research Coordinator
 Project Attendant

Agroforestry

67. Dr. S. Sankar
 68. Dr. U.M. Chandrashekara
 69. Shri K.V. Mohammed Kunhi
 70. " V.P. Ravindran
 71. " T.M. Abdul Vahab

Scientist-in-Charge
 Scientist
 Scientist
 Field Assistant
 Word Processing Asst.

Botany

72. Dr. K.K. Narayanan Nair
 73. Dr. C. Renuka
 74. Dr. M.S. Mukteshkumar
 75. Dr. K. Yesodaran
 76. Shri K. Vijayan
 77. " A.C. Antony

Scientist-in-Charge
 Scientist
 "
 Scientist
 Driver
 Attender

Ecology

78. Dr. K. Balasubramanian
 79. Dr. K. Swarupanandan
 80. Dr. A.R. Ramachandra Menon
 81. Smt. Grace Andrews
 82. Shri M.A. Sankarankutty

Scientist-in-Charge
 Scientist (on leave)
 "
 Stenographer
 Attender

Economics

83. Dr. P.K. Muraleedharan
 84. Shri Mammen Chundamanni
 85. Dr. V. Anitha
 86. " S. Shahul Hameed

Scientist-in-Charge
 Scientist
 "
 Driver

Entomology

87. Dr. R.V. Varma
 88. Dr. George Mathew
 89. Dr. V.V. Sudheendrakumar
 90. Shri K. Mohanadas
 91. " P. Mohandas
 92. " K.C. Subramanian

Scientist-in-Charge
 Scientist
 "
 "
 Driver
 Attender

Genetics

93. Smt. E.P. Indira
 94. Dr. E.M. Muralidharan
 95. Shri E.O. James Tidode
 96. " A.S. Sreenivasan

Scientist-in-Charge
 Scientist
 Typist
 Attender

Non-wood Forest Products

97. Dr. N. Sasidharan
 98. Shri C.K. Vincent
 99. Smt. A.M. Lalitha
 100. " T.G. Chandrika
 101. Shri N.I. Thankappan

Scientist-in-Charge
 Gardener
 Field Worker
 "
 "

Pathology

102. Dr. M. Balasundaran
 103. Dr. C. Mohanan
 104. Dr. K.V. Sankaran
 105. Smt. E.J. Maria Florence
 106. Smt. D. Sumangalamma
 107. Shri A.V. Velayudhan
 108. Smt. T.S. Chandrika

Scientist-in-Charge
 Scientist
 "
 "

Stenographer
 Attender
 Field Worker

Physiology

109. Dr. Jose Kallarackal
 110. Dr. K.K. Seethalakshmi
 111. Shri T. Surendran
 112. " C.K. Somen
 113. " P.I. Madhavan
 114. " M.B. Dasan
 115. " M.K. Sivaraman

Scientist-in-Charge
 Scientist
 "
 "

Scientist
 Driver
 Attender
 Field Worker

Silviculture

116. Shri K.C. Chacko
 117. Dr. R. Chandrasekhara Pandalai
 118. Shri U.N. Nandakumar
 119. " P.K. Chandrasekhara Pillai
 120. " T.C. Paul
 121. " K.R. George

Silviculturist-in-Charge
 Silviculturist
 "
 "

Field Assistant
 Driver
 Attender

Soil Science

122. Dr. M. Balagopalan
 123. Shri Thomas P. Thomas
 124. Smt. M.P. Sujatha
 125. Shri S. Kumaraswamy
 126. " V.M. Ammini
 127. " K.K. Ramesh
 128. " P.M. Vasu

Scientist-in-Charge
 Scientist
 "
 "
 Typist
 Field Assistant
 Attender

Statistics

129. Dr. K. Jayaraman
 130. Smt. P. Rugmini
 131. Shri C.N. Krishnankutty
 132. Shri Sivaram
 133. " K. Girijavallabhan
 134. " P.S. Raman

Scientist-in-Charge
 Scientist
 "
 "
 Driver
 Attender

Wildlife

135. Dr. P.S. Easa
 136. Dr. K.K. Ramachandran
 137. Dr. P. Vijayakumaran Nair
 138. Shri E.A. Jayson
 139. " P. Padmanabhan
 140. " E.T. Kuttikrishnan

Scientist-in-Charge
 Scientist
 "
 "
 Scientist
 Attender

Wood Science

141. Dr. R. Gnanaharan
 142. Dr. K. Mahabala Bhat
 143. Dr. K.V. Bhat
 144. Shri T.K. Dhamodaran
 145. " P.K. Thulasidas
 146. " V.C. Chandran
 147. " V.S. Neelakantan

Scientist-in-Charge
 Scientist
 "
 "
 Laboratory Asst.
 Driver
 Attender

Library

148. Shri K. Sankara Pillai
 149. Smt. N. Sarojam
 150. Shri Subash Kuriakose
 151. Shri K.H. Hussain
 152. " K.F. George
 153. " P.M. Venugopalan
 154. " C.A. Jose
 155. " T. Prabhakaran
 156. " M.C. Reghunathan
 157. " K.V. Sidharthan
 158. Smt. N. Baby

Librarian
 Asst. Librarian
 Artist Photographer
 Documentation Officer
 Library Assistant
 Typist
 Binder
 Clerical Assistant
 Attender
 "
 "

Shri PR Jose, Sergeant retired on 31.10.1998

LIST OF GOVERNING BODY MEMBERS OF
KERALA FOREST RESEARCH INSTITUTE

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| 2. Dr. M.R. Das
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Thiruvananthapuram | .. Vice Chairman |
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Secretariat, Thiruvananthapuram | |
| 4. The Principal Secretary
Finance Department
Secretariat, Thiruvananthapuram | |
| 5. Smt. Lizzie Jacob, IAS
Principal Secretary to Government of Kerala
Forest & Wildlife Department
Secretariat, Thiruvananthapuram | |
| 6. Shri K. Sasidharan Nair, IFS
Principal Chief Conservator of Forests (G)
Thiruvananthapuram | |
| 7. Dr. K.N. Shyamasundaran Nair
Vice-Chancellor
Kerala Agricultural University
Vellanikkara, Thrissur Dist. | |

8. The Inspector General of Forests
Ministry of Environment & Forests
New Delhi

9. Prof. P.S. Ramakrishnan
Professor of Ecology
School of Environmental Sciences
Jawaharlal Nehru University
New Delhi

10. Dr. P. Pushpangadan
Director
Tropical Botanical Gardens & Research Institute
Trivandrum

11. Shri K. Subramaniam, IFS
Director
Institute of Forest Genetics & Tree Breeding
Coimbatore

12. Shri K. Radhakrishnan
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National Remote Sensing Agency
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13. Shri Raji Philip
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Hindustan Newsprint Ltd.
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14. Dr. K.S.S. Nair
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1. Dr. M.R. Das .. Chairman
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2. Smt. Lizzie Jacob, IAS
Principal Secretary to Government of Kerala
Forest & Wildlife Department
Secretariat, Thiruvananthapuram
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