

Kerala Forest Research Institute

**ANNUAL REPORT
1996-'97**

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

1. INTRODUCTION

The Kerala Forest Research Institute (KFRI) was established on 3rd July 1975 under the Travancore-Cochin Literary, Scientific and Charitable Societies Act 1955 with the main objective of undertaking research in all aspects of forestry, wildlife management and wood science & technology. The Institute is situated at Peechi, 19 km east of Thrissur Town. The main campus extends over an area of 28 ha which forms part of the reserve forest in the Peechi Forest Range. The Institute has a sub centre at Nilambur in North Kerala over an area of 43 ha and a Field Research Centre at Velupadam in Central Kerala in an area of 38 ha of land.

The control, administration and management of the Institute are vested with the Governing Body appointed by the Government of Kerala. The Director, appointed by the Government, is the Head of the Institute. The Institute is organized into structural units called Divisions. There are 14 Research Divisions, a Library and an Administration Division including an Administrative Unit, Finance Unit, Engineering Unit and Research Monitoring and Evaluation Unit. The Research Divisions are Agroforestry, Botany, Ecology, Economics, Entomology, Genetics, Non-wood Forest Products, Pathology, Physiology, Silviculture, Soil Science, Statistics, Wildlife and Wood Science.

During the year, Dr. K.S.S. Nair held the post of Director. List of staff as on 31.3.1997 is given in Appendix 1. Appendix 2 and 3 lists the members of the Governing Body and Executive Committee.

2. FINANCE

During the year, the Institute received a grant-in-aid of Rs.131 lakhs (Rs.21 lakhs under non-Plan and Rs.110 lakhs under Plan) from the State Government and Rs.5 lakhs as contribution from the Forest Department. The Institute generated an internal revenue of Rs.7.88 lakhs and Rs.14.19 lakhs was realized through project overheads and consultancies. Thus the total receipt was Rs.158.07 lakhs.

The total expenditure was Rs.159.08 lakhs, causing a deficit of Rs.1.01 lakhs during the year. With the accumulated deficit of previous year, the total deficit at the end of the financial year 1996-97 was Rs.38.73 lakhs.

A Financial statement for the year 1996-'97 (to be audited) is given in Appendix 4.

3. RESEARCH HIGHLIGHTS

During the year special emphasis was placed on review of the progress of the ongoing projects and publication of the final reports of completed projects. To facilitate this a Research Monitoring and Evaluation Unit was formed and Dr. J.K. Sharma, Scientist-in-Charge, Pathology Division nominated as Research Coordinator.

During the year final reports of 18 research projects were brought out. There were 77 ongoing research projects and 17 new projects were initiated. Research support was received from Kerala Forest Department, State Committee on Science, Technology and Environment (STEC), State Planning Board (WGDP), Indian Council of Forestry Research and Education (ICFRE), Department of Biotechnology (DBT), Department of Science and Technology (GOI), Department of Environment & Forests (GOI), World Wildlife Fund (WWF), International Plant Genetic Resources Institute (IPGRI), Overseas Development Agency (ODA), UK and UNESCO. The total research grants received from external sources during the year amounted to Rs.148 lakhs. Brief highlights of some of the research projects completed during the year are given below

Productivity of teak and eucalypts in Kerala

Based on a sample survey of 74,000 ha of teak and 33,000 ha of eucalypt plantations in Kerala the current levels of productivity of then plantations were estimated. The mean annual increment (MAI) of teak was found to be $3.1 \text{ m}^3 \text{ ha}^{-1}$ at 60 years against the potential of $8.4 \text{ m}^3 \text{ ha}^{-1}$ for all India Site Quantity I. For seedling crop of Eucalyptus it was $7.7 \text{ m}^3 \text{ ha}^{-1}$ at 8 years against a potential All-India yield of $18 \text{ m}^3 \text{ ha}^{-1}$. The reasons for these low levels of productivity were analysed and recommendations were made. This study was funded by the Kerala Forest Department through World Bank support.

Mapping the degraded forests of Kerala

A study based on interpretation of remote sensed data, supported with field verifications showed that about 62% of the natural forests of Kerala are degraded. Of the various forest types, moist deciduous forests were the most degraded (78%). In addition to crown density parameters such as status of regeneration and weed invasion were used to identify degraded forests and a method for assessing regeneration of natural forests subjected to afforestation was worked out.

Wildlife Census 1977

KFRI and Kerala Forest Department joined together to estimate the wildlife population of Kerala with the active participation of the public. KFRI provided training to the resource persons, prepared the proforma for the census procured necessary equipments and materials, demarcated and selected the blocks and analysed the data. The report is under finalisation in discussion with senior officials of Forest Department.

Expert System for designing experiments in forestry

An expert system was developed for designing experiments in forestry. The knowledge base was incorporated into the expert system shell GENEX developed by ER & DC to generate a product named as DESIGNEX. This software can identify appropriate experimental designs based on the user-given information about the experimental context. The software will be useful for designing field experiments in forestry.

Handbook on rare and endangered mammals of Kerala

The available information on the status and distribution of seventeen rare and endangered wild mammals in the forests of Kerala has been compiled in a Handbook.

Endemic flora of Shenduruny Wildlife Sanctuary

The Flora of Shenduruny Wildlife Sanctuary was studied and shown to comprise 951 taxa (species and infraspecies) belonging to 118 families. Among these 309 spp. are Western Ghat endemics, and 100 belong to various threat categories including 10 considered as possibly extinct. Two new species viz. *Polyalthia shendurunii* Basha & Sasi. and *Ardisia stonei* Sasi. & Sivar. were described. Several species categorised as possibly extinct collected for the first time after their type collections.

Private sector involvement in forestry research in India

A study on private sector forestry research in India, supported by FAO/ research support programme for Asia and the Pacific (FORSPA) has brought out many interesting aspects. It was shown that the impact of private sector in forestry research in India is not significant in quantitative terms. The contributions of a few are outstanding although that of many is of little significance. At present, only a narrow spectrum of forestry research needs are addressed by the private sector. Factors contributing to the success of private sector organisations were identified and their dependence on public sector organisations and Universities for basic research was recognized..

4. HIGHLIGHTS OF OTHER ACTIVITIES

Training imparted

Ms. Win Win Myint, Head of the Plant Protection Division of the Myanmar Forest Research Institute, was given a 1-month, On-the-job Training at Kerala Forest Research Institute in Forest Entomology with the support of FAO Forestry Research Support Programme for Asia and the Pacific (FORSPA).

A 1-week Training Programme on Teak Cultivation and Management was organised for the benefit of 20 farmers from 27 June to 3 July 1996. The programme was inaugurated by Shri P.R. Kurup, Hon'ble Minister for Forests.

Workshops

Two training workshops were conducted in October 1996 for the benefit of Forest Department. The first one on 'Mass clonal propagation of Eucalyptus' was held from 25th to 26th and the second one on 'Root trainer technology and composting technology' was held from 27th to 29th. Each of these workshops supported by the Pre-Project Funding of the Kerala Forestry Project was attended by 25 to 35 officials and field staff of the Kerala Forest Department and was intended to disseminate newer technologies for adoption by the Department for improving plantation productivity. In addition to the Resource Persons from the Institute, external resource persons who have done pioneering work in these fields were invited. They included Dr. J.P. Chandra of WIMCO Seedlings Ltd.; Dr. S.D. Kulkarni of ITC Bhadrachalam; Dr. Kalyan Chakraborti of West Bengal Forest Department; Mr. Khelkar of Maharashtra Forest Development Corporation; Mr. Badve of BAIF Foundation, Pune, and Dr. K. Gurumurthy of IFGTB, Coimbatore.

A 1-day Wood-based Industries Interaction Meeting was held at the Institute on 26 February 1997 in which representatives of the wood-based industries, Government Departments of Industries, Housing, PWD and others as well as officials of Kerala Forest Department participated. The meeting was organized jointly with the Forest Department and was highly successful in facilitating interaction and analysis of the problems faced by the wood-based industries.

Wildlife Census

KFRI played a key role in planning, organising and conducting Wildlife Census 1997 for Kerala in collaboration with the Forest Department.

Publications

In collaboration with the FAO Forestry Research Support Programme for the Asia Pacific (FORSPA) KFRI published a book entitled Impact of Diseases and Insect Pests in Tropical Forests containing papers presented in a Symposium held at the Institute in November 1993.

Together with TBGRI, KFRI organized and edited a compendium on Biodiversity and Tropical Forests, published by STEC on the occasion of the 9th Kerala Science Congress.

Regular issues of the KFRI newsletter, Evergreen and an updated edition of the KFRI Information Bulletin on termite control in eucalypt plantations were also published.

A brochure entitled 'Two decades of research support to Kerala Forest Department' was also brought out recently (copy attached).

Research Advisory Committee Meeting

A Research Advisory Committee meeting of the Institute was held on 28 June 1996.

KFRI-KFD Interaction Meeting

A KFRI-KFD interaction meeting was held at KFRI on 6 August, 1997. The meeting was chaired by Sri K. Mohanachandran, IAS, Principal Secretary, Forest and Wildlife Department, Government of Kerala. Dr. A.D. Damodaran, Secretary, Science, Technology and Environment Department, and Chairman, Executive Committee, KFRI, also addressed the meeting and participated in the discussion. The meeting was attended by senior officials of the Forest Department and KFRI scientists. All members of the Executive Committee of KFRI also participated. Brief presentations were made on problem solving research relevant to KFD carried out by KFRI and matters of mutual interest were discussed and research and extension priorities were worked out.

5. RESEARCH PROJECTS

5.1 RESEARCH PROJECTS COMPLETED

During the year under report, 18 Research Projects were completed as shown below and Final Reports were published or submitted to the sponsoring agencies.

- KFRI 140/92 - Management of teak defoliator using nuclear polyhedrosis virus (NPV)
Investigators : K.S.S. Nair, M.I. Mohamed Ali,
V.V. Sudheendrakumar, R.V. Varma
and K. Mohanadas
(Report submitted to sponsor - DBT)
- KFRI 148/92 - Water relations and photosynthesis of Oil Palms in penninsular India
Investigator : Jos Kallarackal

KFRI Research Report No.110
- KFRI 149/92 - Use of Micorrhizal and Nitrogen Fixing Symbionts in Reforestation of degraded Acid Soil in Kerala
Investigators : J.K.Sharma, K.V. Sankaran,
M. Balasundaran.

KFRI Research Report No.112
- KFRI 155/92 - Habitat Utilization by Larger Mammals in Chinnar Wildlife Sanctuary
Investigators : E.A. Jayson, K.K. Ramachandran.

KFRI Research Report No.109
- KFRI 157/92 - Status, Food and Feeding habits of Larger Mammals in Chimmony Wildlife Sanctuary
Investigators : E.A. Jayson, P.S. Easa.

KFRI Research Report No.108

- KFRI 164/92 - Vegetation mapping and analysis of Chimmony Wildlife Sanctuary using remote sensing techniques
Investigator : Dr. A.R.R. Menon

KFRI Research Report No. 120.
- KFRI 186/93 - Studies on the growth and prevention of sapstain fungi in rubberwood and its effect on strength properties.
Investigators : E.J.Maria Florence, R. Gnanaharan.
J.K. Sharma.

KFRI Research Report No.114
- KFRI 188/93 - Expert system for designing experiments in forestry
Investigators : P. Rugmini and K. Jayaraman

KFRI Research Report No. 118
- KFRI 191/93 - Statistical analysis package for Forest Mensuration
Investigator : K. Jayaraman

KFRI Research Report No.117
- KFRI 196/93 - Management of the barkfeeding caterpillar *Indarbela quadrinotata* in Albizia Plantations.
Investigator : George Mathew

KFRI Research Report No. 122
- KFRI 198/93 - Preparation of an illustrated manual of the commercial non-wood forest produce plants of Kerala.
Investigator : K.K.N. Nair

KFRI Research Report No.115
- KFRI 200/93 - Fungicidal management of quick wilt of pepper in forest plantations
Investigators: M.I. Mohamed Ali, M. Balasundaran,
K. Yesodharan.

KFRI Research Report No. 111
- KFRI 202/93 - Micropropagation of teak, rosewood and sandal
Investigator : E.M. Muraleedharan

KFRI Research Report No. 119
- KFRI 213/94 - Palm resources of Kerala and their utilization.
Investigators : C. Renuka, K.V.Bhat.

KFRI Research Report No.116

- KFRI 229/93 - Micropropagation of selected medicinal plants
Investigator : E.M. Muraleedharan
- KFRI Research Report No. 123
- KFRI 238/95 - Fungal pathogens as a potential threat to tropical
Acacias - case study of India
Investigators : J.K.Sharma, E.J. Maria Florence.
- KFRI Research Report No.113
- KFRI 249/96 - Private Sector involvement in forestry research in
India.
Investigators : K.S.S. Nair, M. Chundamannil, K.C.Chacko
Consultants : P.M. Ganapathy, S.C. Iyer
- KFRI Research Report No. 121.
- KFRI FELLOW 01/91 - Ecological studies on *Bambusa arundinacea*(Retz.)
willd. growing in teak plantations of Kerala,India.
Investigator : U.M. Chandrashekara,
- KFRI Research Report No.107

5.2 ONGOING RESEARCH PROJECTS

During the year under report, 77 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 and T. Surendran
- KFRI 143/92 - Enhancement of productivity in *E. grandis* through
fertiliser inputs and other cost effective treatments
Investigators : M. Balagopalan and P. Rugmini
- KFRI 147/92 - Structural dynamics of teak stands in Kerala
Investigator : K. Jayaraman
- KFRI 151/92 - Soil nutrient management for teak plantations in
Kerala
Investigators : M. Balagopalan and P. Rugmini
- KFRI 158/92 - Green belt development at Cochin Refineries Ltd.
Investigator : K.C. Chacko

- KFRI 175/93 - Tracing epicentres of teak defoliator outbreak in Kerala
Investigators : K.S.S. Nair, K. Mohanadas, V.V. Sudheendrakumar, R.V. Varma and Santhosh K. John
- KFRI 176/93 - Evaluation of parasitoids for biological control of teak defoliators
Investigators: V.V. Sudheendrakumar, R.V. Varma, K. Mohanadas and K.S.S. Nair
- 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 and Santhosh K. John
- KFRI 190/93 - Evaluation of newer termiticides including plant products for plantation establishment
Investigators : R.V. Varma and K.S.S. Nair
- 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 208/94 - Water relations and rooting depth of selected eucalypt species
Investigators : Jose Kallarackal and C.K. Somen
- 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 and 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 and E.M.Muralidharan
- KFRI 239/95 - Atlas of teak soils in Kerala
Investigators : M. Balagopalan and S. Sankar

- KFRI 242/95 - Tissue culture of rattans (canes) for clonal propagation
Investigators : E.M. Muralidharan and 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 and K. Mohanandas
- KFRI 247/96 - Development of spike disease resistant sandal seedlings through biotechnology involving ELISA technique and tissue culture
Investigators: M. Balasundaran and
E.M. Muralidharan

Natural Forests

- KFRI 146/92 - Macrofungus flora of Peechi-Vazhani Wildlife Sanctuary
Investigators : E.J.M., Florence and K. Yesodharan
- KFRI 163/92 - Studies on the flora of Shendurney Wildlife Sanctuary with emphasis on endemic species
Investigator : N. Sasidharan
- KFRI 165/92 - Vegetation mapping of Peppara Wildlife Sanctuary
Principal Investigator : A.R.R. Menon
- 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 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 and M. Balagopalan
- 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 179/93 - Studies on the flora of Periyar Tiger Reserve
Investigator : N. Sasidharan

- KFRI 184/93 - Studies on the epiphytic flora of the tropical forest ecosystem of Western Ghats with special reference to Nilgiri biosphere reserve
Investigator : M.S. Mukteshkumar
- KFRI 204/93 - Studies on the fern flora of Kerala with special reference to Sylvan Valley, Munnar
Investigator : M.S. Muktesh Kumar
- KFRI 217/94 - Effect of fire on forest soil and vegetation
Principal Investigator : Director
Investigators: K. Swarupanandan, T. Surendran,
K.V. Sankaran and Thomas P. Thomas
- KFRI 218/94 - Insect biodiversity in disturbed and undisturbed forests in the Kerala part of Western Ghats
Investigator : George Mathew
- KFRI 220/94 - Studies on the Shola Forests of Kerala
Principal Investigator : Director
Investigators: K. Swarupanandan, N. Sasidharan,
U.N. Nandakumar and K.C. Chacko
- KFRI 221/94 - Studies on the diversity of selected group of insects in the Parambikulam Wildlife Sanctuary
Investigators : V.V. Sudheendrakumar and
George Mathew
- KFRI 223/94 - Soil microflora of shola forests of Eravikulam National Park
Investigators : K.V. Sankaran and M. Balasundaran
- KFRI 225/94 - Evaluating plant diversity in different forest types of Kerala by laying out permanent sample plots
Principal Investigator : K. Balasubramanyan
Investigator : K.K.N. Nair
- KFRI 234/94 - Preparation of an exhaustive flora of Kerala Forest Research Institute campuses at Peechi, Velupadam and Nilambur
Investigator : K.K.N. Nair
- 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 243/95 - Genetic diversity and conservation of rattans
Investigators : C. Renuka, E.M. Muralidharan
and E.P. Indira

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 and Thomas P. Thomas

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 and James Zacharias

KFRI 154/92 - Status, food and feeding habits of larger mammals in Idukki Wildlife Sanctuary
Investigator : P.S. Easa

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

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

KFRI 161/92 - Studies on man-wildlife conflicts in Peppara Wildlife Sanctuary and adjacent areas
Investigator : E.A. Jayson

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 211/93 - A survey of reptiles and amphibians in Kerala part of Nilgiri Biosphere Reserve
Investigator : P.S. Easa
- KFRI 214/94 - Study on man-wildlife interaction in Wayanad Wildlife Sanctuary, Kerala
Investigators : P.S. Easa and S. Sankar
- KFRI 219/94 - Evaluation of methods for estimating the abundance of herbivores in the forest of Kerala
Investigators : K. Jayaraman, P.S. Easa and E.A. Jayson
- KFRI 222/94 - Studies on the flora of Chinnar Wildlife Sanctuary
Investigators : N. Sasidharan and 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

Wood Science & Technology

- KFRI 182/93 - Effects of faster growth on quality of teak
Investigators : K.M. Bhat and E.P. Indira
- KFRI 195/93 - Bee keeping - Use of unconventional timbers for hives
Investigator : R.V. Varma
- KFRI 203/93 - Cambial activity and juvenile wood formation in teak
Investigator : K.M. Bhat
- KFRI 248/96 - Protection of rubber wood from insect borers
Investigators : George Mathew and R. Gnanaharan

General & Environmental Studies

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

- KFRI 206/93 - Mushroom cultivation using forest litter and waste wood
Investigators : E.J.M. Florence, J.K. Sharma and M. Balasundaran
- KFRI 207/93 - Mass rearing of selected butterflies for possible reintroduction in conservation programme
Investigator : George Mathew
- KFRI 215/94 - Socio-economic and ecological aspects of developing bamboo resources in homesteads of Kerala
Investigators: U.M. Chandrashekhara, S. Sankar, C.N. Krishnankutty and R. Gnanaharan
- KFRI 232/94 - Rhizome and root morphology of rattans
Investigators : C. Renuka and K.K. Unni
- KFRI 235/94 - Harvesting trials on bamboos
Investigator : R.C. Pandalai
- BIC/India - Compendium on bamboos of India
Investigators : K. Sankara Pillai, N. Sarojam and K.H. Hussain

Socio-Economics

- KFRI 181/93 - Teak plantation in Nilambur : An Economic Review
Investigator : Mammen Chundamannil
- KFRI 189/93 - Economics of forest plantations in Kerala
Investigator : Mammen Chundamannil
- KFRI 201/93 - Timber price trends in Kerala
Investigator : C.N. Krishnankutty
- KFRI 230/94 - Biodiversity in Tropical Moist Forests : A sustainable use of non-wood forest products
Investigators: P.K. Muraleedharan, N. Sasidharan, K.K. Seethalakshmi and E.M. Muralidharan
- KFRI 249/96 - Study of private sector involvement in Forestry Research in India
Investigators : K.S.S. Nair, Mammen Chundamannil and K.C. Chacko

Action Research Programmes

- KFRI 192/93 - Greening of Ayyampilly Hills - Participatory Action Research Programme
Investigator : S. Sankar

KFRI 197/93 - Eco-restoration 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 17 research projects were initiated.

Plantation Forestry

- KFRI 250/96 - Consultancy of productivity of teak and Eucalyptus Plantations
Investigators : K.C. Chacko, K. Jayaraman.
C.N. Krishnankutty.
(Kerala Forest Department)
- 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
(Indian Council of Forestry Research and Education)
- KFRI 257/96 - Improvement of productivity of pulpwood species.
Investigators : J.K. Sharma, M. Balasundaran,
E.J. Maria Florence, T. Surendran,
M. Balagopalan.
(Indian Council of Forestry Research and Education)
- 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.
(Indian Council of Forestry Research and Education)
- KFRI 263/96 - Improvement of productivity of eucalypts through fertilizer inputs and silvicultural treatments
Investigators : M. Balagopalan, P. Rugmini.
Kerala Forest Department (Development Fund)
- KFRI 264/96 - Establishment of a pilot scale bamboo stand for edible shoot production in Kerala
Investigator : M.S. Mukteshkumar.
Kerala Forest Department (Development Fund)

Natural Forests

- KFRI 251/96 - **Monitoring degraded forests of Kerala**
Investigators : U.N. Nandakumar, A.R.R. Menon,
S. Sankar, K.C. Chacko.

(Kerala Forest Department)
- KFRI 260/96 - **Vegetation Mapping and Analysis of Neyyar Wildlife Sanctuary using Remote Sensing Techniques.**
Investigators : A.R.R. Menon, Assistant Wildlife
Wardan, Neyyar

Kerala Forest Department (Wildlife)
- KFRI 262/96 - **Prospects of reed bamboo (*Ochlandra travancorica*) for soil conservation in degraded sites**
Investigators : M.P. Sujatha, Thomas.P.Thomas,
S. Sankar.

(Science Technology & Environment Committee, Kerala)

Wood Science & Technology

- KFRI 258/96 - **Evaluation of high input management on growth and timber production in teak**
Investigators : K.M.Bhat, K.C. Chacko, M. Balagopalan.

(Indian Council of Forestry Research and Education)
- KFRI 266/97 - **Development of appropriate tools for harvesting reed bamboos**
Investigators : K.V. Bhat, R.C. Pandalai.

Kerala Forest Department (Development Fund)

General & Environmental Studies

- KFRI 252/96 - **Weather data acquisition from selected Wildlife Sanctuaries in Kerala**
Investigators : Jose kallarakal, C.K. Somen.

Kerala Forest Department (Wildlife)
- KFRI 265/96 - **Ecological and social importance of the Sacred Groves in Kerala**
Investigators : U.M.Chandrashekhara, S. Sankar.

(UNESCO, New Delhi)

Medicinal Plants & Tissue Culture

KFRI 253/96 - Micro propagation of Important, Rare and Endangered Tree Species of Western Ghats
Investigator : E.M. Muraleedharan.

Kerala Forest Department (Wildlife Department)

KFRI 254/96 - Development and dissemination of Low Cost micropropagation techniques for Kaempferia galanga (Kacholam)
Investigator : E.M. Muraleedharan,
U.M. Chandrashekhara

(Science Technology & Environment Committee, Kerala)

KFRI 256/96 - Assessment of field performance of micropropagated teak and eucalypts
Investigators : E.M. Muraleedharan, R.C. Pandalai

(Indian Council of Forestry Research & Education)

KFRI 261/96 - Micropropagation of three valuable timber species in Bay islands
Investigators : E.M. Muraleedharan,
A.B.T.Mandal-CARI

Department of Bio-Technology

6. OTHER ACTIVITIES

6.1 CONSULTANCY SERVICES

The following consultancy projects were taken up during the period.

Completed:

KFRI Cons 9/95 - Vegetation Mapping of Pamba river basin
Investigator : A.R.R. Menon

KFRI Cons 10/96 - Minimising the deterioration of outdoor stored pulpwood
Investigators : R. Gnanaharan, R.V. Varma,
M. Balasundaran.

KFRI Cons 11/96 - Assessment of Commercial Volume of rubber trees in a plantation at Nilambur
Investigator : K. Jayaraman

KFRI Cons 14/97 - Habitat quality assessment and estimation of fish abundance in proposed Kumarakom bird sanctuary
Investigator : P.S. Easa

Ongoing:

KFRI Cons 12/96 - Establishment of Interpretation Centre in Periyar Tiger Reserve
Investigators : P.S. Easa, George Mathew,
N. Sasidharan.

KFRI Cons 13/96 - Establishment of Interpretation Centre at Parambikulam and Wayanad Wildlife Sanctuaries
Investigators : P.S.Easa, V.V.Sudheendrakumar.

New

KFRI Cons 15/97 - Impact pests and disease problems in intensively managed teak plantations in STM
Investigators : R.V. Varma,
All scientists in Pathology
and Entomology

(Sterling Tree Magnum)

6.2 Seminars/Symposia/Workshops attended

International

Dr. R.V. Varma (Entomology Division) attended the International Workshop on Mahogany Shoot Borer conducted in Sri Lanka from 20-24 July 1996.

Dr. K.K. Seethalakshmi (Plant Physiology) attended a meeting on Tree Biotechnology Liaison Group, UK, 2-4 April, 1996 and presented a poster paper on "Endogenous IAA and rooting in *Eucalyptus globulus*, while on training at UK under Colombo Plan.

Mr.T.K. Dhamodaran (Wood Science) attended an International Conference on "Tropical Forestry in the 21st Century" at Bangkok, Thailand during 25-29 November 1996 and presented two papers.

National

Dr. P.S. Easa (Wildlife Biology) attended IUCN Asian Elephant Specialist Group Meeting -- March 11-13, 1996. Asian Institute of Technology, Bangkok, Thailand. Presented a paper on Human-elephant conflict - A case study from Kerala.

Dr. R. Gnanaharan (Wood Science) attended the 'Global Forum on Investment Opportunities in the Indian Rubberwood Industry' held at Cochin during 19-21 March 1996 and presented an invited paper.

Dr. K.S.S. Nair, Director, and Dr. K. Swarupanandan, Ecology Division, attended a Workshop on Permanent Plots and Biodiversity of Western Ghat Forests, organized at Bangalore on 10-4-'96 by the Karnataka Forest Department.

Dr. E.M. Muralidharan (Genetics) attended the National Seminar on Biotechnology of Spices and Aromatic Plants held from April 24-25, 1996 at Calicut.

Dr. K.S.S. Nair (Director), Dr. A.R.R. Menon (Ecology) and Mr. U.N. Nandakumar (Silviculture) attended a one-day Regional Workshop on Indian Remote Sensing Satellite (IRS-IC) Mission and its Application Potential on 22-5-'96 at Centre for Earth Science Studies, Thiruvananthapuram.

Mr. K.C. Chacko (Silviculture Division) and Dr. C. Mohanan (Pathology Division) participated in a short course on Forest Tree Seed Technology organised by ICFRE during 9-18 October 1996 at FRI, Dehra Dun.

Mr. C.K. Somen attended a training course on Electronics for Agricultural Field Investigations organised by CIPT, Kochi, during 19-24 August 1996.

Dr. M. Balasundaran (Pathology Division) and Dr. V.V. Sudheendrakumar (Entomology Division) attended a workshop on Intellectual Property Rights organised by the Dept. of Biotechnology at IICT, Hyderabad, on 20 Sept. '96.

Mr. U.N. Nandakumar (Silviculture Division) attended the International Meet on Resource Inventory Techniques to Support Agroforestry and Environment Activities (Oct. 1-3, 1996) and IUFRO Satellite Meeting: Forestry Research Networking in India-I (Oct. 1, 1996) held at DAV College, Chandigarh.

Dr. P.S. Easa (Wildlife Biology Division), Dr. A.R.R. Menon (Ecology Division), Dr. N. Sasidharan (NWFP Division) and Dr. George Mathew and Dr. V.V. Sudheendrakumar (Entomology Division) participated in the India - Ecodevelopment Project Workshop organised by the Kerala Forest Department from 3-5 Oct. 1996 at Trivandrum. Dr. P.S. Easa reviewed the faunistic research activities in the State.

Dr. P.S. Easa (Wildlife Biology Division) and Dr. N. Sasidharan (NWFP Division) participated in the Seminar on Biodiversity of the High Ranges held at Munnar on 2nd Oct. 1996.

Dr. R. Gnanaharan (Wood Science Division) attended the Indian Rubberwood Task Force Meeting held at Kottayam on 9 Oct. '96.

Dr. K.S.S. Nair (Director) Participated in a symposium on 'Technology for Biological control' held at the Entomology Research Institute on 11 October 1996. He released books published by the Entomology Research Institute in the inaugural function; chaired a Technical Session of the symposium and presented a paper on solar light traps for monitoring pest populations.

Dr. P.S. Easa and Dr. E.A. Jayson attended Pan Asian Ornithological Congress, SACON, November 9-16, 1996

Dr. K.S.S. Nair (Director) gave a lecture on Insect Biodiversity to participants of an NGO training programme organized by M.S. Swaminathan Foundation at Kottackal on 10 Nov. 1996. Dr. C. Renuka (Botany) and Dr. N. Sasidharan (Botany) also gave lectures on medicinal plants and their cultivation.

Dr. R. Gnanaharan (Wood Science), Mr. Muktesh Kumar (Botany), Dr. K.K. Seethalakshmi (Physiology) and T. Surendran (Physiology) attended the National Seminar on Bamboos during 28-29 November 1996 held at Aranya Bhavan, Bangalore. The following papers were presented.

Muktesh Kumar and S. Tephren, 1996. Distribution of South Indian Bamboos and their taxonomic status.

Seethalakshmi, K.K., Muktesh Kumar, Sarojam, N. and K. Sankara Pillai, 1996. Status of information on bamboos occurring in India.

T. Surendran, 1996. Bamboosetum - a means to conserve our bamboos"

Dr. K.S.S. Nair (Director), Dr. N. Sasidharan (Botany), Dr. P.S. Easa (Wildlife), Dr. K.K. Ramachandran (Wildlife), Dr. E.A. Jayson (Wildlife), Smt. P. Rugmini (Statistics) and Dr. M. Balagopalan (Soil Science) participated in the 9th Kerala Science Congress held at Trivandrum during 27-29 January 1997. Dr. K.S.S. Nair served as a member of the presidium for presentation on Biodiversity and Tropical Forests. Dr. Sasidharan presented a paper on "Floristic Diversity in the Forests of Thrissur".

Staff of the Wildlife Division attended the India Ecodevelopment Workshop from October 3-5, organised by Wildlife Institute of India and Kerala Forest Department.

Shri. P. Padmanabhan (Wildlife) attended the National Conference on Tropical Bees and the Environment from December 19-21, 1996 at Bangalore and presented a paper on Problems and Prospects of Bee-keeping in Kerala.

Dr. P.S. Easa attended the Seminar on Biodiversity in Western Ghats organised by Centre for Ecological Sciences, Indian Institute of Science, Bangalore. Presented a paper with Shri. C.P. Shaji (Research Fellow) on Freshwater fish diversity in Kerala part of Nilgiri Biosphere Reserve from November 4-11, 1996.

Dr. U.M. Chandrasekhara attended the Regional Workshop on Community based Conservation held on 9-11 February, 1997 at Indian Institute of Public Administration, New Delhi. He presented a paper entitled "Community-based Conservation: The Case of Chinnar Wildlife Sanctuary by U.M. Chandrasekhara and S. Sankar.

6.3 Training

Mr. K.C. Chacko (Silviculture) and Dr. C. Mohanan (Pathology) participated in a short course on Forest Tree Seed Technology organised by ICFRE during 9-18 October 1996 at FRI, Dehra Dun.

Mr. C.K. Somen (Plant Physiology) attended a training course on Electronics for Agricultural Field Investigations organised by CIFT, Kochi, during 19-24 August 1996.

Mr. K.V. Mohammed Kunhi, Officer-in-Charge, Teak Museum, Nilambur, underwent a two-week training in Museum Techniques at the National Museum of Natural History, New Delhi.

6.4 Extension/Exhibitions/Training Programmes/Lectures

Dr. R.C. Pandalai (Silviculture) attended a one-day Environment Awareness Seminar at Nattika. Lecture on "Water and Soil Conservation through Tree Planting" (11-3-'96).

Dr. Gnanaharan (Wood Science) attended the Indian Rubberwood Task Force meeting held at Kottayam on 12 March, 2 May and 16 May, 1996.

Dr. J.K. Sharma (Pathology) investigated a disease problem of *A. mangium* in the compound of TELK, Angamaly, April 1996.

Dr. C. Renuka (Botany) was a resource person in the International Training Course in Taxonomy and Genetic Conservation of Rattans held at Sarawak and Sabah, Malaysia, from 14-17 April 1996.

Dr. K.S.S. Nair (Director) delivered the inaugural address for the Trichur District Bala Sasthra Congress organized by KSSP at Vellanikkara on 11 May 1996.

Mrs. Win Win Myint from Myanmar was given an on-the-job training in forest entomology in relation to management of teak defoliators from 21 May to June 20, 1996. Her training was coordinated by Dr. R.V. Varma (Entomology). Her training was supported by FORSPA.

Dr. R. Gnanaharan (Wood Science) gave a talk on the prospects of rubber wood processing industry in Kerala to the Field Officers of the Kerala State Co-operative Agricultural and Rural Development Bank on 30 May 1996.

Dr. Jose Kallarackal (Plant Physiology) delivered three lecture-cum-demonstration classes to the M.Sc. (Forestry) students of KAU on 15, 18 May 1996.

Dr. R. Gnanaharan, Wood Science Division, along with two other scientists visited M/s. Hindustan Newsprint Limited to assess the problem of storage of pulpwood material.

Dr. P.S. Easa (Wildlife Biology) gave lectures on -

1. Wildlife Conservation in Nature Camps in Peechi-Vazhani Wildlife Sanctuary;
2. Role of Youth in Diversity Conservation in Dept. of Co-operative and Banking, Kerala Agricultural University in connection with World Environment Day;

3. Wildlife Conservation in Govt. L.P.S. and N.S.S. High School, Mullurkara.

He also organised Wildlife Census in Silent Valley National Park, Peechi-Vazhani and Idukki Wildlife Sanctuaries. The Research Fellows of Wildlife Division participated in the Wildlife Census.

Mr. T. Surendran (Plant Physiology), gave a training to the officers of the Research Wing of the Kerala Forest Department at Palode on vegetative propagation of eucalypts on 15 March and 13 May 1996.

Dr. N. Sasidharan (NWFP) and Dr. M. Balasundaran (Pathology) provided expert advice on the status of health of Banyan tree to Mr. Kailasanatha Pillai, Advocate Commissioner, appointed by the High Court of Kerala to report the status of Banyan tree under dispute.

A video film on Rural Bamboo (Mulayum vizhayaanu in Malayalam and Bamboo - a crop in English) was prepared as part of the research project on Socio-economic and Ecological Aspects of Developing Bamboo Resources in Homesteads. This will be used as one of the media to disseminate information on rural bamboo.

Advice on control measures against pests of teak was given to a couple of progressive farmers by the Entomology Division.

Three farmers' meetings were conducted in Palakkad District to disseminate information on cultivation, management and sustainable use of rural bamboo.

Dr. R. Gnanaharan, Dr. K.M. Bhat and Mr. T.K. Dhamodaran (Wood Science) gave guest lectures to the participants of the Refresher Course in the State Forest Service College, Coimbatore, during Aug.-Sept. 1996.

Dr. P.S. Easa (Wildlife Biology) gave lectures on Environment and Health for school teachers of Chavakkad Educational District held at Thalikulam on 17-9-96; on Wildlife Conservation for Sree Rama Polytechnic, Thriprayar, held at Peechi on 19-10-96; and on Wildlife Conservation at Vimala College, Trichur, on Oct. 14, '96. Dr. Easa and the Research Fellows of the Division of Wildlife Biology participated in the Wildlife Census in Chinnar Wildlife Sanctuary.

Dr. K.K. Ramachandran (Wildlife Biology) acted as a resource person in a training course on Small Population Biology organised by Central Zoo Authority and Zoo Outreach Organisation at Coimbatore during 10-13 Oct. 1996.

Mr. K.C. Chacko (Silviculture) delivered a talk on "Utilisation of degraded forest land" over AIR.

Dr. R.C. Pandalai (Silviculture) delivered a talk on "Planting of Bamboos for soil conservation" over AIR.

Mr. E.A. Jayson (Wildlife Biology) conducted a Quiz Programme on Wildlife in connection with the Wildlife Week Celebration.

Dr. S. Sankar (Agroforestry) and Dr. P.S. Easa (Wildlife Biology) participated in the Panchayath Level Planning Meetings organised by the Pananchery Panchayath and interacted with local people in the micro level planning process.

The Institute in collaboration with the Kerala Forest Department organized a one-day "Workshop on Root-trainer Technology and Organic Pott-ing Media" for forest officials of Ernakulam Social Forestry Circle at KFRI, Peechi on 30/11/1996. Mr. K.C. Chacko, Dr. R.C. Pandalai, Dr. M. Balasundaran and Smt. Maria Florence, delivered lectures and conducted demonstrations.

Dr. N. Sasidharan (NWFP) participated in the Committee Meeting of the Minor Forest Products of Kerala, at Trivandrum on 6/12/96, to fix the price of MFP items for the year 1997.

Dr. P.S. Easa (Wildlife Biology) was nominated to the State Wildlife Advisory Board. He was also nominated to the Board of Studies in Zoology and Wildlife Biology, AVC College (Autonomous), Bharathidasan

University, Tamil Nadu, and to the Advisory Committee constituted by Cochin Devaswom Board for management of Captive elephants of the Board. Dr. Easa was also appointed by the Hon. Hight Court of Kerala as a commission to enquire into the management of elephants in Cochin Devaswom Board.

Dr. Easa attended several meetings organised by Pananchery Panchayath for discussion on Panchayath level planning with peoples' participation. He reviewed projects on agriculture, fisheries, animal husbandry and tourism.

Dr. J.K. Sharma and Dr.M. Balasundaran (Pathology) investigated a disease problem (root collar rot) in pine plantations (1995) at Ponmudi. A pathogen was isolated and culture sent for identification to IMI, UK.

Dr. K.K.N. Nair (Botany) organised extension classes for farmers of Palghat District with regard to cultivation of medicinal plants in wastelands and also took a class on the topic for Botany students of NSS College, Nemmara.

The Entomology Division suggested control measures for teak stem borer problem reported by a private planter from Kottayam.

Dr. P.S. Easa (Wildlife Biology) gave lectures on wildlife conservation in a number of Nature Camps conducted by Kerala Forest Department at Peechi-Vazhani Wildlife Sanctuary.

Dr. P.S. Easa (Wildlife Biology) talked on Biodiversity Conservation in Kerala in programmes organised by Botany Association, S.N. College, Nattika, Zoology Department, Christ College, Irinjalakuda and Science Forum, K.E. College, Mannanam.

Dr. E.A. Jayson (Wildlife Biology) delivered a talk in All India Radio on Dogs: their racial characters.

The Wildlife Biology Division conducted lectures and field demonstrations on Wildlife Techniques for the M.Sc Students of Department of Zoology, University of Kerala. Staff and Research Fellows of the Division gave lectures.

Dr. S. Sankar (Soil Science) took classes on Environment for various trainees at Peechi-Vazhani Wildlife Sanctuary.

The Wood Science Division carried out extension work for various wood industries.

Dr. R. Gnanaharan (Wood Science) took two classes for the M.Sc. (Wood Science and Technology) students at Forest Research Institute, Dehra Dun.

Dr. K. Jayaraman (Statistics) carried out statistical analysis of data for estimating the growing stock of bamboo in Vazhachal Forest Division for a resource survey on bamboo conducted by the Forest Department.

6.5 Visitors

Dr. Jack Fisher, Miami Tropical Botanic Gardens, USA.

Mr. Mick Blowfield, Social Scientist, Natural Resources Institute, UK.

Mr. Lionel Jayanetti of TRADA, U.K.

Dr. D.D. Awasthi, Lichenologist and Emeritus Scientist, Lucknow.

Dr. K.C. Jayaram, D.Sc., R.N.A.Sc., Joint Director (Retd.), Zoological Survey of India.

Mr. Prachya Musikasinthorn, Laboratory of Ichthyology, Tokyo University of Fisheries.

Mr. Ko Ko Gyi, Co-ordinator, TEAKNET, and Mr. San Lwin, Deputy Director of the Forest Research Institute, Myanmar.

Dr. Francois Houllier, Director, French Institute, Pondicherry,

A team of forestry specialists from World Bank, including Dr. Puneet Kishore, Mr. Emmanuel D'Silva, Dr. Malcolm Jansen, Dr. Norman Jones and Dr. Chris Keil.

Shri M.F. Ahamed, Inspector General of Forests, Govt. of India.

Dr. Eric Boa, International Mycological Institute, UK.

Dr. Seema Wahab, Director, Dept. of Biotechnology, Govt. of India.

Dr. Ravi Prabhu, Centre for International Forestry Research, Indonesia.

Mr. K. Radhakrishnan, Director, ISRO, Bangalore.

Dr. S. Adiga, NNRMS, Bangalore.

Mr. K.N. Shyamasundaran Nair, Member, State Planning Board.

Dr. N.M. Joshi, Director General, ICFRE., Dehra Dun.

Dr. E.K.S. Nambiar, Chief Research Scientist, CSIRO Division of Forestry and Forest Products, Australia

Dr. A.M. O'Connell and Dr. T.S. Grove, Senior Principal Research Scientist and Principal Research Scientist respectively of CSIRO Division of Forestry & Forest Products, Perth W. Australia

7. PUBLICATIONS

7.1 Proceedings

Nair, K.S.S., Sharma, J.K. and Varma, R.V. 1996. Impact of Diseases and Insect Pests in Tropical Forests. Proc. IUFRO Symp. Kerala Forest Research Institute, 521. pp.

Old, K.M., Lee See and J.K. Sharma 1996. Diseases of Tropical Acacias, CIFOR, Indonesia, 120 pp.

7.2 Chapters in Books

Balasundaran, M. 1997. Disease management in clonal nursery and plantations of eucalypts. In: Clonal Multiplication of Eucalypts. K. Vivekanandan, K. Gurumurthi and R.S.C. Jayaraj (Eds.). UNDP/FAO Regional Project on Improved Productivity of Man-Made Forests through Application of Technological advances in Tree Breeding and Propagation. Institute of Forest Genetics and Tree Breeding, Coimbatore, India. pp. 21-26.

Balasundaran, M. 1996. Key issues in mycorrhiza/Nitrogen Fixing Symbionts Research. In: Use of Mycorrhiza and Nitrogen Fixing Symbionts in revegetating degraded sites: An overview of FORSPA supported research projects. FAO Regional Office, Bangkok.

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Sasidharan, N. and Sivarajan, V.V. 1996. Flowering Plants of Thrissur Forests. Scientific Publishers, Jodhpur, 579 pp.

7.3 Research Reports

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Jayson E.A. and K.K. Ramachandran 1996. Habitat utilization of large mammals in Chinnar Wildlife Sanctuary, KFRI Research Report No.109, Kerala Forest Research Institute, Peechi.

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Mohamed Ali, M.I; Balasundaran, M. and Yesodharan, K. 1996. Fungicidal management of quick wilt disease of pepper in forest plantations. KFRI Research Report No. 111. Kerala Forest Research Institute, Peechi.

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Florence, E.J.M., R. Gnanaharan and J.K. Sharma. 1996. Studies on growth and prevention of Sapstain fungies in rubber wood and its effect on strength properties-KFRI Research Report No.114. Kerala Forest Research Institute, Peechi.

Nair, K.K.N. 1996. Manual of the Non-Wood Forest Prdouce Plants of Kerala State, India. KFRI Research Report No. 115, Kerala Forest Research Institute, Peechi.

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Rugmini, P. and K. Jayaraman 1997. Expert system for designing experiments in forestry. KFRI Research Report No. 118, Kerala Forest Research Institute, Peechi.

Muralidharan, E.M. 1997. Micropropagation of teak, rosewood and sandal. KFRI Research Report No.119. March, 1997. Kerala Forest Research Institute, Peechi.

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Mathew George, 1997. Management of bark feeding caterpillar *Indarbela quadrinotata* in *Alibizia* plantations. KFRI Research Report No. 122, Kerala Forest Research Institute, Peechi.

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7.4 Scientific Papers

Agroforestry

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Chandrasekara, U.M. 1996. Strengths and weaknesses of traditional systems of bamboo cultivation in rural Kerala. *Agroforestry Forum*, 7: 21-23.

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Ecology

Grellar, A.M., Mohanan, M., Balasubramanian, K. and Wijesundra, D.S.A. 1997. Composition of Forest at Tropical Botanic Garden and Research Institute, Palode and Comparison with some forests of adjacent areas, Kallar and Ponmudi (Tvm Dt.), Kerala. *J. South Asian Nat. Hist.* Vol.8, No.2, 165-182.

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- Nair, K.S.S., Sudheendrakumar, V.V., Varma, R.V., Chacko, K.C. and Jayaraman, K. 1996. Effect of defoliation by *Hyblaea puera* and *Eutectona machaeralis* (Lepidoptera) on volume increment of teak. In: K.S.S. Nair et al (Eds.) Proc. IUFRO Symp. on Impact of Diseases and Insect Pests in Tropical Forests, Kerala Forest Research Institute, Peechi, Kerala, India. pp. 257-273.

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8. LIBRARY SERVICES

Documents

The holdings in the Library are shown below:

Books

Total number at the beginning of the year .. 13,203

Addition during the year 1995-96 .. 186

Journals

Total number of back volumes at the beginning of the year .. 6,000

Additions during the year .. 150

Number of journals currently subscribed .. 43

Reprints

Total number of Reprints at the beginning of the year .. 7,243

Number of reprints acquired during the year .. 226

Publications

Bamboos of South and South-East Asia

Other activities:

Updates of TREE-CD published by CAB International continued during the year. Computerisation of documents is progressing well. Internet has been introduced for information retrieval and e-mail communication. As part of Current Awareness Service, 'Monthly Additions' to the Library were circulated among the Scientists of the Institute.

Bibliographic Services, Microfilm Reader Printer Services, Reprodgraphic Services and Art and Photographic Services were rendered.

APPENDIX - I

LIST OF STAFF AS ON 31-3-1997

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	PA to Director
3.	Smt. K.N. Rajamma	Superintendent
4.	Shri M.K. Aravindakshan	"
5.	" T.J. Alfred Headisjis	PA to Registrar
6.	Smt. Grace Andrews	Stenographer
7.	Shri M.S. Sukumaran	Office Assistant
8.	Shri E.V. Eshac	Office Assistant
9.	Smt. Mary Kuruvila	Receptionist
10.	Shri P.R. Jose	Sergeant
11.	" M. Cherukunhan Nair	Typist
12.	" K.S. Karunakaran	Clerical Assistant
13.	" T. Chandran	Driver
14.	" K. Dhorairaj	"
15.	" V.D. Johny	"
16.	" Kurien Mathew	" (on leave)
17.	" K. Chandran	Attender
18.	" P.V. Subramanian,	"
19.	" K.R. Sevaraman	"
20.	" P.A. Sankarankutty	"
21.	" V.N. Balakrishnan	"
22.	" V.K. Mohandas	Bus Cleaner
23.	" A.C. Antony	Watcher
24.	" K. Said Mohammed	"
25.	" K. Nanu	"
26.	Smt. V.M. Ammini	Sweeper
27.	" K.D. Chinnamma	"
28.	" P.K. Thankamani	Field Worker
29.	" A.K. Ammini	"
30.	" K.C. Mary	"
31.	" E.V. Thanka	"
32.	" K.V. Bharathy	"

3Accounts Unit

33.	Smt. V.K. Leela	Superintendent
34.	Shri K.K. Thomas	Office Assistant
35.	" V.K. Mohanan	"
36.	Smt. K.M. Suseela	"
37.	" M. Kamalamma	"
38.	Shri K.A. Gopalan	"
39.	" B.P. Sreedharan	Attender

Engineering Unit

40.	Shri K.R. Mukundan	Engineer
41.	" P.P. Sunny	Skilled Maintenance Asst.
42.	" U.Y. John	Overseer
43.	Smt. T.V. Chandrika	Typist
44.	Shri D. Skariah	Pump Operator
45.	" K.C. Subramanian	"
46.	" K.M. Velayudhan	"
47.	" P.B. Sajeeva Rao	"
48.	" M.R. Anilkumar	"
49.	" K.K. Ahammed	Attender

Computer Cell

50.	Shri A.R. Rajan	Programmer
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Nilambur Sub Centre

51.	Shri K.V. Mohammed Kunhi,	Senior Scientific Asst. (Officer-in-Charge, Teak Museum, Nilambur)
52.	Shri K. Rajendran	Office Assistant
53.	" K.P. Manoj	Typist
54.	" K. Mohanan	Ticket Vendor
55.	" V. Mohammed Ali	Field Worker
56.	Smt. A.V. Thankam	"
57.	" K.T. Pathumma	"
58.	Shri P. Mohammed	"
59.	" C.P. Shoukathali	"
60.	" E.T. Narayanan	"
61.	" K. Muhammed	"
62.	" K.K. Mohammed	"
63.	" T.P. Padmanabhan	Cook

Field Research Centre, Palappilly

64.	Shri K.K. Unni	Field Assistant
65.	" E.P. Ulahannan	Field Worker
66.	" C.J. John	Field Worker

RESEARCH DIVISIONS

Agroforestry

67.	Dr. U.M. Chandrashekara	Scientist
68.	Shri V.P. Ravindran	Field Assistant
69.	" T.M. Abdul Vahab	Word Processing Asst.

(Dr. S. Sankar, Scientist-in-Charge, Soil Science Divn., held additional charge of the Division)

Botany

70.	Dr. K.K. Narayanan Nair	Scientist-in-Charge
71.	Dr. C. Renuka	Scientist
72.	Dr. M.S. Mukteshkumar	"
73.	Dr. K. Yesodaran	Senior Scientific Asst.
74.	Shri K. Vijayan	Driver
75.	" M.C. Mohandas	Attender

Ecology

76.	Dr. K. Balasubramanian	Scientist-in-Charge
77.	Dr. K. Swarupanandan	Scientist
78.	Dr. A.R. Ramachandra Menon	"
79.	Smt. K. Annapoorni	Stenographer
80.	Shri M.A. Sankarankutty	Attender

Economics

81.	Dr. P.K. Muraleedharan	Scientist-in-Charge
82.	Shri Mammen Chundamannil	Scientist
83.	" S. Shahul Hameed	Driver

Entomology

84.	Dr. R.V. Varma	Scientist-in-Charge
85.	Dr. George Mathew	Scientist
86.	Dr. V.V. Sudheendrakumar	"
87.	Shri K. Mohanadas	"
88.	" P. Mohandas	Driver
89.	" K.C. Subramanian	Attender

Genetics

90.	Smt. E.P. Indira	Scientist
91.	Dr. E.M. Muralidharan	"
92.	Shri E.O. James Tidode	Typist
93.	" A.S. Sreenivasan	Attender

(The Director held additional charge of the Division)

Non-wood Forest Products

94.	Dr. N. Sasidharan	Scientist
95.	Shri C.K. Vincent	Gardener
96.	Smt. A.M. Lalitha	Field Worker
97.	" T.G. Chandrika	"
98.	Shri N.I. Thankappan	"

(The Director held additional charge of the Division)

Pathology

99.	Dr. J.K. Sharma	Scientist-in-Charge
100.	Dr. M. Balasundaran	Scientist
101.	Dr. C. Mohanan	"
102.	Dr. K.V. Sankaran	"
103.	Smt. E.J. Maria Florence	" (on leave)
104.	Shri M.I. Mohammed Ali	Stenographer
105.	Smt. D. Sumangalamma	Attender
106.	Shri A.V. Velayudhan	Field Worker
107.	Smt. T.S. Chandrika	

Physiology

108.	Dr. Jose Kallarackal	Scientist-in-Charge
109.	Dr. K.K. Seethalakshmi	Scientist
110.	Shri T. Surendran	"
111.	" C.K. Somen	Senior Scientific Asst.
112.	" P.I. Madhavan	Driver
113.	" M.B. Dasan	Attender
114.	" M.K. Sivaraman	Field Worker

Silviculture

115.	Shri K.C. Chacko	Silviculturist-in-Charge
116.	Dr. R. Chandrasekhara Pandalai	Silviculturist
117.	Shri U.N. Nandakumar	"
118.	" P.K. Chandrasekhara Pillai	Field Assistant
119.	" T.C. Paul	Driver
120.	" K.R. George	Attender

Soil Science

121.	Dr. S. Sankar	Scientist-in-Charge
122.	Dr. M. Balagopalan	Scientist
123.	Shri Thomas P. Thomas	"
124.	Smt. M.P. Sujatha	Stenographer
125.	Shri A. Ramakrishnan	Field Assistant
126.	" K.K. Ramesh	Attender
127.	" P.M. Vasu	

Statistics

128.	Dr. K. Jayaraman	Scientist-in-Charge
129.	Smt. P. Rugmini	Scientist
130.	Shri C.N. Krishnankutty	"
131.	" K. Girijavallabhan	Driver
132.	" P.S. Raman	Attender

Wildlife

133.	Dr. P.S. Easa	Scientist-in-Charge
134.	Dr. K.K. Ramachandran	Scientist
135.	Dr. P. Vijayakumaran Nair	"
136.	Shri E.A. Jayson	"
137.	" P. Padmanabhan	Senior Scientific Asst.
138.	" E.T. Kuttikrishnan	Attender

Wood Science

139.	Dr. R. Gnanaharan	Scientist-in-Charge
140.	Dr. K. Mahabala Bhat	Scientist
141.	Dr. K.V. Bhat	"
142.	Shri T.K. Dhamodaran	"
143.	" P.K. Thulasidas	Laboratory Asst.
144.	" V.C. Chandran	Driver
145.	" V.S. Neelakantan	Attender

Library

147.	Shri K. Sankara Pillai	Librarian
148.	Smt. N. Sarojam	Asst. Librarian
149.	Shri Subash Kuriakose	Artist Photographer
150.	Shri K.H. Hussain	Library Asst. (on leave)
151.	" V. Asokan	Fair Copy Superintendent
152.	" K.F. George	Library Assistant
153.	" P.M. Venugopalan	Typist
154.	" C.A. Jose	Binder
155.	" T. Prabhakaran	Clerical Assistant
156.	" M.C. Reghunathan	Attender
157.	" K.V. Sidharthan	"
158.	Smt. N. Baby	"

APPENDIX - II

THE GOVERNING BODY

1. Shri Kadavoor Sivadasan (Chairman)
Hon'ble Minister for Forests
Government of Kerala
Secretariat
Thiruvananthapuram - 695 001

2. Dr. P.K. Iyengar (Vice-Chairman)
Chairman
State Committee on Science,
Technology & Environment
General Hospital Road
Thiruvananthapuram - 695 037

3. Shri John Mathai
Secretary to Government of Kerala
Forest & Wildlife Department
Secretariat
Thiruvananthapuram - 695 001

4. Shri K.V. Nambiar, IAS
Secretary to Government
Planning & Economic Affairs Dept.
Secretariat
Thiruvananthapuram - 695 001

5. Shri N. Basheer Rawther
Joint Secretary
Finance Department
Secretariat
Thiruvananthapuram - 695 001

6. Shri P.N. Surendran, IFS
Principal Chief Conservator
of Forests
Forest Headquarters
Vazhuthacaud
Thiruvananthapuram - 695 014

7. Dr. A.M. Michael
Vice-Chancellor
Kerala Agricultural University
Vellanikkara
Thrissur Dist.

8. Shri S. Shyam Sundar, IFS
Principal Chief Conservator
of Forests (Retd.), Karnataka
2989/D, 12th Main
HAL II Stage
Bangalore - 560 008
9. Dr. K.N. Subramanian
Retd. Director (IFGTB)
XXVII/52, "SUDHARSANAM"
Thekkumbhagam
Thripunithura - 682 301
10. Dr. P. Pushpangadan
Director
Tropical Botanical Garden &
Research Institute
Pacha, Palode
Thiruvananthapuram Dist.
11. Shri S. Easwaramurthy
Chief Conservator of Forests
(Research)
Adayar
Madras - 600 020
12. Shri M.F. Ahammed, IFS
Inspector General of Forests
Ministry of Environment & Forests
Paryavaran Bhavan
CGO Complex, Lodi Road
New Delhi - 110 003
13. Shri A.K. Kaderkutty
Managing Director
Western India Plywoods Ltd.
Baliapattom
Kannur Dist. - 670 010
14. Dr. K.S.S. Nair (Member-Secretary)
Director
KFRI, Peechi

APPENDIX - III

THE EXECUTIVE COMMITTEE

1. Dr. P.K. Iyengar (Chairman)
Chairman
State Committee on Science,
Technology & Environment
General Hospital Road
Thiruvananthapuram - 695 037
2. Shri John Mathai
Secretary to Government of Kerala
Forest & Wildlife Department
Secretariat
Thiruvananthapuram - 695 001
3. Shri P.N. Surendran, IFS
Principal Chief Conservator
of Forests
Forest Headquarters
Vazhuthacaud
Thiruvananthapuram - 695 014
4. Dr. K.N. Subramanian
Retd. Director (IFGTB)
XXVII/52, "SUDHARSANAM"
Thekkumbhagam
Thripunithura - 682 301
5. Dr. P. Pushpangadan
Director
Tropical Botanical Garden &
Research Institute
Pacha, Palode
Thiruvananthapuram Dist.
6. Dr. K.S.S. Nair (Member-Secretary)
Director
KFRI, Peechi

Financial Statement for 1996-97

Expenditure

Heads	Approved outlay for 1996-97 Rs.	Actual expenditure for 1996-97 Rs.
A. <u>Non-Plan</u>		
1. Staff salaries and benefits	1,15,00,000	1,32,87,141
2. Office expenses	7,50,000	8,25,145
3. General utilities	6,00,000	8,67,340
Total Non-Plan:	1,28,50,000	1,49,79,626
4. Civil works	4,50,000	4,77,616
5. Capital assets (Laboratory equipments and furniture)	50,000	1,96,907
6. Library	50,000	85,772
7. Research expenses	2,00,000	1,67,837
Total Plan:	7,50,000	9,28,132
Grand Total:	1,36,00,000	1,59,07,758

R e c e i p t s

Sl. No.	Head	Actual receipts 1996-'97
A. <u>Internal Receipts</u>		
1.	House rent for quarters	1,33,966
2.	Hire charges of vehicles	1,33,259
3.	Rent from Guest House & Rest House	20,838
4.	Photocopying charges	65,187
5.	Sale of books	27,694
6.	Interest on bank accounts	85,639
7.	Gate fee from Teak Museum	92,052
8.	Miscellaneous	2,29,633
	Total (A):	7,88,268
B.	Grant from Govt. of Kerala	1,31,00,000
C.	Overhead charges from external projects	14,18,780
D.	Contribution from Forest Department	5,00,000
	Grand Total:	1,58,07,048

EXTERNAL PROJECTS

Project No.	Short title	Funding Agency	Expenditure 1996-97	Budget 1997-98
104/87	Tree Improvement of Eucalyptus for Disease Resistance	KFD	3,98,000	2,00,000
140/92	Management of Teak Defoliators (Hyblaea puera)	GOI	23,000	
143/92	Enhancement of productivity in Eucalyptus grandis	KFD	1,80,000	50,000
144/92	Studies on the growth performance of Teak Nursery Stock	KFD	13,000	
146/92	Microfungal flora of Peechi-Vazhani Wildlife Sanctuary	STEC	7,000	
147/92	Structural Dynamics of teak stands in Kerala	KFD	36,000	60,000
149/92	Use of micorrhizal and nitrogen fixing symbionts in degraded soil	FAO	13,000	
150/92	Impact of upland mangement on downstream ecosystems	FAO	7,000	
151/92	Soil Nutrient Management for Teak Plantations in Kerala	KFD	58,000	50,000
153/92	Survey of small endangered mammals in Kerala	KFD(W)	22,000	
154/92	Status and food feeding habits of larger mammals in Idukki	KFD(W)	13,000	
156/92	Habitat Utilization of animals in Parambikulam WLS	KFD(W)	1,03,000	
158/92	Green belt development at Cochin Refineries Ltd.	CRL	71,000	1,10,000
159/92	The ecology and population dynamics of Endangered Primates	KFD(W)	4,000	
161/92	Man-Wildlife conflict in Peppara WLS	KFD(W)	41,000	
162/92	Movement pattern of large mammals in Vyanad WLS	KFD(W)	90,000	
163/92	Studies on the flora of Shendurany WLS Em	KFD(W)	7,000	
164/92	Vegetation mapping of Chimmy WLS	KFD(W)	31,000	
165/92	Vegetation mapping of Peppara WLS	KFD(W)	1,80,000	
166/92	Vegetation mapping of Aralam WLS	KFD(W)	19,000	
167/92	Vegetation mapping of Eravikulam WLS	KFD(W)	87,000	
168/92	The grassland forest ecosystem in WG	GOI	24,000	
170/92	Soil and water loss from Teak and Eucalypt	KFD	4,000	
172/92	Harvesting and regeneration techniques of reeds	KFD	91,000	30,000
174/92	Ecological and Environmental assessment of forest cover of Kerala	KFD	73,000	40,000
175/92	Tracing the epicentres of Teak defoliator outbreaks in Kerala	KFD	1,000	13,000
176/92	Parasites for biological control of teak defoliator	KFD	50,000	1,50,000
177/92	Permanent plots to demonstrate the effect of protecting Teak from Defoliator.	KFD	26,000	17,000
178/93	Standardisation of indirect evidences of Wild animals for identification	KFD(W)	5,000	
179/93	Studies on the flora of Periyar Tiger Reserve	KFD(W)	21,000	
180/93	Wildlife Census of Kerala	KFD(W)	4,000	
182/93	Effects of faster growth on quality of Teak	KFD	96,000	10,000
183/93	Crop damage by wild animals in Kerala and evaluation	KFD(W)	33,000	30,000
184/93	The epiphytic flora in the tropical forests ecosystem	KFD(W)	70,000	
185/93	Habitat, distribution and behaviour ecology of stream fishes	KFD(W)	9,000	
186/93	Growth and prevention of sapstain fungi in rubberwood	STEC	3,000	
187/93	Hane garden agroforestry systems of Kerala	STEC	6,000	
188/93	Expert ecosystems for designing experimentation forestry	STEC	9,000	
189/93	Economics of forest plantation in Kerala	KFD	26,000	35,000

Object No.	Short title	Funding Agency	Expenditure 1996-97	Budget 1997-98
		KFD	8,000	18,000
0/93	Evaluation of newer termiticides	DCI	9,000	
2/93	Afforestation of Ayyampilly Hills	PCK	9,000	
14/93	Under planting Rattans in Rubber Plantations			
17/93	Eco-restoration of a micro water shed in Mukundapuram Taluk	PEAD	3,58,000	
		GOI	42,000	
13/93	Cambial activity and juvenial wood formation in Teak	KFD	2,000	
14/93	Studies on the fern flora of Kerala			
15/93	Ation plan for the ecorestoration of a degraded micro watershed	KFD	18,000	
		STEC	4,000	
06/93	Mushroom cultivation using forest litter and waste wood			
08/94	Water relations and rooting depth of selected eucalypt species.	GOI	1,39,000	
		KFD(W)	55,000	
09/94	Patterns of fish assemblages in Periyar Lake			
10/94	Botanical studies in the medicinal plant conservation areas	FRLHI	36,000	
		GOI	1,11,000	10,000
		GOI	1,77,000	
111/94	Reptiles and amphibians in the Nilgiri Biosphere Reserve			
114/94	Man-wildlife interaction in Wyanad WLS	KFD	14,000	15,000
117/94	Effect of fire on Forest Soils, Vegetation and Timber Value.	WWF	1,24,000	1,75,000
		KFD(W)	35,000	50,000
218/94	Insect Biodiversity in Disturbed and undisturbed forests	KFD(W)	65,000	
219/94	Methods for estimating the abundance of herbivores	KFD(W)	2,34,000	1,50,000
220/94	Studies on the shola forests of Kerala	KFD(W)	52,000	50,000
221/94	Diversity of insects in Parambikulam Wildlife Sanctuary	KFD(W)	57,000	30,000
222/94	Studies on the Flora of Chinnar Wildlife Sanctuary.	KFD(W)	93,000	80,000
223/94	Soil Microflora of Shola Forests of Eravikulam NP	WWF	84,000	89,000
224/94	Sloth Bear in Parambikulam Wildlife Sanctuary.	FORD	5,53,000	3,00,000
225/94	Plant diversity in different forest types of Kerala			
230/94	Sustainable use of non-wood Forest products	GOI	3,42,000	2,40,000
236/95	Medicinal plants for sustained utilization of the Waste lands	KFD	1,32,000	30,000
		KFD(W)	4,61,000	2,23,600
239/95	Atlas of Teak Soils in Kerala			
240/95	Gaur in Periyar Tiger Reserve, Kerala	GOI	1,85,000	1,60,800
241/95	Ecorestoration of a degraded Watershed in Attappady.	GOI	5,14,000	3,00,000
		IPGRI	1,19,000	50,000
242/95	Tissue culture of Rattans (Canes)			
243/95	Genetic diversity and conservation of Rattans.	UNESCO	4,15,000	4,00,000
244/95	Biodiversity Conservation potential and Ecosystem Rehabilitation	ODA	6,14,000	2,40,000
		GOI	4,30,000	2,44,000
245/95	Use of baculovirus agents against teak defoliator	GOI	8,17,000	1,55,000
246/95	Fire related ecosystem dynamics in the WG	STEC	28,000	25,000
247/95	Development of spike-disease resistant sandal	FORSPA	1,26,000	50,000
248/95	Protection of rubberwood from insect borers	KFD	10,85,000	1,00,000
249/96	Study of private sector involvement in forestry research	KFD	9,66,000	4,00,000
250/96	Productivity of teak and Eucalyptus Plantations	KFD(W)	8,57,000	1,00,000
251/96	Monitoring degraded forests in Kerala	GOI	1,08,000	90,000
252/96	Weather data from selected Wildlife Sanctuaries	STEC	15,000	10,000
253/96	Micro propagation Rare and Endangered Tree Species			
254/96	Low Cost micropropagation techniques for Kacholam			
255/96	Seed handling and nursery practices for selected forest trees	ICFRE	4,52,000	1,90,000

Project No.	Short title	Funding Agency	Expenditure 1996-97	Budget 1997-98
256/96	Assessment of field performance of micropropagated teak and eucalypts	ICFRE	58,000	25,000
257/96	Improvement of productivity of pulpwood species.	ICFRE	7,88,000	3,20,000
258/96	High input management on growth and timber production in teak	ICFRE	1,30,000	1,30,000
259/96	Development of GIS based management information system for forest plantations	ICFRE	3,81,000	80,000
260/96	Vegetation Mapping of Neyyar WLS	KFD(W)	43,000	1,42,000
261/96	Micropropagation of valuable timber species in Bay Islands	GOI	78,000	2,50,000
262/96	Prospects of reed bamboo for soil conservation	STEC	15,000	33,000
263/96	Improvement in productivity of eucalypts through fertilizer inputs	KFD(D)	65,000	2,50,000
264/96	Establishment of a pilot scale bamboo stand for edible short production	KFD(D)	25,000	2,50,000
265/96	Ecological and social importance of the Sacred Groves in Kerala	UNESCO	15,000	1,50,000
266/97	Development of appropriate tools for harvesting reed bamboos	KFD(D)	9,000	90,000
267/97	Elephant Population in Periyar	AECC		36,000
268/97	Heartwood formation in STM teak plantations	STM		1,45,000
269/97	Modelling the growth of teak	STM		8,00,000
270/97	Assessment of insect pest problems	STM		5,00,000
271/97	Ecophysiology of host-parasite relationship in teak	DST		6,25,000
272/97	Survey and estimation of bamboo	KFD(W&R)		3,50,000
273/97	Lichen Flora of Kerala	ICFRE		1,70,000
274/97	Conservation and Genetic Improvement of Bamboo	ICFRE		2,90,000
275/97	Damping-off in Forest Nurseries in Kerala	ICFRE		1,80,000
276/97	Biodiversity of New Amarambalam (NER)	GOI		3,00,000
277/97	Carrying capacity Greater Kochi Region	MEF,GOI		1,33,200
278/97	Germplasm collection and growth studies of bamboo	ICFRE		8,50,000
279/97	Development of technology for collection, processing and testing of tree species	ICFRE		10,00,000
280/97	Establishment of semi-permanent Field Clonal Propagation Unit for Eucalyptus	ICFRE		4,30,000
Cons 3/94	Pest of Bamboos in Asia	INBAR	1,00,280	8,100
Cons 4/94	Diseases of Bamboos in Asia	INBAR	1,76,272	10,000
Cons 5/94	Standardisation of Rattan Grading Rules	INBAR	49,538	6,200
Cons 6/94	Indigenous Tools, Equipment and technologies for processing Bamboo and Rattan	INBAR	76,045	2,700
Cons 7/95	Vegetation Mapping of Trichur Division	NNRMS		25,000
Cons 8/95	Properties and quality of teak timber with special reference to juvenile wood	ATF	8,829	28,000
Cons 9/95	Vegetation mapping of Pamba river basin	FOABS	49,699	
FOABS Cons	Drying, Preservation and processing of wood			
Cons 10/96	Minimising the deterioration of outdoor stored pulpwood	HNL	54,607	50,000
Cons 11/96	Assessment of Commercial Volume of rubber trees in a plantation at Nilambur	Dr.J. Puthamara	9,636	14,920

Sl	Short title	Funding Agency	Expenditure 1996-97	Budget 1997-98
12/96	Establishment of Interpretation Centre in Periyar Tiger Reserve	KFD(W)		1,00,000
13/96	Establishment of Interpretation centre at Parambikulam and Wayanad Wildlife Sanctuaries	KFD(W)		3,40,000
14/97	Habitat quality assessment and estimation of fish abundance	SAWWT		50,000
15/97	Insect pests and disease problems in intensively managed teak plantations in STM	STM	8,005	6,00,000
16/97	Status and distribution of Masheer in selected streams and reservoirs in Kerala	IGRFDP		1,90,000
17/97	Preparation of Preliminary Report on Medicinal Plant Cultivation at Pariyaram	CUSHADHI		10,000
18/97	Data sheet on Teak (<i>Tectona grandis</i>) for the CABI Electronic Compendium Project	CABI		1,00,000
19/97	Wildlife Census of Kerala	KFD		50,000
20/97	Mahoit Training Programme	KFD(W)		
Total			1,40,38,911	1,38,84,520