

Kerala Forest Research Institute

**ANNUAL REPORT
1994-'95**

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

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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 Trichur 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 having 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 Administrative Division including an Engineering Unit. Research undertaken by the Institute has been directly related to the priorities of the forestry sector of Kerala. During the year under report, 5 research projects were completed. There were 67 ongoing research projects and 23 new projects were initiated.

During the year, Dr. S. Chand Basha, Director, retired on superannuation on 31 December 1994 and Dr. K.S.S. Nair, Scientist-in-Charge, Entomology Division, assumed charge of Director.

The Institute received Rs.91 lakhs from the State Government as grant-in-aid and Rs.111.48 lakhs from other agencies against specific research projects during the year under report.

The Governing Body met once on 24 September 1994 and the Executive Committee met 4 times.

2. INFRASTRUCTURE & STAFF

Construction work of Teak Museum at Nilambur was completed and good progress was made in collection and preparation of exhibits for the Museum. Construction of a building to house the Herbarium was taken up and partly completed.

The list of staff as on 31-3-1995 is given in Appendix I.

3. RESEARCH HIGHLIGHTS

Highlights of the research projects completed during the year and the significant interim results of the ongoing research activities are given below.

Genetic improvement of *Ailanthus*

A study of the family and single tree heritability in *Ailanthus* showed that there is a high genetic correlation between height and girth and therefore selection for height will also improve girth. While 4% genetic gain can be expected for height, 1% gain can be expected for girth. A comparative study of *A. triphysa* and *A. integrifolia* spp. *calycina* (*A. grandis*) showed that the latter is pest resistant while the former, although pest susceptible, can grow well in degraded and lateritic soil and is preferred as a matchwood because of presence of an aromatic resin. Both species can therefore be used under different conditions for different purposes.

Selection of disease resistant *Eucalyptus*

Due to humid climate, fungal diseases are the major threat to *Eucalyptus* productivity in Kerala. Efforts to select disease resistant trees have yielded success. Seventy eight disease evading trees of *E. grandis* and 40 of *E. tereticornis* have been selected from plantations across Kerala. Further selection was made by subjecting them to high disease pressure under experimental field conditions and the selected species and provenances are now undergoing field trials.

Diseases of bamboo and rattan

In a study of diseases of Bamboo and Rattan, 41 disease organisms were identified in bamboo and 21 in rattan. Thirteen of these organisms (fungi) are new to science.

While none of the rattan diseases were of serious nature, in the case of bamboo, the 'emerging culm disease' caused by *Fusarium moniliformae* var. *intermedium* was serious in nurseries, and little leaf disease caused by a Mycoplasma-like organism was serious in plantations in the dry tracts in Attappady and Chinnar.

Decay of standing trees in natural forests

A study of diseases of trees in natural forests, showed that an average of 20% of the trees were affected by natural decay. External indicators of these diseases were identified to help to detect the diseased trees. Using these external indicators, prediction equations were developed to estimate the loss of timber due to decay.

Managing the teak defoliator

An in depth analysis of the population dynamics of the teak defoliator based on extensive sampling in Nilambur teak plantations over a 3-year

period showed that occurrence of outbreaks was strongly correlated with the arrival of pre-monsoon showers. Aggregation and displacement of moth populations occurred due to processes not yet fully understood. A positive feed-back control mechanism driven by availability of tender foliage caused the build up of outbreak populations. It was also shown that the long advocated biological control using insect parasitoids will not succeed in the case of teak defoliator because of the shifting foci of infestation of this highly mobile insect.

New species of fishes

In a study on the fresh water fishes of Nilgiri Biosphere Reserve, 91 species of fishes were recorded, 2 of them were found to be new to science.

Identification of mammals based on hair structure

Based on a study of hair structure of 37 mammals, a key was developed to identify mammals on the basis of the structure of hair retrieved from the scat. This will help in investigation of forest offences.

Presence of cane turtle in Chimmony Wildlife Sanctuary

In a study of the wildlife fauna of Chimmony Wildlife Sanctuary, presence of the endemic, endangered cane turtle (*Heoseys silvatica*) was recorded for the first time.

Status of teak stands in Kerala

A survey of the teak plantations in Kerala revealed that 60% of the plantation area are overstocked due to delayed thinning or growth of miscellaneous species. The predominant site quality classes were Class II (48%) and Class III (41%). With the existing productivity levels, the plantations were found to support a potential total yield of 360 m³/ha at 60 years if maintained under full stocking. The age class distribution of the plantations was highly skewed with a predominance of young plantations up to 30 years of age. The maximum sustainable harvest (timber and small wood) from teak plantations in Kerala worked out to 31,500 m³/year for the first 20 years and 53,500 m³/year thereafter.

Grading rules for rattan (cane)

Based on a critical analysis and harmonisation of existing grading rules, model grading rules were formulated for Asian rattans, both in the unsplit and split form. Emphasis has been placed on standardized terminology, classification into large-diameter and small-diameter canes and nomenclature of commercial species.

4. RESEARCH PROJECTS COMPLETED

During the year under report, 5 Research Projects were completed and Final Reports published as shown below.

KFRI 101/87 - Development of a management strategy for the teak defoliator, *Hyblaea puera*.
Investigators : K.S.S. Nair, K. Mohanadas and
V.V. Sudheendrakumar

KFRI Research Report No.95

KFRI 106/87 - Decay of standing trees
Investigator : C. Mohanan

KFRI Research Report No.97

KFRI 110/87 - Diseases of bamboo, canes, reeds in Kerala
Investigator : C. Mohanan

KFRI Research Report No.98

KFRI 115/87 - Genetic improvement of *Ailanthus triphysa*
Investigator : E.P. Indira

KFRI Research Report No.100

KFRI 210/94 - Botanical studies in the Medicinal Plant Conservation areas in Kerala
Investigators : N. Sasidharan and C. Renuka

KFRI Research Report No.99

5. ONGOING RESEARCH PROJECTS

During the year under report, 67 research projects were under operation as shown below:

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 140/92 - Management of the teak defoliator using nuclear polyhedrosis virus (NPV)
Investigators : K.S.S. Nair, M.I. Mohammed Ali, V.V. Sudheendrakumar, R.V. Varma and K. Mohanadas
- 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 149/92 - Use of mycorrhizal and nitrogen-fixing symbionts in reforestation of degraded acid soils in Kerala
Investigators : J.K. Sharma, K.V. Sankaran, M. Balasundaran and S. Sankar
- KFRI 150/92 - Impact of upland management on downstream ecosystem
Investigator : S. Sankar
- KFRI 151/92 - Soil nutrient management for teak plantations in Kerala
Investigators : M. Balagopalan and P. Rugmini
- 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 182/93 - Effects of faster growth on quality of teak
Investigators : K.M. Bhat and E.P. Indira
- KFRI 190/93 - Evaluation of newer teratocides including plant products for plantation establishment
Investigators : R.V. Varma and K.S.S. Nair
- KFRI 196/93 - Management of the bark feeding caterpillar *Indarbela quadrinotata* in *Albizia* plantations
Investigator : George Mathew
- KFRI 227/94 - Provenance trials in *Acacia*
Investigator : E.P. Indira

NATURAL FORESTS

- KFRI 137/91 - Studies on the existing flora and specialised ecological niche of the Malayattoor Forest Division
Investigator : K.K.N. Nair
- KFRI 146/92 - Macrofungal 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 164/92 - Vegetation mapping of Chimmony W.L.S.
Principal Investigator : A.R.R. Menon
- KFRI 165/92 - Vegetation mapping of Peppara W.L.S.
Principal Investigator : A.R.R. Menon
- KFRI 166/92 - Vegetation mapping of Aralam W.L.S.
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
P.I. : Director
Investigators: K. Swarupanandan, S. Sankar,
N. Sasidharan and M. Balagopalan
- 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. Muktesh Kumar
- KFRI 198/93 - Preparation of an illustrated manual of the non-
wood forest produce plants of Kerala
Investigator : K.K.N. Nair
- KFRI 204/93 - Studies on the fern flora of Kerala with special
reference to Sylvan Valley, Munnar
Investigator : M.S. Muktesh Kumar
- KFRI 237/94 - Conservation, management and sustainable utiliza-
tion of non-timber forest products in Southern
Western Ghats, Kerala, India
Investigator : S. Sankar

WILDLIFE

- KFRI 152/92 - Prey-Predator studies in Eravikulam National Park
Investigator : P.S. Easa
- KFRI 153/92 - Survey of small mammals in Kerala with special
reference to endangered species and wildlife cen-
sus 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 155/92 - Habitat utilisation by larger mammals in Chinnar Wildlife Sanctuary
Investigators : E.A. Jayson and K.K. Ramachandran
- 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 157/92 - Status, food and feeding habits of larger mammals in Chimmony Wildlife Sanctuary
Investigators : E.A. Jayson and P.S. Easa
- KFRI 159/92 - Studies on the ecology and population dynamics of endangered primates in Silent Valley National Park
Investigator : K.K. Ramachandran
- KFRI 160/92 - Status survey of primates in Shendurney Wildlife Sanctuary and adjacent areas
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 173/92 - Management plan for Project Elephant areas in Kerala
Investigator : P.S. Easa
- KFRI 178/93 - A field guide for identification of wild animals based on indirect evidences
Principal Investigator : E.A. Jayson
- KFRI 183/93 - Studies on crop damage by wild animals in Kerala and evaluation of control measures
Principal Investigator : E.A. Jayson
- KFRI 185/93 - An investigative survey of stream fishes, their habitat distribution and behaviour ecology in the N.B.R. area of Kerala
Investigators : P.S. Easa and S. Chand Basha

- KFRI 209/93 - Patterns and processes of fish assemblages in Periyar Lake-Valley System
Principal Investigator : L.K. Arun
- 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 226/94 - Status and distribution of rare and endangered animals of Kerala and publication of a Booklet
Investigator : E.A. Jayson

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

GENETICS & TREE BREEDING

- KFRI 129/90 - Propagation of medicinal plants, bamboo and rattan through tissue culture
Investigator : E.M. Muralidharan
- KFRI 202/93 - Micropropagation of Teak, Rosewood and Sandal
Investigator : E.M. Muralidharan

FUNDAMENTAL STUDIES

- KFRI 148/92 - Water relations and photosynthesis of the oil palm in peninsular India
Investigator : Jose Kallarackal
- KFRI 188/93 - Expert system for designing experiments in forestry
Investigators : K. Jayaraman and P. Rugmini

- KFRI 191/93 - Statistical analysis package for forest mensuration
Investigator : K. Jayaraman
- KFRI 193/93 - Analysis of data from long term trials
Investigators : P. Rugmini and K. Jayaraman

WOOD SCIENCE & TECHNOLOGY

- KFRI 186/93 - Studies on the growth and prevention of sapstain fungi in rubber wood and its effect on strength properties
Investigators: E.J.M. Florence, R. Gnanaharan and J.K. Sharma
- KFRI 203/93 - Cambial activity and juvenile wood formation in teak
Investigator : K.M. Bhat

GENERAL STUDIES

- KFRI 134/90 - Preparation of campus flora of Peechi, Nilambur and Velupadam
Investigators : K.K.N. Nair, K. Yesodharan and K.K. Unni
- KFRI 192/93 - Greening of Aiyampilly Hills - Participatory Action Research Programme
Investigator : S. Sankar
- KFRI 195/93 - Bee keeping - Use of unconventional timbers for hives
Investigator : R.V. Varma
- KFRI 197/93 - Eco-restoration of a degraded watershed in Mukundapuram Taluk of Thrissur District
Investigator : S. Sankar
- KFRI 200/93 - Fungicidal management of quick wilt disease of pepper in forest plantations
Investigators: M.I. Mohammed Ali, M. Balasundaran and K. Yesodharan
- 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 212/94 - Preparation of a perspective plan for forestry sector of Kerala
Principal Investigator: Chand Basha
Investigators : S. Sankar and A.R. Rajan

BAMBOO & RATTAN

- KFRI 135/91 - Silviculture, management and utilization of bamboo resources of Southern India (Phase II)
Investigators : R. Gnanaharan, U.N. Nandakumar, K.K. Seethalakshmi and K.V. Bhat
- KFRI 136/91 - Management and utilization of rattan resources of India (Phase II)
Investigators : K. M. Bhat, T. K. Dhamodaran, C. Mohanan, K.K. Seethalakshmi, M.S. Mukteshkumar, C. Renuka and U.N. Nandakumar
- BIC/India Bamboo Information Centre - India
Investigators : K. Sankara Pillai, N. Sarojam and K.H. Hussain

6. NEW RESEARCH PROJECTS

During the year under report the following 23 research projects were initiated.

PLANTATION FORESTRY

- KFRI 208/94 - Water relations and rooting depth of selected eucalypt species
Investigators : Jose Kallarackal and C.K. Soan
- 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 238/95 - Fungal pathogens as a potential threat to tropical Acacia - Indian case study
Investigator : J.K. Sharma and E.J.M. Florence

NATURAL FORESTS

- KFRI 210/94 - Botanical studies in the medicinal plant conservation areas in Kerala
Investigators : N. Sasidharan and C. Renuka
- KFRI 213/94 - Palm resources of Kerala and their utilization
Investigators : C. Renuka and K.V. Bhat
- KFRI 217/94 - Effect of fire on forest soil and vegetation
P.I. : 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
P.I. : 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
P.I. : K. Balasubramanyan
Investigator : K.K. Narayanan Nair

WILDLIFE

- 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 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

GENERAL STUDIES

- KFRI 231/94 - Mapping of forests of Kerala
Investigator : A.R.R. Menon

BAMBOO & RATTAN

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

AGROFORESTRY & ENVIRONMENTAL FORESTRY

- 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

SOCIO-ECONOMICS

- 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

GENETICS & TREE BREEDING

- KFRI 229/94 - Micropropagation of some medicinal plants
Investigator : E.M. Muralidharan

ACTION RESEARCH PROGRAMME

- KFRI 236/95 - Generation of silviculture and harvesting technology of selected medicinal plants for the sustained utilization of the wastelands of Kerala
 Investigators : K.K.N. Nair, R.C. Pandalai,
 U.M. Chandrashekara and
 E.M. Muralidharan

7. OTHER ACTIVITIES

(A) CONSULTANCY SERVICES

The following consultancy projects were taken up. In addition, three wood processing industries were visited and technical input was provided on consultancy basis.

- KFRI Cons.3/94 - Pests of Bamboos in Asia
 Investigator : R.V. Varma
- KFRI Cons.4/94 - Diseases of bamboos in Asia
 Investigator : C. Mohanan
- KFRI Cons.5/94 - Standardization of Rattan grading rules
 Investigator : K.M. Bhat
- KFRI Cons.6/94 - Indigenous tools, equipment and technologies for processing bamboo and rattan
 Investigator : R. Gnanaharan
- KFRI Cons.7/95 - Forest mapping of Trichur Revenue District using IRS data
 Investigator : A.R.R. Menon

(B) PARTICIPATION IN SEMINARS/SYMPOSIA

International

Dr. K.V. Sankaran participated in Vth Mycological Congress, Vancouver, Canada, 14-21 August 1994 and presented a paper "Status of mycorrhizal associated in *Acacia auriculiformis* plantations in Kerala".

Dr. R. Gnanaharan and Dr. K.M. Bhat participated in the Interdisciplinary Plant Biomechanics Congress held in Montpellier, France, during 5-9 September 1994 and presented the following papers respectively: Biomechanical response of reed bamboo along the length of the culm and across the culm wall thickness; Structural basis for biomechanical behaviour of rattan.

Dr. Jose Kallarackal attended the Annual Meeting of the Australian Society of Plant Physiologists held at Gold Coast, Australia, on 28 September 1994.

Dr. K.M. Bhat attended a Workshop on *Albizia* and *Paraserianthis* held at Mindanao, the Philippines, during 13-18 November 1994 and presented a paper, "Wood properties and utilization of Indian *Albizia* spp. : An assessment in the context of species selection for planting".

Dr. K.M. Bhat participated in the Post-harvest Technology Working Group (INBAR) Meeting held in Quzen City, Philippines, during 23-25 November 1994 and presented a paper, "Industrial utilization of bamboo and rattan: An overview". Also, he visited the Ministry of Forestry (Standardisation of Forest Products & Quality Control), Jakarta, Indonesia, during 26-28 November 1994 in connection with INBAR internship on standardisation of rattan grading rules.

Dr. Mukteshkumar attended the UNESCO Regional Training Workshop on Lichen Taxonomy during 12 to 18 Dec. 1994 at Tribuvan University, Kirtipur, Kathmandu, Nepal.

Dr. P.K. Muraleedharan attended Expert Consultation on Non-wood Forest Products, organized by the FAO at Yogyakarta, Indonesia, 17-27 January 1995.

Dr. A.R.R. Menon participated in the Expert Committee Meeting on Bamboo Resource Evaluation, at FRIM, during Feb. 1995.

National

Dr. K. Swarupanandan attended the seminar on "Mangroves of Kerala" organised by K.F.D. on 16-4-1994.

Dr. K. Swarupanandan attended the "Interaction Meeting on Evolutionary Biology" at IISC, Bangalore, organised by DST from 20th to 22nd April 1994.

Dr. R. Gnanaharan attended a one-day Seminar on "Cost Effective Technologies and Use of Indigenous Materials in Housing and Habitat Sector" held at Trivandrum on 3 May 1994 and presented a paper, "Use of indigenous timbers in housing sector".

Dr. J.K. Sharma and Dr. M. Balasundaran attended the Meeting of Mycorrhiza and NFT research held at KFRI from 1-5 August 1994. They presented the result of the FORSPA funded project.

Dr. A.R.R. Menon attended the seminar on "Coastal Zone Management at CESS, Trivandrum, on 21 August 1995.

Dr. R. Gnanaharan participated in a Seminar on "Environmental Implications of Cost Effective Technology" at Trivandrum on 4 October 1994 and presented a paper, "Timber substitutes and their environmental implications".

Dr. K.K.N. Nair attended the Seminar on Cultivation of Medicinal Plants organised by NABARD at Mangalore during Oct. 30-31 and Nov.1, 1994.

Dr. K.K.N. Nair attended the First National Conservation Congress organised by WWF-India at New Delhi during 19-24 Nov. 1994.

Dr. R.V. Varma attended the National Seminar-cum-Workshop on Honey bee diseases, their diagnosis and management from Dec.6-9, 1994 at the University of Agricultural Sciences, Bangalore.

Dr. K. Jayaraman, Smt. P. Rugmini and Mr. C.N. Krishnankutty attended the 48th Annual Conference of ISAS held at the College of veterinary and Animal Sciences, Mannuthy, during 15-17, December 1994.

Dr. George Mathew attended and chaired a Session in the Symposium on "Recent trends in plant, animal and human pest management" at Christian College, Madras, from 26-30 December, 1994.

Dr. K.K.N. Nair attended the International Conference on Medicinal and Aromatic Plants held at Calcutta during 30 Dec. 1994 to 3 Jan., 1995.

Dr. E.M. Muralidharan attended the Seventh Kerala Science Congress held from 27-29 January 1995 at Palakkad and presented a paper entitled "An evaluation of cost-reduction measures in micropropagation".

Dr. K. Swarupanandan attended the DOEn Project Monitoring Workshop at Goa University on 1st & 2nd February 1995.

Dr. M. Balasundaran participated in the National Seminar on Crop Breeding organised by the Dept. of Botany, University of Kerala, Trivandrum, Feb. 3, 1995.

Dr. R.V. Varma attended and presented a paper "Evaluation of newer termiticides for eucalypt plantation establishment" in the National Workshop on Termite Control from 20-21 Feb. 1995 at the Central Building Research Institute, Roorkee, U.P.

Dr. R. Gnanaharan delivered a Keynote Address entitled, "Developments in Timber and Timber Products Technology" at the Workshop on Assessment of New Building Materials Technology Developments in India held at the Regional Engineering College, Calicut, on 23 March 1995. Also, he presented a paper, "Bamboo for structural applications: A hurdle to overcome".

Dr. M. Balasundaran and Smt. E.J.M. Florence attended a National Symposium on Applied Mycology organised by the Dept. of Botany, Pune University, March 24-25, 1995 and presented two papers - (a) Utilization of forest litter for cultivation of edible mushroom, (b) Interaction between rhizosphere actinomycetes and root pathogens in tree crop plants

(C) TRAINING IMPARTED

A Training Course was conducted under the Third Country Training Programme (funded by the British ODA) for Mr. Mohan Babu Gurung, Nepal, and Mr. Sirajul Islam, Bangla Desh.

A Training Programme on Conservation Biology was organised for Foresters and Forest Guards from Medicinal Plant Conservation Areas of Kerala, from 4-4-'94 to 9-4-'94.

(D) SERVICE AS RESOURCE PERSON

Dr. R. Gnanaharan was a resource person at the Workshop on the Processing of Rubber Wood organized by STED, Calicut, at Kasaragod on 17, 18 June and at Trivandrum on 20 June 1994.

Dr. C. Renuka was a resource person in the 'seed technology workshop' held at IFGTB, Coimbatore, from 20th to 22nd July 1995.

Dr. R. Gnanaharan and Mr. T.K. Dhamodaran were resource persons at the Workshop on the Utilization of Timber organised by the Karimpuzha Social Development Project, Kottappuram, Palakkad, on 9th August 1994.

Dr. C. Renuka was a resource person in the advanced training programme in cane furniture manufacturing for the rattan artisans organised by KFRI & District Industries Centre, Pathanamthitta during 16-18 Oct. 1995.

Dr. R.V. Varma acted as a resource person and gave lectures on applied entomology in the inservice training programme conducted by the Calicut University on 17-10-1994.

Dr. R. Gnanaharan gave guest lectures to the participants of Refresher Courses at SFS College, Coimbatore, on 20 October 1994; 19 January and 23 February 1995.

Dr. R. Gnanaharan gave guest lectures to the students of a Diploma Course at IPIRTI, Bangalore, on 16 November 1994.

Dr. K.S.S. Nair acted as a resource person and gave lectures on protection of stored wood from insects in a 1-year Certificate Course in Mechanical Wood Industries Technology conducted by the Indian Plywood Industries Research and Training Institute, Bangalore, on 18-11-1994.

Dr. R. Gnanaharan gave lecture-cum-demonstration on bamboo preservation to the artisans of Tripura at Agarthala during 24-26 November 1994.

Mr. T. Surendran was a resource person for the Training Programme on "Afforestation and Tree Planting" for NGOs and other voluntary agencies, between 21-23 December 1994 at Peechi, organised by the Regional Centre for National Afforestation and Ecodevelopment Board at KFRI.

Dr. K.M. Bhat gave lectures and conducted wood anatomy practicals for State Forest Service Officer trainees at Coimbatore SFS College during 6-16 February 1995.

Dr. Jose Kallarackal was a resource person for the Annual Training Workshop of Botany Teachers of Kerala Universities held in March 1995 at M.G. University.

Dr. P.S. Easa was nominated as Consultant, WWF-India for Environmental Impact Assessment of Eco-development Programme proposed in Tiger Reserves in India; Periyar Tiger Reserve (Kerala); Rajiv Gandhi National Park (Karnataka); Buxa Tiger Reserve (West Bengal) and Similipal Tiger Reserve (Orissa). He was a Member, Kerala State Wildlife Advisory Board, Govt. of Kerala.

(E) PARTICIPATION IN TRAINING

Dr. K.K. Seethalakshmi attended a training programme under the Colombo Plan at the University of Bath, U.K.

Shri T.K. Dhamodaran underwent a 4-month training in Wood Science and Technology at the University College of North Wales, U.K.

Dr. E.M. Muralidharan attended the Summer Institute on Cell Technology and Genetic Engineering of Crop Plants at Centre for Plant Molecular Biology, TNAU, Coimbatore.

Dr. K. Swarupnandan attended the MDP Course on Geographic Information System at the Indian Institute of Forest Management, Bhopal.

Dr. K.M. Bhat and Shri T.K. Dhamodaran attended Training Course on ISO-9000 conducted by the Institution of Engineers (India), Kerala Chapter, Trivandrum.

Dr. A.R.R. Menon attended the Training Course on Environmental Impact Assessment on Water Resource Projects at CWRDM, Neyyattinkara.

(F) AWARDS/FELLOWSHIPS

Dr. K.V. Sankaran was awarded Darwin Fellowship to spend one year at International Mycological Institute, U.K., from May 1994 to April, 1995.

Dr. Jose Kallarackal was awarded a Fellowship of the International Tropical Timber Organisation to do research in Australia and New Zealand from September to November, 1994.

Dr. J.K. Sharma visited Vietnam as an FAO Consultant from 12 April to 14 May to identify the major disease problem in eucalypts.

(G) EXTENSION/EXHIBITION

Dr. R.V. Varma gave an invited talk - Forest Pest Problems in Kerala - at the Dr. Y.S. Parmar University of Horticulture and Forestry, Solan, on 25-2-1995.

The following advisory work was extended:

- (a) borer attack in eucalypt plantations
- (b) die-back in *Artocarpus heterophyllus*
- (c) mealy bug problem in teak

Report on the Mangrove Vegetation along the backwaters of Cochin around Cochin Refineries was given as per the request of Cochin Refineries.

Statistical analysis of data was carried out for estimating the growing stock of reeds in different Forest Divisions of Kerala in respect of a resource survey on reeds conducted by the Forest Department.

Technical services like identification of wood specimens and examining specimens for preservative retention and penetration, were provided. Technical information was provided to CPWD and BHEL in formulating specification standard on processed rubber wood. Technical advice was given on wood processing and other allied matters to various companies.

Scientists from the Pathology Division attended to nine enquiries from the Kerala Forest Department. The disease problems were investigated and recommendations sent in Extension Reports.

Dr. P.S. Easa gave lectures on Wildlife Conservation and Management Techniques during the Training Programme for Foresters and Guards of Parambikulam Wildlife Sanctuary.

Dr. P.S. Easa and Dr. K.K. Ramachandran gave talk on Biodiversity in Kerala, in the National Seminar for Young Environmentalists organised by Jawahar Bala Bhavan, Periyar Tiger Reserve, Thekkady,

A discussion with farmers on planting of the tree species in the homesteads of Kerala was broadcasted through AIR. Dr. K.K.N. Nair participated in the discussion.

Insect exhibits were provided for an exhibition conducted by Social Forestry Division, Calicut.

An exhibition of Medicinal Plants during the inauguration of Sanatorium Complex of Thrissur District Prakrithi Chikilsa Kendra was conducted at Peramangalam. An Exhibition of Medicinal Plants was also arranged at Kodungalloor in connection with Flower Show.

(H) VISITORS

Mr. O.N. Kaul IFS (Rtd.) Consultant, Tata Energy Institute.

Mr. Andrews Jenson, Research Officer, FORSPA/FAD, Bangkok, Thailand.

Dr. Nick Malajezuk, Principal Scientist, CSSRO Division of Forestry Wembley, Australia.

Dr. Alok Adholeya, Tata Energy Research Institute, New Delhi.

Mr. Precha Wadisirisuk, Biological Nitrogen Fixation Resource Centre for South & South-East Asia, Bangkok, Thailand.

Dr. Loretto U. Della Cruz, Laguna, Philippines.

Dr. Ngyen Duc Thang, Forest Sciences Institute of Vietnam, Hanoi, Vietnam.

Dr. Ir. Suhardi, Gadjat Mada University, Indonesia.

Dr. D.J. Bagyaraj, University of Agricultural Sciences, Bangalore.

Dr. C.T.S. Nair, Senior Progra Officer, FORSPA/FAD, Bangkok, Thailand.

Prof. K. Natarajan, University of Madras, Madras.

Dr. K. Leelavathy, Calicut University, Calicut.

Mr. Paul Eastman, Consultant to INBAR

Prof. A.N. Rao of the National University of Singapore

B. PUBLICATIONS

A total of 46 publications were brought out during the year under report.

A. Books

Bamboo Researchers and Projects of South and South-East Asia
- A Directory

B. Scientific Papers/Proceedings

- Muktesh Kumar & K.S. Manilal, (1994). Morphology and floral anatomy of Vandoid orchids and taxonomic status of Vandoi-deae. *Proceedings National Seminar on Accade of Orchid Research in India*. October 1994. New Delhi.
- Chand Basha, S. and Muktesh Kumar, (1994). Three little known species of *Orchlandra* Thw. (Poaceae) from Western Ghats, India. *Rheedea*, 4(1): 24-30.
- P.K. Muraleedharan and Anjana Shankar, (1994). Rattan based industry in Kerala: Raw material supply and marketing. *Journal of Non-Timber Forest Products*, Vol. 1(1/2), pp. 83- 88.
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- Sasidharan, N. and V.V. Sivarajan (1994). A new species of *Ardisia* from Peninsular India. *Rheedea*, 4: 116-119.
- Basha, S.C. and N. Sasidharan (1994). A new species of *Polyalthia* (Annonaceae) from Peninsular India. *Rheedea*, 4: 21-23.
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- Sutton, B.C. and K.V. Sankaran (1994). *Pseudocercospora elaeocarpic* sp. nov. on *Elaeocarpus* in India. *Mycoscience*, 35: 395-397.
- Sankaran, K.V. (1994). Fungi associated with decomposition of teak and Albizia litter in Kerala. *Indian Forester*, 120: 446-454.
- Mohammed Ali, M.I.M. and E.J.M. Florence (1994). Studies on collar rot of teak seedlings. *Indian Forester*, 20: 69-72.

- Sharma, J.K. and C. Mohanan (1994). Severity of *Cyclindrocladium* leaf blight in eucalypt plantations in relation to intercropping with tapioca and rainfall. *Indian Forester*, 120: 1104-1107.
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- Jeykumar, P. and Kallarackal, J. (1994). *Removing Whorls - A Shimoga experiment*. *Indian Oil Palm Journal*, 4: 25-26.
- Kallarackal, J. and Soman, C.K. (1994). *Water use of Eucalyptus tereticornis at two sites with different stand density in the tropics*. In: *Proceedings of the Annual General Meeting of the Australian Society of Plant Physiologists held in Gold Coast, Australia, from 28-30 September 1994*.
- Rugmini, P. and Balagopalan, M. (1994). Factor analysis of soil properties in *Paraserianthes falcataria* (L.) Nielsa plantations. *J. Trop. Agri.*, 32(1): 44-49.
- Rugmini, P. and Balagopalan, M. (1994). Soil properties as influenced by elevation : A factor analysis. *J. Trop. Agri.*, 32(2): 142-144.
- Pradeep, K.P.; Krishnakumary, K. and Rugmini, P. (1994). Follower timing and nutrient requirements of ratoon crop of banana CV. Musa (AAB) 'Mysore' (Palayamkodan). *J. Trop. Agri.*, 32(2): 168-169.
- Bhat, K.M. (1994). Wood diversity in Indian *Dalbergia* species: Implications for utilization and genetic improvement. In: S.B. Westley and J.M. Rossetko (eds.) *Dalbergia*. NFTA, USA. pp. 40-47.
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- Bhat, K.M.; Danbury, D.; Chaturvedi, T.N.; Joshi, R.B.; Joshi, M.R.; Kamaluddin, M.; Kamala, B.S. and Keshav, K. (1994). Wood production and use - A field manual. In: J.M. Rossetko and S.B. Westley (eds.). NFTA, USA. pp. 13-20.
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- Dhamodaran, T.K. and Gnanaharan, R. (1994). Commercial scale trial of an economical schedule for boron impregnation treatment of green rubber wood. *Holz als Roh- und Werkstoff*, 52: 323-324.

- Gnanaharan, R. (1994). Physical and strength properties of *Dendrocalamus strictus* grown in Kerala, India. In: Bamboo in Asia and the Pacific. FORSPA Publication No.6. FAO, Bangkok. pp. 188-192.
- Gnanaharan, R. (1994). Field evaluation of preservative treated bamboo. In: Bamboo in Asia and the Pacific. FORSPA Publication No.6. FAO, Bangkok. pp. 243-246.
- Gnanaharan, R. 1994. Use of indigenous timbers in housing sector. In: K. Raghavan Nambiar (ed.) Cost Effective Technologies and Use of Indigenous Materials in Housing and Habitat Sector. Kerala State Nirmathi Kendra, Thiruvananthapuram. pp. 43-45.
- Gnanaharan, R. (1994). Biomechanical response of reed bamboo along the length of the culm and across the culm wall thickness. In: Summaries of Plant Biomechanics Congress, 5-9 September 1994. Montpellier, France. Editions Scientifiques Elsevier, pp. 71-72.
- Gnanaharan, R. (1994). Timber substitutes and their environmental implications. In: S.R. Varma (ed.) Environmental Implications of Cost Effective Building Technology. Nirmathi National Institute of Habitat Management, Thiruvananthapuram. pp.28-31.
- Nair, K.K.N.; R.C. Pandalai; K.V. Bhat; George Mathew and Mohammed Ali (1995). Botany, wood characteristics and silvicultural techniques of the South-East Asian indigenous timber species - *Haldina cordifolia* (Haldu) : *Ann. For.*, 3: 53-64.
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- Renuka, C. (1995). Reproductive biology of rattans. In: J.T. Williams, I.V. Ramanuja Rao and A.N. Rao (Eds.) *Genetic Enhancement of Bamboo and Rattan*. INBAR, New Delhi, IPGRI, Singapore, and FORTIP, Philippines.
- Mukteshkumar, (1995). A re-investigation on the taxonomy of the genus *Ochlandra* Thw. (Poaceae - Bambusoideae). *Rheedea*, 5(1): 63-89.
- Dr. A.R.R. Menon presented a paper entitled "Remote sensing application in Bamboo evaluation - A case study in Kerala". Proc. 4th International Bamboo Workshop, Chiang Mai, Thailand, from 27th to 30th Nov. 1995. FORSPA Publ. No.6, pp. 51-55.

- Varma, R.V.; Balagopalan, M. and Nair, K.S.S. (1995). Field evaluation of neem cake as a possible protectant against subterranean termites attacking eucalypt seedlings. *Annals of Forestry*, 3(2): 171-173.
- George Mathew and Rahmathulla, V.K. (1995). Biodiversity in the Western Ghats - A study with reference to moths in the Silent Valley National Park, India *Entomon*, 20(2): 25-33.
- George Mathew (1995). Field performance of some indigenous tree species with respect to insect pestincidence in Kerala. *Indian J. Forestry*, 18(2): 133-140.
- Nair, K.K.N.; Pandalai, R.C.; Bhat, K.V.; Mathew, B. and Ali, M.I.M. (1955). Botany, wood characteristics and silvicultural techniques of the South-east Asian indigenous timber species, *Haldina cordifolia*. *Annals of Forestry*, 3(1): 53-64.
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- Easa, P.S. and Balakrishnan, M. (1995). The population, density and structure of Asian elephants in Parambikulam Wildlife Sanctuary, Kerala, India. *J. Bombay nat. Hist. Soc.*, 92(2): 225-229.
- E.A. Jayson and B. Christopher (1995). Sighting of Spiny Dormouse, *Platacanthomys lasiurus* Blyth, 1859 in Peppara Wildlife Sanctuary, Trivandrum District, Kerala.

- A. Veeramani and E.A. Jayson (1995). A survey of crop damage by wild animals in Kerala. *Indian Forester*, 121(10): 949-953.
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APPENDIX - I

LIST OF STAFF AS ON 31-3-1995

DIRECTOR : Dr. S. Chand Basha - until 31 December 1994
 Dr. K.S.S. Nair - since January 1995 (additional charge)

REGISTRAR: Shri Joseph K. John

ADMINISTRATION

1.	Shri P. Aravindakshan	Dy. Registrar (Fin.)
2.	" K.K. Bhagianadh	Dy. Registrar (Admn)
3.	Smt. V.K. Leela	Superintendent
4.	" K.N. Rajamma	"
5.	Shri M.K. Aravindakshan	"
6.	" P. Achuthankutty	PA to Director
7.	" T.J. Alfred Headisjis	PA to Registrar
8.	" M.S. Sukumaran	Office Assistant
9.	Smt. K.M. Suseela	"
10.	Shri E.V. Eshac	"
11.	" K.K. Thomas	"
12.	" V.K. Mohanan	"
13.	Smt. M. Kamalamma	"
14.	Shri P.A. Sulaiman	"
15.	" K.A. Gopalan	"
16.	" P.R. Jose	Sergeant
17.	Smt. Mary Kuruvila	Receptionist
18.	Shri K.S. Karunakaran	Clerical Assistant
19.	" M. Cherukunhan Nair	Typist
20.	Smt. T.V. Chandrika	"
21.	Shri T. Chandran	Driver
22.	" K. Dhorairaj	"
23.	" V.D. Johny	"
24.	" M.C. Mohandas	Attender
25.	" K.R. Sevaraman	"
26.	" K.R. George	"
27.	" P.S. Raman	"
28.	" V.N. Balakrishnan	"
29.	" M.C. Reghunathan	"
30.	" V.K. Mohandas	Bus Cleaner
31.	" A.C. Antony	Watcher
32.	" K. Said Mohammed	"
33.	" K. Nanu	"
34.	Smt. V.M. Ammini	Sweeper
35.	" K.D. Chinnamma	"

Engineering Unit

36.	Shri K.R. Mukundan	Engineer
37.	" K.S. Gopalan	Overseer
38.	" U.Y. John	"
39.	" P.P. Sunny	Skilled Maintenance Asst.
40.	" B.P. Sreedharan	Attender
41.	" D. Skariah	Pump Operator
42.	" K.C. Subramanian	"
43.	" K.M. Velayudhan	"
44.	" P.B. Sajeeva Rao	"
45.	" M.R. Anilkumar	"

Computer Cell

46.	Shri A.R. Rajan	Programmer
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RESEARCH DIVISIONAgroforestry

47.	Dr. U.M. Chandrashekhara	Scientist
48.	Shri K.V. Mohammed Kunhi	Senior Scientific Asst.
49.	" V.P. Ravindran	Field Assistant
50.	" T.M. Abdul Vahab	Word Processing Asst.

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

Botany

51.	Dr. K.K.N. Nair	Scientist-in-Charge
52.	Dr. C. Renuka	Scientist
53.	Dr. M.S. Mukteshkumar	"
54.	Dr. K. Yesodaran	Senior Scientific Asst.
55.	Shri K.K. Unni	Field Assistant
56.	" P.V. Subramanian	Attender
57.	Smt. A.M. Lalitha	Field Worker
58.	" T.G. Chandrika	"
59.	Shri N.I. Thankappan	"
60.	" C.J. John	"
61.	" E.P. Ulahannan	"
62.	Smt. P.K. Thankamani	"
63.	" A.K. Ammini	"
64.	" K.C. Mary	"
65.	" E.V. Thanka	"
66.	" K.V. Bharathy	"

Ecology

67.	Dr. K. Balasubramanian	Scientist-in-Charge
68.	Dr. K. Swarupanandan	Scientist
69.	Dr. A.R.R. Menon	"
70.	Smt. K. Annapoorni	Stenographer
71.	Shri A.V. Velayudhan	Attender

Economics

72.	Dr. P.K. Muraleedharan	Scientist-in-Charge
73.	Shri Mammen Chundamannil	Scientist
74.	" S. Shahul Hameed	Driver

Entomology

75.	Dr. K.S.S. Nair	Scientist-in-Charge
76.	Dr. R.V. Varma	Scientist
77.	Dr. George Mathew	"
78.	Dr. V.V. Sudheendrakumar	"
79.	Shri K. Mohanadas	"
80.	" P. Mohandas	Driver
81.	" K.V. Sidharthan	Attender

Genetics

82.	Smt. E.P. Indira	Scientist
83.	Dr. E.M. Muralidharan	"
84.	Shri E.O. James Tidode	Typist
85.	" V.S. Neelakantan	Attender

(The Director held additional charge of the Division)

Non-wood Forest Products

86.	Dr. N. Sasidharan	Scientist
87.	Shri C.K. Vincent	Gardener

(The Director held additional charge of the Division)

Pathology

88.	Dr. J.K. Sharma	Scientist-in-Charge
89.	Dr. M. Balasundaran	Scientist
90.	Dr. C. Mohanan	"
91.	Dr. K.V. Sankaran	"
92.	Smt. E.J. Maria Florence	"
93.	" D. Sumangalamma	Stenographer
94.	Shri A.S. Sreenivasan	Attender
95.	Smt. T.S. Chandrika	Field Worker

Physiology

96.	Dr. Jose Kallarackal	Scientist-in-Charge
96.	Dr. K.K. Seethalakshmi	Scientist
98.	Shri T. Surendran	"
99.	" C.K. Somen	Senior Scientific Asst.
100.	" P.I. Madhavan	Driver
101.	" M.A. Sankarankutty	Attender
102.	" M.K. Sivaraman	Field Worker

Silviculture

103.	Shri K.C. Chacko	Silviculturist-in-Charge
104.	Dr. R.C. Pandalai	Silviculturist
105.	Shri U.N. Nandakumar	"
106.	" Santhosh K. John	Range Officer
107.	" P.K. Chandrashekara Pillai	Field Assistant
108.	" K. Rajendran	Office Assistant
109.	" K.P. Manoj	Typist
110.	" T.C. Paul	Driver
111.	" P.M. Vasu	Attender
112.	" K. Mohanan	Watcher
113.	" V. Mohammed Ali	Field Worker
114.	Smt. A.V. Thankam	"
115.	" K.T. Pathumma	"
116.	Shri P. Mohammed	"
117.	" C.P. Shoukathali	"
118.	" E.T. Narayanan	"
119.	" K.K. Mohammed	"
120.	" T.P. Padmanabhan	Cook

Soil Science

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

Statistics

128.	Dr. K. Jayaraman	Scientist-in-Charge
129.	Smt. P. Rugmini	Scientist
130.	Shri C.N. Krishnankutty	"
131.	Smt. Grace Andrews	Stenographer
132.	Shri K. Girijavallabhan	Driver
133.	" K.K. Ahammed	Attender

Wildlife

134.	Dr.	P.S. Easa	Scientist-in-Charge
135.	Dr.	K.K. Ramachandran	Scientist
136.	Shri	E.A. Jayson	"
137.	"	P. Padmanabhan	Senior Scientific Asst.
138.	"	M.B. Dasan	Attender

Wood Science

139.	Dr.	R. Gnanaharan	Scientist-in-Charge
140.	Dr.	K.M. Bhat	Scientist
141.	Dr.	K.V. Bhat	"
142.	Shri	T.K. Dhamodaran	"
143.	"	V.C. Chandran	Driver
144.	"	P.A. Sankarankutty	Attender

Library

145.	Shri	K. Sankara Pillai	Librarian
146.	Smt.	N. Sarojam	Asst. Librarian
147.	Shri	Subash Kuriakose	Artist Photographer
148.	"	V. Asokan	Fair Copy Superintendent
149.	"	K.F. George	Library Assistant
150.	"	P.M. Venugopalan	Typist
151.	"	C.A. Jose	Binder
152.	"	E.T. Kuttikrishnan	Attender
153.	"	K. Chandran	"
154.	"	K.C. Subramanian	"

APPENDIX - II

T.S. VAIDYANATHA IYER & CO.
Chartered Accountants
Near Thiruvambadi Temple
Trichur - 680 001

AUDITORS' REPORT

We have audited the annexed Balance Sheet of the KERALA FOREST RESEARCH INSTITUTE, PEECHI, as at 31st March 1995 and the annexed Income and Expenditure Account for the year ended on that date and report that:

- 1) We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit.
- 2) In our opinion, proper books of account and records have been kept by the Institute so far as appears from our examination of the books and records.
- 3) The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of account and records maintained by the Institute.
- 4) As in the past, fixed assets have not been physically verified by the Management during the year under review.
- 5) In our opinion and to the best of our information and according to the explanations given to us, the accounts, together with notes thereon, give a true and fair view:
 - a) In the case of the Balance Sheet, of the state of affairs of the Institute as at 31st March, 1995; and
 - b) In the case of the Income and Expenditure Account, of the excess of Expenditure over Income for the year ended 31st March, 1995.

For T.S. VAIDYANATHA IYER & CO.,
Chartered Accountants
Sd/-

T.V. Balakrishnan
Proprietor

Trichur,
12th October, 1995

KERALA FOREST RESEARCH INSTITUTE, PEECHI

BALANCE SHEET AS AT 31ST MARCH, 1995

Previous Year			Current Year	
Rs.	Rs.		Rs.	Rs.
		LIABILITIES		
		GENERAL FUND		
1,65,79,423		Balance as per last Balance Sheet	1,55,32,002	
95,00,180		Add: Grant received from Government	91,00,000	
<u>2,60,79,603</u>			<u>2,46,32,002</u>	
1,05,47,601		Less: Excess of expenditure over income	1,25,03,362	
<u>1,55,32,002</u>			<u>1,21,28,</u>	
4,00,743		RESERVES AND SURPLUS		
85,467		Surplus in Grants (Excess of income over expenditure of completed external projects)	4,00,743	
<u>4,86,210</u>		Overhead charges of external projects capitalised	8,52,869	
62,44,764			<u>12,53,</u>	
<u>2,22,62,976</u>				
		CURRENT LIABILITIES AND PROVISIONS:		
		As per Schedule "A"		72,83,
1,55,33,390		Total Liabilities		<u>2,06,65,</u>
15,99,190				
51,30,396		ASSETS		
<u>2,22,62,976</u>		FIXED ASSETS: As per Schedule "B"		1,46,17,
		CAPITAL WORK-IN-PROGRESS:		
		As per Schedule "C"		15,99,
		CURRENT ASSETS, LOANS AND ADVANCES:		
		As per Schedule "D"		44,49,
		Total Assets		<u>2,06,65,</u>

Auditors' Report annexed.

For T.S. VAIDYANATHA IYER & CO.,
Chartered Accountants

Sd/-

T.V. Balakrishnan
ProprietorTrichur,
12th October, 1995

Sd/-

DIRECTOR

KERALA FOREST RESEARCH INSTITUTE
PEECHI - 680 653, TRICHUR

KERALA FOREST RESEARCH INSTITUTE, PEECHI

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1995

Particulars	Current Year Rs.	Previous Year Rs.
EXPENDITURE		
Salaries and Allowances ..	92,90,436	71,12,722
Contribution to Provident Fund ..	5,57,828	4,75,027
Leave Travel Concession ..	25,714	34,224
Leave Salary & Pension Contribution ..	14,537	11,423
Group Gratuity Assurance ..	2,54,013	1,18,269
Staff Welfare Expenses ..	1,10,802	78,425
Travelling Expenses ..	87,313	1,51,698
Postage, Telephone, Telex ..	2,79,718	2,65,779
Printing, Stationery, Photocopy ..	1,43,327	80,554
Electricity Charges ..	2,37,339	1,14,053
Books and Periodicals ..	1,26,022	6,02,212
Seminars and Symposia ..	4,066	29,134
General Research Expenses ..	1,90,180	33,740
Repairs and Maintenance ..	6,04,560	5,79,631
Legal Expenses ..	8,000	5,502
Audit Fees ..	8,500	8,500
Other Expenses ..	96,855	1,03,414
Depreciation ..	9,15,865	10,51,379
Total :	1,29,55,075	1,08,55,686

INCOME

Interest on Bank/Treasury Deposits ..	73,033	4,050
Rent Recoveries from Staff ..	1,37,442	1,23,828
Guest House Rent ..	15,385	10,607
Vehicle Hire Charges Recoveries ..	75,400	54,123
Photocopying Charges ..	47,197	21,816
Other Income ..	1,03,256	93,661
Excess of Expenditure over Income ..	1,25,03,362	1,05,47,601
Total :	1,29,55,075	1,08,55,686

Referred to in our report of even date.

For T.S. VAIDYANATHA IYER & CO.,
Chartered AccountantsSd/-
T.V. Balakrishnan
ProprietorTrichur,
12th October, 1995Sd/-
DIRECTOR
KERALA FOREST RESEARCH INSTITUTE
PEECHI - 680 653, TRICHUR

APPENDIX - III

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, IAS
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 M.C. Geevarghese
Addl. Secretary to Govt. (Retd.)
T.C. 9/105-B
S.S. Koil Lane
Jawahar Nagar, P.O.
Kaudiar
Thiruvananthapuram - 41
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
(Director, IFGTB (Retd))
"Radhika Nivas"
38, Kalianna Gr. Street
K.K. Pudur
Coimbatore - 641 038
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 - IV

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, IAS
Secretary to Government of Kerala
Forest & Wildlife Department
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Director
Tropical Botanical Garden &
Research Institute
Pacha, Palode
Thiruvananthapuram Dist.
6. Dr. K.S.S. Nair (Member-Secretary)
Director
KFRI, Peechi