annual report
1984-'85

kerala forest
research institute

INTRODUCTION

During the year 1984-85 the Institute, keeping in line with its high tradition, intensified its activities considerably. Some additional equipment and other requisite facilities for research investigations were provided to the laboratories and field studies were continued. A Computer (Workhorse Level II) was got installed. Several experimental plots were established in forest areas. Few more projects relevant to forest management were also identified. Six Research Reports based on the studies conducted by the Institute were published. In addition, 25 Scientific papers have been published in journals. An information bulletin on "Preservative treatment of rubber wood" was published both in English and in Malayalam. A number of scientists participated in seminars/workshops/symposia, both within and outside the country.

GOVERNING BODY

The Governing Body constituted in order M. S. No. 11/81/Plg. dated 24-3-1981 by the Government of Kerala continued during the year The Governing Body consists of the following members:

Ex-officio:

1.	Minister for Forests (Kerala)	...	Chairman
2.	Chairman, State Committee on Science, Technology and Environment, Kerala.	...	Vice-Chairman
3.	Inspector General of Forests, Govt. of India.	...	Member
4.	Commissioner for Economic Development & Special Secretary to Government of Kerala, Planning & Economic Affairs Department.	...	,,
5.	The Secretary to Govt. of Kerala Finance Department.	...	,,
6.	The Chief Conservator of Forests, Kerala.	..	,,
7.	The Vice-chancellor, Kerala Agricultural University	..	,,
8.	Director, Kerala Forest Research Institute, Peechi	...	,,

Scientists:

9.	Shri Hari Singh Retd. Inspector General of Forests Bangalore	..	Member
10.	Prof. Y. M. L. Sharma International Forestry Consultant Bangalore	...	,,

11. Shri J. C. Varmah
Ex-President ...
Forest Research Institute & Colleges
Dehra Dun

12. Shri K. K. Nair
Chief Conservator of Forests, Kerala (Retd) ... ..
Kozhikode

Representative of forest-based industry:

13. Shri A. K. Kaderkutty
Managing Director
Western India Plywoods Ltd. ... ..
Baliapattom.

The Governing Body met twice during the year

EXECUTIVE COMMITTEE

The Executive Committee consists of the following members:

1.	Chairman, State Committee on Science, Technology & Environment (Kerala)	...	Chairman
2.	Commissioner for Economic Development & Special Secretary to Govt. of Kerala Planning & Economic Affairs Department	...	Member
3.	Chief Conservator of Forests, Kerala	...	,,
4.	Shri K. K. Nair, Chief Conservator of Forests, Kerala (Retd.) Kozhikode	...	,,
5.	Shri A. K. Kaderkutty Managing Director Western India Plywoods Ltd. Baliapattom	...	Member
6.	Director, Kerala Forest Research Institute Peechi	...	,,

The Executive Committee met three times during the year.

CAMPUS DEVELOPMENT

The Institute campus is located at Peechi in 28.174 hectares of forest land leased out by the Kerala Forest Department for a period of 99 years. In the reporting year, 10 Type 1 quarters, the construction of which was entrusted during the previous year was

completed and these quarters were allotted to the employees of the Institute. Construction work of 10 Nos. of Type II quarters was entrusted to Kerala State Construction Corporation. The work of these quarters is in progress. With the completion of these quarters, the total number of quarters in the campus at Peechi will be 71. The Director's Bungalow being constructed by the Kerala State Construction Corporation is nearing completion. The construction of the Orchidarium is in progress

WATER SUPPLY TO THE INSTITUTE CAMPUS

The work on permanent water supply system to the campus entrusted to the Kerala Water & Waste Water Authority is almost completed. Erection of Chlorinator, electrification of filter plant and laying internal pipe connection to the filter unit are to be completed. However, the Institute is partially making use of this system. Water from the well is pumped to the temporary water tanks erected on the hill top and supplied to the quarters, laboratory etc. through the distribution lines already laid. A small overhead water tank exclusively to serve the Type I quarters located on the south west side of the campus was also got constructed and commissioned during the year under report. It may be stated that at present, no difficulty is being experienced for regular supply of water to the Institute campus.

ESTABLISHMENT OF SUB CENTRES

There is a Sub Centre at Nilambur under this Institute which is located in an area of 43.358 hectares of forest land leased out by the Kerala Forest Department for 99 years. Necessary experimental plots are being developed on a phased programme in this Sub Centre. In the year under report, one 'Type I' twin quarters was got constructed there. The work for providing fencing around the Sub Centre campus and the work on providing permanent water supply facilities for the Sub Centre have been started. The fencing work is nearing completion. As for the Water Supply Scheme, the ground level water tank and the basement and other works for the Pump house have been completed. These two works are expected to be completed without further delay.

It is proposed to set up a field station at Parambikulam for wildlife studies. A suitable site has been located at Parambikulam for this station and the Kerala Forest Department has been moved for sparing the site for our purpose.

TEAK MUSEUM AND STUDY CENTRE

The construction of Teak Museum and Study Centre at Nilambur is fast progressing.

Other Activities

A workshop was orgnised on 10th April 1984 on "Nursery diseases and pests of Eucalypts in Kerala and their control". About 97 Officers drawn from the Kerala Forest Department, Kerala Forest Development Corporation and Forest School, Walayar attended the workshop. The Workshop was inaugurated by Shri M. Sivarajan, Chief

Conservator of Forests (Development) Dr J K. Sharma and Dr. K. S. S. Nair, Scientists of the Institute gave lectures on "Nursery diseases of eucalypts and their control" and "Pests of eucalypts and their control" respectively The participants visited a demonstration nursery raised by the Pathology Division at Pattikkad. Methods of assessing germinability of seeds and quantity of seeds required per bed, correct method of sowing preparation of fungicidal solution and treatment of seeds beds were demonstrated. Also, the method of treating the beds and seedlings against ants and caterpillars, method of treating the container seedlings with insecticide solution for preventing termite attack in the field etc. were also demonstrated to the participants.

TRAINING PROGRAMME FOR GIRIJANS

A training programme for Girijans was jointly organised by the Directorate of Indian System of Medicine, Trivandrum, Kerala Agricultural University, the Djrectorate of Kerala, Institute for Research Training and Development Studies of Scheduled Castes and Tribes, KozhiKode and the Kerala Forest Research Institute, Peechi at Chindakki, Attappady, during 9-13th March 1985 on scientific identification and collection of medicinal plants. Sri. N. Sasidharan, a scientist from the Botany (Taxonomy) Division participated in this programme and conducted classes for the trainees He also surveyed the area with the trainees and Tribal chiefs and collected some of the rare medecinal plants used by them. The Herbarium specimens of the medicinal plants, he collected from there, were prepared and kept in the Institute herbarium. At the conclusion of this training programme the trainees visited the medicinal plants garden of this Institute, met the Director and had discussions with him.

SEMINAR ON ECODEVELOPMENT OF WESTERN GHATS

Following the successful organisation of a National Seminar on Eucalypts in January 1984, the Institute was privileged to organise a Seminar on Ecodevelopment of Western Ghats on behalf of the Kerala State Committee on Science, Technology and Environment in October 1984, in collaboration with the Centre for Water Resources Development and Management, Calicut, the Centre for Earth Science Studies, Trivandrum, the Tropical Botanic Garden and Researeh Institute, Trivandrum and the Kerala Forest Department. The Seminar was held on 17-18 October 1984 at the Institute campus.

The objectives of this seminar were (1) to study the environmental problems arising from pest developments in this region and methods for ecological restoration in degraded areas and (2) to assess the data requirements, to identify areas for research and studies to devise suitable approaches for managing life support systems in a suitable manner.

108 delegates and 30 observers attended the Seminar and 65 papers covering the following areas were presented:

(1) sustainability of agriculture; (2) conservation and management of forest resources; (3) energy development and environmental impact; (4) optimum use of

water resources: (5) environmental impact of mining: (6) constitution and management of biosphere reserves and (7) impact of human settlements on environment.

In the inaugural function presided by Prof. A. Abraham, Chairman of the Executive Committee of the Tropical Botanic Garden and Research Institute, Shri. K. Karunakaran, Hon. Chief Minister of Kerala, delivered the inaugural address He stressed the importance of adopting a development path which is acceptable socially and economically and viable ecologically. There were also special addresses by Shri. V. Remachandran, Chief Secretary, Kerala Government, on "Approach to development in Western Ghats", by Prof. A Abraham on "Plant wealth of Western Ghats - Kerala and their conservation" and by Dr. P. N. Nair, Chief Conservator of Forests (Development), Kerala, on " Forests of Western Ghats - Kerala'.

Some of the important recommendations of the seminar are as follows:

1. Scientsits, Planners and Administrators should jointly evolve a composite sensitivity index for each area in the western Ghats region based upon physical, ecological and biological factors which will give clear indication as to how a proposed development of extension or an existing development would affect the environmental quality of the area.

2. Restoration of degraded environment should have high priority. Tribal skill and their knowledge of the forest should be used to the maximum extent in such restoration, so that they realise that further degradation, either by themselves or by others, is against their own interests;

3. So far as agricultural activities in the Western Ghats are concerned, there should be no further extension of agriculture. Intensification and improvement of agricultural practices are called for in the presently cultivated areas;

4. Collection of endemic flora of Western Ghats and their systemic preservation should be organised at appropriated centres (*ex situ* conservation in arboreta and Botanical Gardens);

5. There should be better management and use of springs as substantial source of water in the Western Ghats. As a protection measure, conservation of springs and improvement in storage and distribution should be undertaken;

6: As a measure of protection from over exploitation of forests for firewood, firewood depots should be established by the Forest Department at convenient places and to sell firewood, if necessary, at a subsidised rate to the people:

7. The rehabilitation of displaced population from a project area should not be within the reserved forest areas and preferably be located in the area that will benefit from the project by acquiring some land for the purpose and;

8. Watershed planning in the Western Ghats region should be conceived in a multi-level planning framework. The various planning functions, which would be

undertaken at the watershed level, should be identified and linked to the higher level of planning and decision making.

WELFARE MEASURES TO THE STAFF

Staff Council:

The Staff Council constituted by the Institute with a view to provide the staff members a forum for presenting their views to better their working and service conditions functioned smoothly. The suggestions and recommendations of the Council which required immediate solution were solved to the extent possible. Also, the Council has generated a feeling among the staff members that their problems are heard and remedial measures taken up by the Institute.

STAFF ASSOCIATION

There is also Staff Association functioning in the Institute. This association has been organised by the staff members themselves, and takes interest in the welfare measure of the employees. Recreation facilities to the staff members are made available through this Association. Under the auspices of this Association, the staff members undertook a picnic tour to Thekkady for which the Institute's Bus was made available.

CO-OPERATIVE SOCIETY

The staff members of the Institute has organised a Co-operative Society in the Institute campus. In addition to thrift deposit scheme, Chit funds and advancing of loans to its members, the society is running a small Store for the benefit of the staff members. All possible assistance has been extended to them from the Institute. The furniture items required for their office use were supplied by the Institute. In addition, a sum of Rs. 3,500/- has been granted to them for procuring almirahs, racks etc. required for running the Store.

STAFF

The staff position as on 31-3-1985 is shown in Appendix I.

Dr. K. Jayaraman joined the Institute on 2-5-1984 as Statistician. The posts of Plant Physiologist, Geneticist and Botanist could not be filled up as yet. The vacancies have been notified again in the newspapers.

Shri. E. Mohamed, Silviculturist left the Institute on 30-6-1984 on the expiry of his term of appointment. Shri. K. Shanmuganathan, Additional Chief Conservator of Forests (Retired) Tamil Nadu joined the Institute as Silviculturist on 4th March 1985.

FINANCE

The budget for 1984-85 approved by the Governing Body was for Rs. 76 lakhs. For the Research Projects financed by the External Agencies, the provision made in the

budget estimate for 1984-85 was Rs. 2.49 lakhs. The Government released only Rs.65 lakhs during the year. The year started with a cash balance of Rs. 4.75 lakhs. The expenditure incurred during the year was Rs. 62. 235 lakhs. The cash balance at the close of the year was Rs. 7.81 lakhs.

M/s V. Parasurama Iyer and Company, Chartered Accountants, Kozhikode audited the accounts of the Institute for the year. The audited statement of account is given at Appendix II.

LIBRARY

Acquisition of Documents

Details of various documents acquired in the library during 1984-85 are furnished below:

Sl. No.	Item		Nos. acq. during 1984-85	Total of each item as on 31st March 1985
1.	Books	...	403	9431
2.	Reprints	...	580	4224
3.	Photocopies	...	160	1180
4.	Journals	...	2	234
5.	Backvolumes	....	180	1440
	Total	...	1415	16509

Documentation work

1. Classified and catalogued all documents acquired during the period.
2. As a current awareness service, the Library continued the practice of issuing Library News Release enlisting new arrivals in the Library at regular intervals.
3. Work towards revising the Catalogue of Journals available in KFRI Library had been carried out.

BOTANY (PHYSIOLOGY)

Physiol 01/1979: Studies on the physiology of vegetative propagation of important timber species by rooting stem cuttings.

Objectives are: (a) To study the rooting behaviour of the stem cuttings of economically important timber species; (b) To study the efficacy of different growth regulators on induction of roots on stem cuttings; (c) To study the effect of girdling and pinching on root initiation of cuttings; (d) To find out the optimal conditions for the induction of roots on stem cuttings for vegetative propagation.

Monthly rooting trials with stem cuttings of *Tectona grandis, Gmelina arborea, Swietenia macrophylla, Melia dubia* (Syn. *Melia composita*) using different growth

regulators (IAA, IBA, NAA, coumarin and boric acid) were continued upto June 1984. The data on sprouting and rooting responses were recorded at monthly intervals. The work under this project has been completed and the data are being processed for analysis.

Physiol 02/1979: Investigations on the possibility of vegetative propagation of bamboos and reeds by rooting stem cuttings.

Objectives are (a) To investigate systematically and intensively the possibilities of vegetative propagation by rooting stem cuttings; (b) The effect of season and different growth regulators (auxinic and non auxinic) on root induction of stem cuttings of *bamboos* and reeds.

The project work has been completed and first draft of the report prepared. The important findings of the project are given below.

The results show that it is possible to propagate successfully, important bamboos and reeds of Kerala *(Bambusa arundinancea* (Retz.) willd. *Bambusa balcooa*. Roxb., *Dendrocalamus strictus Nees*. *Ochlandra travancorica Bedd*. (*Benth. ex Gamble*), *Ochlandra scriptoria* (Dennst. C. E. C. Fischer). The percentage of success in the vegetative propagation, by rooting stem cuttings, is significantly influenced by various factors like growth regulating substance used for induction of rooting, method of treatment, season, nature of material used and method of planting

Of the different growth regulating substances, indole butyric acid (IBA), nephthalene acetic acid (NAA) and coumarin were found promising for induction of rooting and sprouting in most of the species. 'Cavity-method' of treatment, in which hormone solution is poured into the cavity of the culm cutting, proved to be more advantageous than the 'dip-method' of treatment in which lower portions of the cuttings are dipped in the hormonal solutions. Seasonal responses in sprouting and rooting varied from species to species. In most of the species, summer months beginning from February to May had pronounced good effect on the rooting as it was maximum during this period. Seasonal influence was highly significant in the case of two reed species, viz. *Ochlandra travancorica* and *O. scriptoria* as they rooted only during February to June. Of the different propagation materials used, two noded culm cuttings were found to be the best; side branch cuttings and 'nodal-bud-chips' were also induced to root but with less success. Among the two planting methods, horizontal planting gave more vigorous sprouts and profuse rooting in cuttings than the vertical planting. Culm cuttings generally took 3 to 6 months to root profusely and to form rhizome, after which they could be used as good planting material.

Physiol 03/1979 Studies on the physiology of induction of flowers in teak and eucalypts

Objectives are (a) To induce flowering in profusion and before the stage of natural flowering; (b) To study the effect of certain growth regulators and physical treatments like girdling, pinching on growth and development of young seedlings

Seedlings of *Eucalyptus tereticornis* were raised and potted at regular intervals. Two sets of 1 and 2-year-old plants were treated with different concentrations of 2, 3, 5-tri-iodo-benzoic acid (TIBA), Chloroethyl trimethyl ammonium chloride (CCC), potassium nitrate (KNO_3) and Ethrel (CEPA). Regular observations were recorded on the growth of the treated as well as control plants. A detailed experiment was designed for induction of early flowering in teak by foliar application of growth regulating substances, viz. CCC, Ethrel, GA, TIBA and potassium nitrate. About 1500 grafts were prepared from eight flowered trees selecting scion material from top 1/3rd of the crown during February-March. The sprouted grafts are being maintained.

Other activities

(i) Shri T. Surendran was associated with the Projects Silvi. 04/1981 and Silvi. 07/1981.

Silvi. 04/1981: Studies on stump as planting material for Eucalyptus tereticornis plantations.

The work under this project has been completed and first draft of the report prepared.

Silvi. 07/1981: Establishment of a Bambooteaux in the Institute

Offsets of three unidentified species of bamboos (Local names: *Oorenkolli, Erankal* and *Karuthimula)* were collected from Erumamunda (Nilambur Forest Division) and planted in the Bambooteaux at Nilambur.

(ii) In collaboration with the Silvicultural Research Wing of the Kerala Forest Department, a field trial on vegetative propagation of bamboos and reeds *(Bambusa balcooa, Bambusa vulgaris* and *Ochlandra travancorica)* was undertaken during 1983-84. Successfully rooted cuttings of these species were field-planted during June 1984 in ca. 4-ha at Kollathirumedu (Vazhachal Forest Division). Regular observations on survival and field establishment were recorded.

(iii) As per the request from the Kerala Forest Department, a detailed note was furnished on vegetative propagation of *Ochlandra travancorica*.

BOTANY (TAXONOMY)

Bot 04/1982: Establishment of a herbarium in the Institute

The objective of this project is to build up a herbarium of flowering plants of Kerala State. Collections were made from Nelliampathy, Sholayar, Pattikkad, Moozhiyar, Vazhachal, Nilambur, Peechi, Ponmudi and Neyyar Dam area and a total of 500 specimens were added to the herbarium. This include *Piper barberi* Gamble, an endangered species, *Sarcandra chloranthoides* Gard., a vesselless Angiosperm, *Memecylon gracile* Bedd. and *Turraea villosa*, a little known taxa.

Bot 05/1982: Morphological, anatomical and physical properties of Calamus spp. of Kerala forests

The objectives are (a) to prepare a key for the identification of *Calamus* species based on morphological and anatomical characteristics, (b) to study the basic density variation along the stem and (c) to maintain a live collection in the Institute campus.

Collections were made from all the forest divisions of Kerala and a total of 10 species could be collected. In general, it can be said that forests at Thenmala, Ranni, Konni, Palghat and Nilambur divisions are comparatively rich in *Calamus* populations.

Based on diameter, the Kerala canes can be classified into three groups: large diameter (>20 mm) - 2 species; medium diameter (10-20 mm) - 3 species and small diameter (<10 mm) - 5 species. Specific gravity is high in small diameter canes and vice versa. The mean internodal length was short in small diameter canes and long in large diameter ones. Detailed anatomical studies by sectioning and maceration are under progress.

One-year-old seedlings of *C. hookerianus* were out-planted near Peechi reservoir and that of *C. hookerianus* and *C. thwaitesii*, in Nilambur. Growth measurements are recorded regularly.

Bot 06/1983: Preservation of Dalbergia L. f. in Kerala by establishment of a germplasm bank

The objectives of this project sponsored by the Department of Environment, Government of India are (a) collection of live materials of all species of *Dalbergia* in Kerala, (b) identification of various species under the genus, (c) raising a live collection of the genus in the Institute, (d) preparation of a taxonomic account with dichotomous keys and illustrated descriptions and (e) preparation of a distribution map.

Based on the data gathered from literature and consultation of various herbaria, exploration work was continued. Specimens and propagules, for the taxonomic study and for raising a live-collection of the following species were collected: *D. beddomei, D. benthamii, D. candenatensis, D. lanceolaria; D. latifolia, D. rubiginosa, D. sissoides, D. sissoo, D. sympathetica* and *D. volubilis*. Seedlings of the above species have been raised in polythene bags and pots. Herbarium specimens were also prepared for all the above mentioned species and taxonomic studies are in progress. Illustrations and distribution maps are also being prepared.

II. Extension

Information was given to the Kerala Forest Department for raising a medicinal plant garden and also plants of 16 species.

Other items

The Division is associated in the proposed project, 'Long term environmental and ecological studies of Pooyamkutty hydro-electric project - Western Ghats of Kerala - Preconstruction stage analysis' and an initial survey was conducted.

ECOLOGY

Ecol 01/1979: Preparation of a soil-cum-vegetation map of the forests of Trichur Division

The latest map of the Trichur Forest Division (1974) was used for reference in the beginning. Soil samples from moist deciduous and semi evergreen forests were collected from areas where vegetational studies were conducted. Aerial photographs of 1976 and 1982 were referred to precisely delimit the forested area.

Field work and analysis of data were completed in collaboration with Soil Science Division (both soil and vegetation). In respect of soil studies the following are some of the essential work done:

i) Soils from 16 profiles at zero to 150 cm. were taken from the natural forests and analysed. The analysis were restricted to gravel, sand, silt, clay, organic, carbon, pH in water, exchange acidity and exchangeable bases.

ii) Soil samples from pits at depths of 0 to 20, 20 to 40 and 40 to 60 cm. were analysed for the properties as mentioned above. Besides, bulk density was also determined.

iii) Soil samples from 45 pits at depths of 0 to 20, 20 to 40 and 40 to 60 cm. were taken from various plantations also and the soil samples analysed for the properties as mentioned under soil properties.

From the point of view of vegetation 45 areas were selected from both moist deciduous and semievergreen forests and the vegetational analysis were done by list count quadrat method. The parameters chosen were girth classes of individuel trees, relative frequency, relative density and relative basal area. From these, Importance Value Index were calculated to derive various associations. Profiles of important areas were drawn.

Appropriate statistical analysis of the data was carried out with the help of the Statistics Division. Suitable maps were prepared. The final report is under preparation.

Ecol 02/1979: A field key to the identification of indigenous arborescent species of Kerala based on eco-taxonomic features

The report on the above project has been written. Tree species of over 10 cm. in height and numbering 341 were selected from various floras dealing with the state of Kerala and a number of dependable diagnostic characters were chosen for preparing the artificial vegetative key.

Besides the key, a detailed annotation of the species dealt with, an index to binomials and Malayalam names were also given.

The key was field tested for its utility in various forest types and was found to be useful.

Ecol 03/1979: Eco-taxonomic study of the seedlings of commercially important species of Kerala and preparation of a key for their identification.

The report on this project has been written up and is under typing. The study included 55 commercially important species. The seedlings were either of the nursery origin from identified mother trees or from the field. Important taxonomic characters dealing with the cotyledons and first pair of leaves were used for preparing the key. Voucher herbarium specimens were made and all the species have been illustrated for an easy, spot identification. A description of the seedlings have also been provided.

The key was field tested and found to be very useful.

Ecol 04/1980 : Phenological studies in representative evergreen forests of Kerala.

Three areas were chosen for the study, viz. Chandanathode (Northern Circle) Sholayar (Central Circle) and Idukki (Southern Circle).

Analysis of data for Idukki has been completed and for the other two areas is in progress.

Ecol 05/1982: Species relation studies in the moist deciduous forests of Trichur Division.

Sixty field trips were undertaken in Trichur Forest Division covering 276 localities. Of this, 165 localities were considered for analysis. The vegetational studies were divided into two major sub-groups like, structural aspect of the vegetation and species relationship aspect.

Analysis of the above data with the assistance of Statistics Division is in progress to obtain information on characteristic species for specific habitat.

Ecol 06/1983: Impact of selection felling in a forest ecosystem in Kerala

Data pertaining to logging damages, microclimate (air temperature, relative humidity, soil temperature, soil moisture) are being gathered. Availability of light to various strata, and also before and after logging are being collected. Besides logging damages, damages due to road laying, of dragging using elephants are also being monitored. Regeneration studies have been initiated and phenological observations are continuing. Soils from unworked area were collected and analysed. Soils from worked area are yet to be collected.

ECONOMICS

Econ 02/1982: A socio-economic study of farm foresty in Kerala.

The main objective of the study is to identify the socio-economic factors that influence the cultivation of tree crops in the homesteads and house compounds in Kerala.

Initially it was proposed to undertake a detailed household survey in selected villages covering all important agroclimatic regions in Kerala and the project was submitted to NABARD for financial support. Since then NABARD did not show any interest in the proposal, the project was scaled down and work was commenced during the year. Initially three villages in Trichur district representing low land, midland and high-land were selected and after stratification of households based on size of land holding, sample households were surveyed. Complete information on socio-economic status, pattern of agriculture, intensity of tree cropping, etc. has been collected. On completion of the household survey in Trichur district, it was considered desirable to undertake a similar survey in one village in the rice cultivating region in Palghat district to compare the pattern of tree cropping in an entirely different agro-ecosystem. This was taken up in Alathur and completed. In all 249 households have been covered.

Preliminary tabulation of data has also been completed. Based on the findings from the survey of two villages a paper 'Socio-economic factors influencing farm forestry; A case study of tree cropping in the homesteads in Kerala, India' was prepared and submitted for presentation at the EWC/FAO Workshop on the socio-economic aspects of social forestry in the Asia-Pacific Region held during September 1984.

The time for completion of the project is March 1985. The report is expected to be ready by October 1985.

Econ 05/1984: History of Forest managementin Kerala

Work on the project is presently focussed on the post 1956 period Data on investment on forestry and its change over time, reflecting the changes in priority have been gathered from the administration reports. This will give a clear indication of the emerging trends in forestry.

2 Other works

A preliminary assessment of the consumption of wood in Kerala

(Authors - PK Muraleedharan, P. Rugmini and CTS Nair)

This was undertaken by the division in response to a request from the Chief Coservator of Forests (Social Forestry) in connection with the world Bank aided Social Forestry Project. The objectives of the study are (1) making a tentative assessment of the consumption of wood and (2) identifying the gaps in information to facilitate a detailed wood balance study Most of the information was collected from secondary resources. In addition wood-based industrial units were visited and discussions were held with representatives of manufacturing associations. Important conclusions from the study are as follows:

(i) Total wood consumption in 1981-82 is estimated as 11.21 million m^3 Of this firewood accounts for about 88. 5 percent.

(ii) Sawmilling continues to be the major industrial consumer accounting for about 64.4 percent of the total industrial wood use. 17.2 percent of the industrial wood consumption is accounted by pulpwood.

(iii) Recorded removal of timber and firewood accounts for only a small fraction of the total wood consumption while non-forest sources continues to be a major source of wood supply.

The report was submitted to the Chief Conservator of Forests in June 1984.

Bamboo - reed based industry in Kerala

(by CTS Nair)

The above report was prepared on the request of the FAO to be used as a document for a meeting on small scale forest based industries proposed to be held in Indonesia in September 1985. An attempt was made to quantify the contribution of reed based industries, both industrial and modern, in terms of rural employment, value added generation, basic needs fulfilment, multiplier effects, etc. A comparison between traditional industries like mat-weaving and basket making with modern manufacturing like pulp and paper clearly indicates the relevance of each sector to Kerala conditions Although the value added generated per person is very low in the traditional sector, in terms of value added generated per unit of raw material used, they have a clear advantage over the modern sector. Appropriateness of different industries have been examined on the basis of generation of basic needs income, production of basic needs goods, employment, capital labour ratio, raw material consumption per worker, skill requirement, pollution, resource depletion, self reliance, etc.

The report was submitted to FAO in February 1985.

3. The final report of Project Econ. 04/1982 submitted to the FAO has been published by the FAO. on Forestry Paper No. 53 'Intensive multiple use forest management in Kerala'.

ENTOMOLOGY

Entom 09/1983: Seasonal incidence and possible control of important insect pests of Ailanthus triphysa in Kerala.

This project was initiated in April 1983 to study the seasonal incidence of the major pests of *Ailanthus triphysa* in order to explore the feasibility of developing suitable control methods.

Further data were collected on the incidence and nature of damage caused by *Eligma narcissus* and *Atteva fabriciella* in the experimental plots at Pothuchadi. Detailed observations were made on damage to terminal buds caused by *Atteva*. Compared to previous years the damage caused by *Eligma* was negligible.

The effectiveness of the two pathogens isolated from *Eligma narcissus*, viz , the bacterium *Bacillus firmus* and the fungus, *Paeciliomyces farinosus* was further studied. *B. firmus* was found pathogenic only to *E. narcissus*, where as P. *farinosus* was pathogenic to both the pests. Selected insecticides (Cypermethrin, Ekalux and Nuvacron, were also tested under field conditions.

Information was also gathered on other insects feeding on *Ailanthus* and incidence of the two major pests in other localities.

Entom 10/1983: Studies on the natural enemies of the teak pests, Hyblaea puera and Eutectona machaeralis.

This project was initiated in April 1983 to gather information on the natural enemies of the major teak pests *Hyblaee puera* and *Eutectona machaeralis*, with a view to assess the feasibility of using natural enemies for management of the pests.

Continued survey was made for natural enemies of the teak pests at the three observation sites viz, Aravallikavu, Nedungayam and Karieum-muriem. In addition to confirming the presence of parasites and predators recorded last year, data on the percentage of parasitism by each species was obtained. While 4 species of insect parasites were found on *Hyblaee puera*, only one was recorded on *E. machaeralis*. Brief notes on the parasites are given below.

On **Hyblaea puera**:

Palexorista solennis: Recorded from all the three sites. Presence was noticed in April, May, June and July. The percentage of parasitism was low, with about 2 to 12 per cent of the larvae being infested.

Sympiesis sp. : Recorded from all the three sites. Presence was noticed in July and October. The percentage of parasitism ranged from 14 to 21 during July when the host population was generally high. In October, when the host larvae were rare, 2 out of 6 larvae from Nedungayam, 5 out of 11 larvae from Aravallikavu and 1 out of 1 larva from Kariem-muriem were infested

Ichnumonid species: One unidentified species infested 20 percent of the larvae at Aravallikavu during July. This was not recorded from other sites.

Brachymeria sp. : Recorded only from Nedungayam; during April about 2% of the larvae were infested.

In addition to the above parasites, a bacterium, *Enterobacter aerogenes* was isolated from dead larvae collected from the field. Infestation was noted during June-July.

On **Eutectona machaeralis** :

Ichneumonid species : One unidentified species infested about 23 percent of the larvae in April 1985 at Aravallikavu. There was no major outbreak of the pest during the year, but larvae were present in all the three sites during November and December. However, no parasitism was found during this period.

Entom 11/1983: A study of insect pest incidence in natural forests

This project initiated in April 1983 aims at testing the generally held assumption that pest outbreaks do not occur in natural forests as compared to plantations. The

study is also expected to yield information useful for management of pests in man-made forests through understanding of the checks and controls operating in natural forests.

Observations were continued on pest infestation in 20 selected, commercially important tree species both in the evergreen and moist-deciduous forests.

The moist deciduous species *Albizia odoratissima* and *Dalbergia Latifolia* were practically free from pest infestation *Haldina cordifolia, Tectona grandis, Gmelina arborea, Careya arborea* and *Lagerstroemia speciosa* were susceptible but severe infestation never occured in the natural habitat.

Of the evergreen species, practically all were free from major infestation although low level attack by defoliators occurred in most cases. *Litsea floribunda, Anacolosa densiflora, Antidesma tenuis* etc., were found to be susceptible to defoliators. A Cerambycid borer was collected from the trunk of *Mesua ferrea* which caused mortality of trees in natural stands.

Entom 12/1983: Search for natural resistance to the insect pest, Hyblaea puera in teak

This project was initiated in April 1983 to identify teak trees resistant to the defoliator *Hyblaea puera*, if any, so that they could be utilised for breeding resistance against the pest as part of an attempt to develop an integrated pest management system for teak plantations.

Forty six trees which escaped defoliation during the natural occurrence of infestation in the previous year were marked in plantations located at Kulathupuzha, Konni, Nilambur, Parambikulam, Neriamangalam and Wynad Based on observations of repeated escape from defoliation and on other considerations, 10 most resistant trees were selected for further investigation from among the 46 trees selected in the first round. They included 2 trees from Konni, 1 from Kulathupuzha, 2 from Nilambur, 1 from Neriamangalam, 2 from Parambikulam and 2 from Peechi. Budwood material were collected from some of the selected trees and grafts raised. This work is continuing and when all the grafts have been raised, it is proposed to test them for resistance under controlled conditions. The grafts so raised will also be planted out in the field to test them more vigorously. The present information indicates that the observed resistance/escape from defoliation is due to phenological factors.

Entom 13/1984 Biology and Ecology of the teak trunk borer, Cossus cadambae Moore. and its possible control

This project initiated in October 1984 is intended to study the biology of the teak borer, *Cossus cadambae* and factors influencing their infestation in teak plantations in order to develop suitable management strategies.

Most of the teak plantations in the Chalakudy and some in Trichur Division were found infested by *Cossus cadambae*. The larvae collected from the field are being reared in the laboratory for studying the biology. Seasonality of the insect is being studied in

the field by collecting light-trap data. An experimental plot (100 trees) has been selected at Palappilly for studying the rate of spread of this insect and its activity during the various months of the year. Two birds, a woodpecker and an undermined species other than woodpecker were found to predate on the larvae in the field.

Other activities:

1. Statistical analysis of the data from the completed project Entom 02 (Effect of defoliation on volume increment of teak) was completed using the computer facility at Kerala University, Trivandrum. The results show that 44% of the potential volume growth is lost due to defoliation. Preparation of the final report of this project is in progress. Under project Entom 05 (Biology and control of insect pests of fast growing hardwood species) the experimental work has been completed and data processing is in progress.

2. Several instances of insect damage reported by the Forest Department as listed below were investigated and advice given on control.

Tree species	Problem caused by	Location
Teak; nursery	White grubs	Chengannoor
Teak; plantation	Gall insects	Pothuchadi
Teak; plantation	*Cossus cadambae*	Parambikulam
Ailanthus triphysa	*Eligma narcissus and Atteva fabricella*	Kodanad
Albizia falcataria	Bagworm	Arippa and Punalur
Eucalyptus spp.	Bagworms	Kalamassery
Mahogony; saplings	*Hypsipyle robusta*	Adoor, Kannoth
Ipil Ipil	Termites/White grubs	Angamoozhi
Casuarina	*Sahyadrassus malabaricus*	Kasargode
Sandal	Unidentified bugs	Kodanad
Petrocarpus santalinus	Caterpillars	Palappilly.

GENETICS

Genet 02/1979: Improvement of eucalypts by selection and interspecific hybridization

Objectives of the project: The project was initiated with the objective of genetic improvement of eucalypts in Kerala by selection and interspecific hybridization.

Work done during the period under report included selection of more plus trees in *Eucalyptus grandis* and seed collection for use in establishing a progeny trial. Trees from selected provenances raised in pots for use in controlled crossings were maintained. They were not flowered as yet.

Genet 03/1979: Genetic improvement of matchwood species Bombax ceiba, and Ailanthus triphysa

The Objective of the project is to increase wood yield and quality of match wood from these species.

i) Established a one parent progeny trial of *Ailanthus triphyse* incorporating 10 selected superior trees.

ii) Established families from one-parent progeny trials of *Bombax ceiba* and *Bombax insigne*.

iii) Carried out grafting trials in *Bombax ceiba* and *Bombax insigne*. Heteroplastic grafts were also attempted between the two species with good success.

iv) Data on survival and height of the plants in the progeny trials were recorded.

Genet 04/1979: Provenance and floral biological studies Gmelina arborea

This study aims at detailed study of the floral biology of the species and selection of the suitable provenance for Kerala conditions.

Observations were made on the different characteristics like girth, height of clear bole, taper, flowering and fruiting. Controlled pollination studies were also conducted. The data collected are under statistical analysis.

Genet 05/1982: Management practices for teak seed orchards

The project envisages to evolve a package of practices for the management of teak seed orchards in Kerala.

Work done during the period under report included operations like weeding, pruning, casuality replacement protection etc. Soil analysis and manuring were also conducted.

Other activities:

i. Associated in the project concerned with screening for *Hyblaea puera* resistance in teak initiated by the entomology division. Observations were made on the flushing phenology and seasonal performance of the plus trees selected with regard to *Hyblaea* attack. Scion materials were collected from the trees which were apparently resistant and grafts raised for further testing under controlled conditions.

ii. Progeny trials in *Bambusa arundinacea* : Two one-parent Progeny trials of *Bambusa arundinacea* were laid out, one at Vellanikkara and the other at Nilambur, incorporating 12 families. Data on survival, height and number of culms were collected.

iii. A one-parent progeny trial of Mahagony was laid out at Nilambur incorporating 10 families. Data on survival and height were recorded.

iv. A trial of *Acacia* spp. was laid out at Nilambur incorporating 8 families. Data on height and survival were collected.

v. Progeny trial of *Albizia* was laid out at Nilambur incorporating 4 families Data on height and survival were collected.

vi. Progeny trial of *Leuceene* was laid out at Nilambur incorporating 6 families. Data on height and survival were collected.

vii. Extended assistance in the selection and maintenance of teak seed production areas by the Kerala Forest Department.

viii. Collected scion materials from 30 plus trees and raised grafts for the establishment of a production teak seed orchard at Nilambur.

PLANT PATHOLOGY (FUNGAL DISEASES)

Pathol F 01/1979: Survey of representative plantations in Kerala for leaf, stem and root diseases of forest trees and assessment of level of infection

The objectives are (i) To prepare a checklist of pathogens responsible for causing various diseases in plantations of eucalypts, teak, balsa, rosewood, *Gmelina arborea*, *Bombax ceiba* and *Ailanthus triphysa*. (ii) To assess the level of infection of major diseases.

The field observations on survey of representative plantations and nurseries were completed. Observations on the effect of *Cryphonectria* on coppicing were recorded.

Pathogenicity of various pathogens, viz. *Pseudomonas*, *Pseudoepicoccum* on teak *Colletotrichum*, *Corynespora* on *Gmelina*, *Cryphonectria cubensis* and *C. gyrose* on different provenances of *Eucalyptus* were confirmed.

The details of new species of *Phomopsis*, *Pseudoepicoccum* on teak, *Meliola* on *Ailanthus*, *Cytospora* and *valsa* on *Eucalyptus* were studied and morphological and cultural characters recorded. The descriptions were given for Latin translation.

Thirty five specimens of various fungal fructifications were prepared for scanning electron microscopy and SEM was done at the School of Biological Sciences, Madurai Kamaraj University, Madurai, Tamil Nadu after freeze drying and gold plating the specimens under vacuum. The morphology of the fructifications was studied under Hitachi S-540 Scanning Electron Microscope and photographs prepared.

Details of fructifications of various pathogens such as *Coniella*, *Cytospora*, *Valsa*, *Hendersonula*, *Hysterium*, *Cryphonectria*, *Physalospora*, *Griphosphaeria*, *Macrovalsaria* and rusts of teak, *Bombax* and *Dalbergia* were studied in microtome sections prepared using Cryomicrotome; semi-permanent and permanent slides were prepared.

Cultural characteristics of fungal and bacterial isolates of various pathogens were studied and identification attempted. For confirmation 60 isolates and 8 herbarium specimens were forwarded to Commonwealth Mycological Institute, Kew, U. K. During the reporting period confirmation of 45 isolates and 4 herbarium specimens was received from CMI.

The project work has been completed and data pertaining to incidence and level of severity of major diseases were analysed. The first draft of the report has been prepared

and typing is in progress. Plates of photographs showing symptoms and morphological details of various diseases are being prepared.

Pathol F 02/1979: Epidemiology of Cylindrocladium associated with Eucalyptus leaf blight and its control using soil fumigants and systemic fungicides.

This project was undertaken with the view to find out (i) the prevalent species of *Cylindrocladium* in Kerala and its distribution, (ii) Host-pathogen relationships, mode of infection, survival capability and genetical variability of the pathogen, (iii) Diurnal and seasonal variations in the incidence of conidia and its relation to disease severity and climate, and (iv) Methods of chemical control.

1. Field observations were completed.

2. Following epidemiological studies were completed:

   a) Effect of temperature and pH on conidial germination of *C. quinqueseptatum* was studied,

   b) The infection process (penetration by the germ tubes) of *C. quinqueseptatum*, was studied through scanning electron microscopy at different time intervals—penetration usually occurred through epidermis within 3-4 hours of incubation at 25°C.

3. To ascertain genetical variability in isolates of *C quinqueseptatum* following studies were completed.

   a) Growth (diam and morphological characteristics) of 5 isolates, selected in earlier experiments, was studied on 10 different growth media-isolates showed marked differences in the sporulation, microsclerotia production, colony colour, and diameter growth.

4 Project has been completed. The data from the various experiments were processed and tables prepared for statistical analysis.

Pathol F 03/1982: Diseases of Albizia falcataria in Kerala and their possible control measures

Objectives: (i) to prepare a checklist of prevalent diseases of A. falcataria in nurseries and plantations, (ii) to assess the level of infection of serious diseases; (iii) to suggest chemical control measures for diseases of major concern.

Field Studies

Observations on incidance and spread of die-back disease in selected plots of representative plantations were continued. Artificial inoculation tests with *Botryodiplodia theobromae*, *Phomopsis mendax* and *Hypoxylon* spp. were repeated on 1- and 3-year-old *A. falcataria* respectively at KFRI Campus and Kattilappara. Thenmala and pathogenicity of two former pathogens confirmed. The role of tapioca stem as a source of inoculum

and of fire as a predisposing factor on the incidence of die-back disease was studied under artificial conditions.

Lab. Studies

i. Of the thirteen fungicides screened *in vitro* against two strains of *Rhizoctonia solani* causing web blight of seedlings of *A. falcataria*, the efficacy of the two most effective ones, i.e. Terrachlor Super-X and Bavistin was tested *in vivo* studies. Fungicides were applied separately in two sets: immediately after transplanting, before a week of transplanting and after a week of transplanting of seedlings in the infested soil. Bavistin at 0.01% (a. i.) was found to be very effective in controlling the web blight causd by both the strains (highly and less aggressive). Terrachlor was effective against less aggressive strain only.

ii. An experiment was conducted to study the rate of spread of mycelium of *R. solani* under different soil moisture regimes.

iii. Leaf and petioles infected with *R. solani* were fixed for histopathological studies using TEM and SEM.

iv. Pathogenicity tests of *Pythium* sp., causing damping of seedlings of *A. falcataria* were unsuccessful.

Extension work

During the reporting period various disease problems of *Ailanthus triphysa, A. grandis, Casuarina equisitifolia*, Tamarind, Neem, *Bambusa, Acacia auriculiformis*, Teak, *Eucalyptus* spp., Mohogany, *Pterocarpus* sp., *Lagerstromia speciosa* at Mysore, Thodupuzha, Tirunelveli, puthoor, Nilambur, Kasaragod, Adoor, Achoornam, Chengannur, Trivandrum, Vazhachal, Malappuram, Moovattupuzha, Kalady, Kodanad, Kothamangalam, Varapuzha, Pandupara, Asamannoor, V Vadavukodu, Ambalamukal, CTCRI (Trivandrum) referred to the Division by the Forest Department and other Agencies were investigated and recommendations sent for remedial measures in the Extension Report.

Most of the disease problems were related to seedlings in Social Forestry nurseries.

PLANT PATHOLOGY (NON-FUNGAL DISEASES)

Pathol NF 02/1979: Studies on the little leaf disease of eucalypts

Objectives: (1) To find out the nature of the causal agent of the disease and its mode of transmission (2) To develop a method of detection of diseased trees in the field.

The project report was published as KFRI Research Report 25.

Pathol NF 03/1980: Studies on the spike disease of sandal

Objectives: (1) Isolation, characterisation and identification of causal agent (2) Possible control of the disease in the field.

Studies were continued to detect the insect vector of sandal spike disease in Marayoor Sandal reserve forests where the disease is prevalent. Several insects were

collected during night using light traps and during the day using sweep net. The collections mainly consisted of moths and butterflies. *Nephotettix virescens* were also collected in the trap. These insects were discarded as they had been reported not to be the vector of the spike disease. Further-more, the diseased and healthy trees were closely observed and doubtful insects particulary those that are sap sucking were collected using aspirator. A pentatomid bug, *Halya dentatus* collected, appeared to thrive well on diseased as well as healthy sandal trees. However, transmission experiments using this insect gave negative results. Another insect identified as *Redarator bimaculatus* was collected in large numbers both from diseased and healthy trees. This insect was observed throughout the year in the spiked area while they were rarely seen in other sandal reserves with no spike disease Attempts to transmit the disease on 6-12-month-old seedlings through *R. bimaculatus* gave positive results. presence of Mycoplasma-like-organisms (MLO) in the salivary glands and intestine of the insect and in the tissue of vector-transmitted spiked seedlings was confirmed through transmission electron microscopy

The project report has been prepared and typing is in progress. Photographic plates are also being prepared.

Pathol NF 04/1982: Root nodulation potentialites of Leucaena leucocephala in Kerala.

Objectives: Acquisition and isolation of suitable rhizobial strains and investigations on their effectiveness.

Based on the results of last years nursery trials three isolates each of local and exotic strains of rhizobium, nodulating roots of *Leucaena leucocephala* were utilized for testing their efficiency in different soil pH. Quantity of sulphur and lime to adjust the required pH was standardised. Polythene containers filled with pH adjusted soil were prepared for raising the *Leucaena* seedlings. The experiment is in progress.

Pathol NF 05/1984: Control of Teak mistletoe through trunk injection of chemicals

Objectives: To find out suitable chemicals for selective killing of mistletoe and to standardise their dose and time of application.

In addition to various herbicides, viz. Afalon, Tolkan, Gramoxone, Dalapon and Sencor screened earlier, which showed selective killing of the mistletoe, three new herbicides viz., Glyphosate, Delchlor and Atrazine and two adjuvants, viz., Ethokem and NPX Agro adjuvant were procured for tree infusion experiments. Sencor, Glyphosate and Atrazine were infused into parasite attacked trees in an 18-year-old teak plantation at Potta in Machad Range, Wadakkancherry, with and without adjuvants. Observations on the effect of these herbicides on host and parasite are being recorded.

Other activities:

The Division is associated with the project Wood 05/1980: Natural durability of ommercial timbers of Kerala with reference to decay. The project work has been completed.

SILVICULTURE

Silvi 01/1977: Silviculture and management of fast growing indigenous hardwood species with multiple end uses

Objectives: (a) To study natural variability and to locate good seed stands of *Gmelina arborea*, *Anthocephalus chinensis* and *Melia dubia (sym. M. composita)*; (b) to study seed variability and standardize nursery practices; (c) To provide technical guidance to raise plantations.

The data on height, girth, survival etc. with regard to *Gmelina arborea* provenance trials collected during the last seven years were compiled and the analysis is in progress. It is interesting to note that the growth of *Gmelina arborea* appears very similar to that of teak of the same age, in the adjoining area. Thinning is necessary in the *Gmelina* plots now.

The report is ready for submission.

Silvi 02/1977: Study of afforestation techniques of the grass lands of Kerala

Objectives: (a) To carry out field trials to identify commercially valuable species for afforestation of grasslands and (b) To standardize economic method for raising plantations.

The report after discussion in the IRC/SIC is ready for publication.

Silvi 04/1981: Studies on the utilization of stump as planting material for raising plantations of Eucalyptus tereticornis

Objectives: To standardize the practices for raising plantations of *Eucalyptus tereticornis* with stumps as planting material. The experimental part of the project was over by June 1984. The data is being analysed and the report will be ready shortly.

Silvi 05/1981: Studies on the effect of slash burning on planting site for teak

Objectives: To find out whether slash burning is necessary at all and if necessary to evolve a practice of slash burning which is acceptable with respect to most of the positive effects with specific reference to (a) Rate of growth (b) soil properties and (c) weed growth.

The usual periodic observations on height, girth and survival of teak were taken on May and November 1984. The observations recorded so far reveal that

(1) The treatment "no burning with taungya" gave maximum height growth and

(2) Weed growth was almost the same in all plots and *Chromolaena odorata* (Syn. *Eupatarium oderatum*) was the major weed.

The experiment will be completed by the end of this year (1985).

Silvi 06/1981: Estimation of quantity of Eucalyptus seeds for sowing in nurseries.

Objectives: To evolve a suitable method to determine the germinability and prefix the quantity of seeds of *Eucalyptus tereticornis* and *Eucalyptus grandis* to be sown in a standard bed. The repetition of the experimental trial which was proposed to be done during August-September 1984, was not possible due to the frequent rain. The work is being continued.

Silvi 07/1981: Establishment of the Bamboo-teauxe in the Institute

Objectives: Collection, identification and establishment of Indian species of bamboos. The following species were planted in the bambooteaux.

1. *Bambusa balcooa*
2. *Dendrocalamus brandisii*
3. *Dendrocalamus giguntеus*
4. *Oxytenanthera monostigma*
5. *Bambusa tulda* (Assam)
6. *Bijuli* (Assam)
7. Koorankolli

So far, 19 species of Bamboos have been introduced. Additons to this collection will be made as and when new materials are located.

Silvi 08/1984: Possibility of employing polyurethane foam nursery technique for various important forest species

Objectives: To investigate into the suitability of polyurethane foam nursery technique for various species of forestry importance and standardize the nursery practices of the same.

While it has succeeded with *Eucalyptus tereticornis*, experiments are afoot with *Anthocephalus chinensis, Eucalyptus camaedulensis* and *Casuarina equisetifolia*.

Miscellaneous trials

Objectives: To study seasonal growth pattern of the following tree species.

		introduced in
1.	*Ailanthus triphysa*	1982-83
2.	*Chukarasia tabularis*	Jan. 1984
3.	*Swietenia macrophylla*	Jan. 1984
4.	*Pterocarpus indicus* (Phillipines)	Oct. 1984
5.	*Pterocarpus santalinus*	Oct. 1984
6.	*Pterocarpus dalbergiodes*	Oct. 1984
7.	*Pterocarpus marsupium*	Oct. 1984
8.	*Acacia mangium*	Jan. 1985
9.	*Calliandra calothyrsus*	Jan. 1985

Measurements are being taken monthly on every 5th day except in the case of *Pterocarpus* species, where measurements are recorded fortnightly. The measurements will be taken for a period of two years from the date of planting.

Following plots were laid out in June-July 1984 at Nilambur subcentre with the view of having small sample plots of different species within the campus.

Sl. No.	Species	Espacement	No. of plants planted
1.	*Pterocarpus santalinus*	M × 2M	100
2.	*Pterocarpus indicus*	,,	50
3.	*Pterocarpus dalbergioides*	,,	50
4.	*Pterocarpus marsupium*	,,	100
5.	*Leucaena leucocephala* Var K 28	,,	20
6.	,, Var K 72	,,	8
7.	,, Var K 8	,,	20
8.	*Pinus patula*	,,	20
9.	*Acacia* sp.	,,	60
10.	*Acacia nilotica* (var Rambealli)	,,	60
11.	*Erythrina strita*	,,	50
12.	*Ochroma pyramidale*	,,	100
13.	*Melia azadirach*	,,	100
14.	*Acacia nilotica*	,,	48
15.	*Albizia lebbeck*	,,	182
16.	*Calliandra calothyrsus*	,,	80

Training;

Sri. K. C. Chacko, Junior Silviculturist was deputed for undergoing the two year training course in the State Forest Service College, Coimbatore commencing from 1. 1. 1985.

SOIL SCIENCE

Soil 07/1981: Effect of Mussoorie Phos on the growth of Eucalyptus tereticornis seedlings

Findings were published as Research Report 23. Conclusion: Pot trial of eucalypt seedlings in strongly to medium acidic soil indicates good response to Mussoorie Phos (MP) inputs. On a medium acidic soil 150 g MP placed at 20 cm depth has maximum effect on root growth of seedlings. Pilot field trial on a medium acidic soil reveals significant increase in girth of saplings on addition of 100g MP/seedling. Hence 100-150g MP is recommended for application in the pit at planting time, 10-20 cm deep and 10cm away from seedlings, for better establishment and growth of eucalypt seedlings in medium to strongly acidic soils.

Soils 08/1982: Foliar analysis in Eucalyptus tereticornis and E. grandis to assess soil test methods for nitrogen, phosphorus and potassium.

Objective: Evaluation of nitrogen, phosphorus and potassium levels in leaves to assess the requirements of eucalypts for these nutrients and correlation of tree nutrient content with that of the soil.

Two study sites were selected one in 1977 *E. tereticornis* and the other in 1980 *E grandis* plantation. Soil sampling consisted of 12 soil pits in each site with 0-20, 20-40 and 40-60 cm depths of sampling; plant samples were taken during three seasons. Completed nitrogen, phosphorus and potassium analyses of soil and plant samples Data analysis is in progress.

Soil 09/1982: Physical properties of soils in relation to Eucelypt growth

Objective: Establish the relationship between soil physical properties and height growth of eucalypts.

Two study sites were selected one in 1977 *E. tereticornis* and the other in 1980 *E. grandis* plantation. Soil sampling comprised 12 pits in each site with 0-20, 20-40 and 40-60 cm depths of sampling. Tree parameters were also taken Completed soil separates bulk density, particle density and water-holding capacity analyses. Data analysis is in progress.

Soils 10/1984: Soils in teak plantations of different site quality

Objective: Indepth study of various soil parameters in teak plantations in relation to site quality, I, II, III and IV. This investigation should disclose the integrative soil parameters influencing site productivity.

Study transects are in teak plantations of Thenmala, Konni, Malayattoor, Nilambur, Chedleth and Begur areas. Soil sampling in Nilambur site was completed.

Soils 11/1984: Physical and chemical properties of soils in Albizia falcataria plantations

Objective: Indepth study of physical and chemical properties of soils in albizia plantations.

Study sites selected are in 1977 Arippa and Kollathirumed plantations. Soil sampling consisted of 20 pits in each location with 0-20, 20-40 and 40-60 cm depths of sampling. Tree parameters were also taken. Soil samples are being analysed.

Soils 12/1984: Nutrient partitioning in an evergreen forest ecosystem

Objective: Establish the nitrogen, phosphorus, potassium, calcium and magnesium distribution pattern in an evergreen forest ecosystem.

Study area is in Pothumala, Nelliampathi Range. Demarcation, enumeration of species and sampling of wood, leaf litter and soil components are in progress.

Soils 13/1984: Effect of varying soil moisture and bulk density on root growth of teak, eucalypt and albizia seedlings.

Objective: Determination of root dry matter yield of teak, eucalypt and albizia seedlings raised in pot culture under varying moisture and bulk density.

Completed soil sampling and fabrication of soil press. Seedlings are being raised.

Soils 14/1984: Ex-situ decomposition of leaf litters of teak; eucalypt and albizia

Objective: Study on the decomposition and incorporation of leaf litters of teak, eucalypt and albizia in plantation soils under controlled conditions and elaboration of the microflora involved in decomposition.

Collection was done for leaf litters and respective surface soils from teak, eucalypt and albizia plantations. Incubation and field investigation with litter bags are in progress.

Interdisciplinary Projects

The Division associated with the following projects of Botany (Taxonomy), Ecology and Silviculture Divisions

Bot 01/1979

Study of soil requirements for selected medicinal plants and study of soils in the medicinal plants garden at Peechi

Ecol 01/1979

Study of soils in natural forests and plantations for preparation of soil-cum-vegetation map of Trichur Forest Division. Completed analysis on 367 samples collected from 89 soil pits and 16 profiles. Data sheets were prepared.

Silvi 02/1977

Study of soil properties of experimental plots at Chandanathod Data were included the Project Report (to be published).

Silvi 05/1981

Study of soil properties before burning, after burning and after final taungya cropping in Mundakkadavu area.

Other Activities:

The Division attended to the following queries:

Suitability of *Acacia mearnsii* in Surianelli area of Devicolam Range, Munnar Forest Divison. Provided the necessary help to Silviculturist.

Advice on suitable species for planting programme in Agali Range, Palghat Special Forest Division.

Fertilizer recommendation for seed production plantations of teak in Kulathuppuzha, Kodanad, Peermed, Olavakkot, Nilambur and Mananthavadi Research Ranges.

Suitability of *Casuarina equisetifolia* and *Acacia auriculiformis* for intercropping in cashew plantations. Discussion with Divisional Forest Officer, Trichur.

Wilting of *Casuarina* seedlings in the Medical College Campus, Kottayam. Recommendation was sent to the Range Officer (Social Forestry).

Studies on soil erosion in different agroclimatic regions. Data collected from the KFRI plots were forwarded to Water Management (Agri) Division, CWRDM, Kunnamangalam.

Mortality of teak in Parambikkulam. The plantations were studied for ascertaining whether soil factors are causing the mortality. Discussion with Divisional Forest Officer, Parambikkulam.

STATISTICS

Stat 02/1977: A data bank for forestry sector in Kerala

The project had the objective of collecting and compiling data pertaining to forestry and allied activities in the State. As a first step in this direction a complete list of items on which data would need to be gathered was prepared with the associated defenitions of each of the terms involved. Since it was expressed by the last Research Advisory Committee that the data supplied by the Forest Department can be relied upon, the data available in the Administration Reports of the Forest Department was considered for compilation. The data for the period since 1956 are being compiled.

A request was sent to the Divisional Forest Officers to supply the data on age and species-wise area under plantations in each range and the data has been received from a number of Divisions. The data relating to the price of timber in the State collected from sixteen major timber depots are being updated.

Efforts are under way to initiate a periodic flow of data from the Forest Department to the Institute at the primary source level i. e., Range Office in order to check the loss of data, occurring there due to improper storing of old files.

Stat 05/1979: Analysis of factors influencing timber prices in Kerala

The project is completed. Final report has been prepared.

Stat 06/1984: Statistical techniques in forestry research and forestry

The project was initiated with a view to equip the Division with the recent statistical techniques so as to improve upon its advisory function. This called for a review

of the available literature on forest statistics and also the task of finding new applications of statistics in forestry research and forestry.

The review has indicated a wide variety of basic statistical techniques being applied in these fields though without much thought into the limitations inherent in them. Many of the works have also failed to incorporate the recent developments in the field. A comprehensive report on the more recent statistical techniques of potential application in forestry research indicating their methodology and use is under preparation.

Interdisciplinary Projects

Division is associating with the project Econ 02/1982-A Socio-economic study of farm forestry in Kerala. One Scientist-E and the Field Assistant were completely engaged during the first half of the period under report in the preparation of the questionnaire of the household survey for the project and collection of data. The data collected through the survey were compiled.

The Division participated in the preparation of an interim report- 'A preliminary assessment of the consumption of wood in Kerala' for the Kerala Forest Department.

Other activities:

The Division also attended to the statistical planning and inferential problems pertaining to the following research projects undertaken in other Divisions.

1. Pathol NF 03/1980 : Studies on the spike disease of sandal.
2. Entom 02/1977 : Studies on the seasonal incidence of teak defoliators and the effect of defoliation on volume increment of teak.
3. Entom 13/1984 : Biology, ecology and possibility of control of the teak trunk borer *Cossus Cadambae*.
4. Silvi 08/1983 : Polyurethane foam sheet for raising forest tree seedlings.
5. Wild 05/1983 : Habitat utilization by large mammals in teak plantations and natural forests.
6. Wood 08/1984 : Comparison of wilt-diseased and non-diseased (over aged) coconut stem wood with respect to their utilization potential.
7. Physiol 02/1979 : Investigations on the possibility of vegetative propagation of bamboos and reeds by stem cuttings.
8. Soils 09/1982 : Physical properties of soils in relation to eucalypt growth.
9. Soils 13/1984 : Effect of varying soil moisture and bulk density on root growth of teak, eucalypt and albizia seedlings.

10. Soils 14/1984 : Ex-situ decomposition of leaf litters of teak, eucalypt and albizia.

Sixteen lectures on Basic Statistics were delivered to the scientific staff of the Institute as a part of the orientation programme in Statistics.

WILDLIFE BIOLOGY

Wild 02/1977: An ecological study in Periyar in Tiger Reserve with special reference to wildlife

The suggestions made by the referees were incorporated in the final report. The report was submitted to the sponsoring agency.

Wild 03/1980: Long term environmental and ecological impact of multipurpose river valley projects - A comprehensive study in Western Ghats - wildlife studies.

Analysis of data was carried out and a report prepared. The impact of the Idukki hydro electricity Project to the wild animals was evaluated and few recommendations made. The report was submitted to the sponsoring agency. Ecology Division of KFRI collaborated in this project.

Wild 04/1983: Ecology and behaviour of Malabar Giant Squirrel Ratafa indica maxima schreber.

A major part of observation and data collection in this project was carried out during April 1984 to March 1985.

Bend tail, the recognizable female individual selected for observation and its marked young one was followed and their movement and occupation of different nests in the study area recorded. Various interactions between the mother and young one were observed and photographed. During the period some of the male giant squirrel in the study area were tracked The males were not found to have any role in the care of the young ones. Mother-young relationship was the predominant social interaction in the giant squirrels.

Bonnet macaques were found to feed on the fruits of *Schleichera oleosa* during June 1984. The giant squirrels did not show any direct interaction with the bonnet monkeys. They were some times found to feed on the same tree. On two occasions the giant squirrel showed avoidance to the troop of bonnet macaques. A troop of Nilgiri langur also occasionally visited the study area.

The Home range of Bend tail and its marked young one was noted. In December 1984 one instance of courting and mating of giant squirrel was observed. In January 1985 Bend tail gave birth to another young one. By this time Bend tail had no interaction with the previous marked offspring. They started using different nests. The new young one was weighed and photographed. The young one weighed 80 gms and

the eyes were not open by about 15 days after birth. The Bend tail shifted the young one to another nest in the study area.

The study shows that the mother giant squirrel shifts its young one from one nest to another. During the subsequent visits attempts were made to locate the young one of the Bend tail. It appears that the young one has died, probably due to predation.

During the period from April 1984 to March 1985 phenological data of flowering, fruiting, leaf fall and flushing were also noted in the selected tree species in the study area. This was for studying the monthly food availability to the giant squirrels in the study area.

Wild 05/1983 Habitat utilization by large mammals in teak plantations and natural forests

Observations in the transects laid out in zero year, three year, 20 year old, 60 year old teak plantations and natural forest was continued. Data were collected at three monthly intervals on the food availability, habitat use by animals and damage to plants. Feeding trials on captive elephants, samber and spotted deer were carried out to determine the importance of different species to the animals. The plantations seem to have different plant combinations and animal occupancy at different ages.

Wild 06/1984: Movement pattern of Asiatic Elephant, Elephas maximus in Parambikulam Wildlife Sanctuary.

A herd of eleven elephants were selected for the study. The herd consisted of 4 adult females, 4 juvenils females, one juvenile male and two babies of which one is a male. One adult male was seen joining the herd occasionally and leaving after one or two days.

The herd was followed and the route was plotted in a map. They were found to follow a fixed route unless they were disturbed. Human interference such as forestry operations and tourism were the major disturbances that made them deviate from their route. During summer, the movement was comparatively less and they were often seen around the lake area because of the lack of water in other areas.

The herd is being followed and data collected.

WOOD SCIENCE

Wood 02/1979: Effect of age and location on pulpwood quality of Eucalyptus grandis

The objectives are (a) to study the effect of age and locality on the pulpwood quality parameters, viz., wood density and fibre length and (b) to elucidate the relationships between these parameters and tree growth indicators like height and diameter.

The preliminary results show that there is no significant difference in wood density between 3-year-old and 7-year-old trees, indicating no loss in pulp yield, if 3-year-old

trees are pulped as against 7-year-old trees. Investigation on wood density of 9-year-old trees and fibre length in trees of different ages is in progress.

Wood 05/1980 : Natural durability of commercial timbers of Kerala with reference to decay

The objectives are to assess the resistance of commercial timbers of Kerala against decay caused by wood-rotting fungi and rate these timbers into different durability classes.

Samples from *Vepris bilocularis* were exposed to three white-rot fungi, viz., *Polyporus versicolor, P. hirsutus* and *P. sanguineus* and two brown-rot fungi, viz., *P. palustris* and *Gloeophyllum trabeum*. *V. bilocularis* is moderately resistant against *P. versicolor, P. hirsutus* and *P. palustris* and resistant against *P. sanguineus* and highly resistant against *G trabeum*.

Hopea parviflora is highly resistant against the above three white-rot and two brown-rot fungi. *H. parviflora* can be classified as Class I timber (highly resistant).

Samples from *Vateria indica* when exposed to *P. versicolor* and *P. hirsutus* (white-rot fungi) lost 12.58 and 5.37 percent respectively of the original weight. Hence they can be included under resistant class against *P. versicolor* and highly resistant class against *P. hirsutus*.

Wood 06/1982: Wood and bark properties of branches of selected tree species in Kerala

The objectives of this study are (a) to determine the physical properties of branches such as basic density of wood and bark, bark percentage, and compare them with those of stems and (b) to investigate the anatomical properties, viz., percentage of heartwood (if distinct) and cell types (fibres, vessels, rays and parenchyma) and fibre dimensions.

Field and laboratory work have been completed. Data analysis is in progress and the final report is under preparation.

Wood 07/1982: Establishment of Xylarium

The objectives are (a) identification and collection of wood samples of Kerala timbers, (b) collection of voucher specimens and (c) preparation and collection of authentic slides of wood samples.

Four samples were added to the collection accounting for a total of 58 species. Preparation of slides and identification of wood samples are in progress.

Wood 08/1984: Comparison of wilt-diseased and non-diseased (overaged) coconut stem wood with respect to their utilization potential

The objectives are (a) to generate basic information on physical and mechanical properties of wilt-diseased and non-diseased coconut stem wood, (b) to determine sawn timber output and (c) to evaluate charcoal production by portable unit.

Ten wilt-diseased palms each of three age groups (15-25years; 35-45 years and 55–65 years) and 10 senile palms (non-diseased) were converted to sawn sizes. Recovery of sawn sizes is higher in non-diseased senile palms (26.5%). The diseased palms of lower age groups (15 to 45 years) contain only 12 to 16 percent sawn sizes. Density measurements of samples from different locations of palms have been completed.

Extension

Wood samples were identified for the Kerala Forest Department and the Central Warehousing Corporation. Information on the treatment of rubber wood was given to 18 different parties. Technical details of seasoning kiln were given to three parties. General information on wood and wood products was given to four parties. Treated rubber wood samples were analysed for a firm. *Euphorbia neriifolia* was tested for latex content for the Karnataka Forest Department. Commissioning trails of seasoning kilns were undertaken for M/s. Kerala State Wood Industries Ltd., Nilambur.

MULTIDISCIPLINARY PROJECTS

Genl 03/1985: Long-term environmental and ecological studies of Pooyamkutty hydroelectric project - Western Ghats of Kerala - Preconstruction stage analysis

This is a project sponsored by the Department of Environment, Govt. of India and is multidisciplinary in nature with the involvement of following disciplines:

Ecology, Soil Science, Botany (Taxonomy), Wildlife,
Forest Economics and Silviculture.

The objective is to generate baseline data prior to the construction of this hydroelectric project so that an impact assessment can be made later during and after completion of the construction.

The following aspects will be investigated:

1. Land use pattern
2. Vegetation and Ecology
3. Soil
4. Wildlife
5. Human impact.

A general survey of the area was first undertaken as a prelude to taking up indepth studies which will be commenced after the monsoon.

DISTINGUISHED VISITORS

1.	Dr. K. G. Adiyodi Chairman Kerala Public Service Commission	— visited on	22-8-1984
2.	Dr. F. T. Last Institute of Terestrial Ecology Bush Estate Near Periwick Midlothian SCOTLAND, U. K.	— ,,	27-10-1984
3.	Dr. K. Gopalan Vice-Chancellor University of Cochin	— ,,	26-11-1984
4.	Dr. Andrew M. Greller Assoc. Professor Dept. of Biology Queens College S. U. N. Y., Flushing NEW YORK	— ,,	10-1-1985
5.	Prof. S. Balasubramaniam Assoc. Professor of Botany University of Peradeniya Peradeniya SRI LANKA	— ,,	10-1-1985
6.	Dr. I. A. S. Gibson Moor Cottage Ninfield Sussex ENGLAND	— ,,	30-1-1985
7.	Dr. David Cooke Ist Secretary, Science British High Commission British Council Division New Delhi	— ,,	31-1-1985
8.	Dr. I.P. Abrol Director Central Soil Salinity Research Institute KARNAL	— ,,	31-1-1985

9. Dr. Charles R. Hatch
Forestry Adviser
USAID
New Delhi — visited on 15-3-1985

10. Dr. Lennart Ljung
Senior Forest Specialist
World Bank
P. O. Box 416
New Delhi — " 15-3-1985

11. Dr. A. K. Banerji
World Bank
New Delhi — " 15-3-1985

PARTICIPATION IN SEMINAR, WORKSHOP, CONGRESS AND SPECIAL LECTURES DELIVERED

Dr. CTS Nair attended the IUFRO Symposium on Effects of Forest Land Use on Erosion and slope stability, held at Hawaii, USA from 7–11 May 1984 and presented a paper entitled 'Land use conflicts in the catchment of Idukki Reservoir: their implications on erosion and slope stability' by CTS Nair.

Dr. KKN Nair attended the Workshop on Ecodevelopment of Western Ghats held at Trivandrum from 11-13 May 1984.

Dr. P. Vijayakumaran Nair and Shri PS Easa participated in the Short Course on Social Forestry and Wildlife held at Alwaye on 9 June 1984. Shri Easa gave a talk on 'The sanctuaries in Kerala: Problems and prospects'.

Shri PS Easa and Shri EA Jayson participated in the All-India Symposium on Animal behaviour organised by the Ethological Society Conference at Trivandrum on 15 June 1984.

Shri MS Muktesh Kumar attended a Training Course in Orchid Culture organised by the Indian Institute of Horticultural Research, Bangalore from 5-12 July 1984.

Dr. TG Alexander attended the Seminar on Remote Sensing organised by the Kerala State Land Use Board, Trivandrum on 9 August 1984.

Dr. P. Vijayakumaran Nair and Shri PS Easa participated in the Wildlife Week Celebrations at the Calicut University on 24 Sept. 1984. Dr. Vijayakumaran Nair gave a talk on 'Wildlife Sanctuaries around us' and Shri Easa gave a talk on 'Wildlife of Kerala'.

Eight papers were presented by the Scientists of Kerala Forest Research Institute at the Seminar on Ecodevelopment of Western Ghats held at KFRI, Peechi from 17-18 October 1984.

Alexander TG, Balagopalan, M. Thomas, P. Tomas Mary, MV and Sankar, S. Soils in relation to anthropic disturbances: a case study from the western half of Attappadi.

Jayson, EA. Ecodevelopment of Wildlife Sanctuaries in the Western Ghats of Kerala.

Menon, ARR. The forest denudation of Kerala: a case study of the Trichur Forest Division.

Nair, NG. Endemic trees and their key role in the phytogeography of Western Ghats.

Nair, KKN. Conservation of genetic diversity of *Dalbergia* species in the Western Ghats with special reference to Kerala.

Nair, CTS. Ecodevelopment: a meaningful alternative or a fashionable slogan?

Nair, PVK, Ramachandran, KK and Easa PS. Characteristics of three populations of elephants of the Western Ghats.

Shri Ramachandran, KK. Ecology and distribution of the arboreal mammals of Western Ghats.

Dr. KSS Nair and Shri George Mathew prepared themes and designs for exhibits on insect variety and diversity in October 1984 on invitation from the National Museum of Natural History, New Delhi, for an exhibition organised by the Museum.

Dr. KSS Nair delivered two invited lectures on wood distroying insects and their control, for the trainees attending the Plywood Technology courses at the Indian Plywood Industries Research Institute, Bangalore on 12 November, 1984.

Dr. RV Varma attended the British Crop Protection Conference at Brighton, UK from 19–22 November, 1984 and presented a paper entitled '*Paecilomyces farinosus*' a potential biological control agent for major pests of *Ailanthus* in Kerala, India' by RV Varma and C. Mohanan.

Dr. KM Bhat participated in the IUFRO Project Group 5.01 (Properties and Utilization of Tropical Timbers) Workshop held at Manaus, Brazil from 19-24 November 1984 and presented a paper entitled 'properfies of selected less-known Tropical hard-woods' by KM Bhat and a paper entitled 'Utilization of rubber wood in India' by R. Gnanaharan.

Shri George Mathew delivered an invited lecture and conducted practicals on Eco-taxonomy and diagnostics of Timber borers, for trainees at the International Training Workshop at St. John's College, Agra on 27-28 November 1984.

Shri M Balagopalan attended the 'International Seminar on Geobotany and Biogeo-chemistry in Exploration for Groundwater and Mineral Resources' at SV University, Tirupathi from 27-30 November, 1984 and presented a paper 'Soil Organic carbon distribution along a transect through teak, eucalypt and albizia plantations' by M. Balagopalan and TG Alexander.

Dr. CTS Nair attended the Seminar on Ecological crises in India and Legislative safeguards, at New Delhi from 30 Nov - 2 Dec. 1984 and presented a paper entitled 'Crisis in forest resource management' by CTS Nair.

Dr. TG Alexander took part in the 49th Annual Convention and Golden Jubilee Celebrations of the Indian Society of Soil Science, New Delhi from 7-10 December, 1984 and presented two papers: (1) 'Cultural practices for managing soil erosion in forest plantations of Kerala' by TG Alexander and Thomas P. Thomas; (2) 'Effect of Mussoorie rockphosphate on the growth of *Eucalyptus tereticornis* seedlings' by TG Alexander and MV Mary.

Dr. KSS Nair attended the National Workshop on 'Advances in Insect behaviour' held at the Entomology Research Institute, Loyola College, Madras from 14-16 December 1984 and presented a paper entitled 'Role of behavioural studies in the development of management strategies for forest insect pests'.

Shri M. Balasundaran, Shri C. Mohanan and Dr. KV Sankaran participated in a symposium on 'Environment and Plant Diseases' organised by the Indian Phytopathological Society at Lucknow from 8-10 January 1985 and presented the following papers:

1) 'Spread of Spike disease in the sandal reserve forests of Marayoor, Kerala' by M. Balasundaran, MI Mohammed Ali and S. K. Ghosh.

2) 'Twig, branch and trunk cankers of *Eucalyptus* caused by *Cryphonectria gyrosa* in Kerala' by C. Mohanan, JK Sharma and EJ Maria Florence.

3) 'Epidemiology and Chemical control of web blight of *Albizia falcataria* caused by *Rhizoctonia solani* by KV Sankaran and JK Sharma.

Dr. P Vijayakumaran Nair, Shri KK Ramachandran, Shri PS Easa and Shri EA Jayson participated in the Seminar on Wildlife Management held at Thekkedy in connection with the Golden Jubilee Celebrations of Periyar Wildlife Sanctuary from 12-14 January, 1985. Shri Jayson presented a paper entitled 'Wildlife trade and its impact on conservation efforts'.

Dr. S. Kedharnath participated in the Golden Jubilee meetings of the Indian Academy of Sciences at Bangalore from 6-8 February 1985.

Dr. S. Kedharnath delivered the fifth Dr. TV Ramakrishna Ayyar Centenary memorial lecture on 22 March, 1985 at the Entomology Research Institute, Loyola College, Madras. The title of the lecture was "Breeding for insect resistance in forest trees".

PAPERS PUBLISHED IN JOURNALS, BOOKS

1. Bhat, K. M. and Bhat, K. V. 1984. Wood properties of 1-year-old *Eucalyptus tereticornis* Sm. Australian Forest Research 14: 129-133.

2. Bhat, K. M., Bhat K. V., Dhamodaran, T. K. and Rugmini, P. 1984. Some Wood and bark properties of *Hevea brasiliensis*. Journal of Tree Sciences 3: 40-46.

3. Bhat, K. M., Bhat, K. V. Dhamodaran, T. K. and Rugmini, P. 1984. Long-fibred raw material from tropical hardwood: *Dillenia pentagyna* Roxb. In Proc. Pacific. Regional Wood Anatomy Conference, Tsukuba, Japan.

4. Bhat, K. V. and Bhat, K. M. 1984. Wavy grain in *Grewia tiliifolia Vahl*. IAWA Bull n. s. 5:249-252.

5. Chacko, K. C., Muhammad, E. and Alexander, T. G. 1984. Effect of farm yard manure, rock phosphate and lime on growth and yield of *Leuceana leucocephala* var. k. 28. Leucaena Research Report, Hawaii, No. 5:20-21.

6. Dhamodaran, T. K. and Gnanaharan, R. 1984. Effect of immersion time on loading and distribution of boric acid in rubber wood by diffusion process. Journal of the Indian Academy of Wood Science 15:10-23.

7. Ghosh, S. K., Mohammed Ali, M. I, Balasundaran, M. and George Mathew. 1983. *Redarator bimaculatus*, a possible vector for Sandal Spike in Kerala. Int. J. Tropical Plant Diseases 1:197-198.

8. Gnanaharan, R., Ghosh, S. K. and Balasundaran, M. 1983. Effect of mistletoe on the strength properties of *Tectona grandis* L. F. Material und Organismen 18:313-318.

9. Gnanaharan, R, Ghosh, S. K., Balasundaran, M. and Dhamodaran, T K. 1984. Predictors of ultimate strength of mistletoe-infested teak (*Tectona grandis* Linn. f) Holzforschun 38: 293-295.

10. Kedharnath, S. 1984. Forest Tree Improvement in India. Proc Indian Acad. Sci. (Plant Sci.), 93:3:40 -4 2.

11. Mathew, G. 1984. Occurrence of an unusual type of frenulum in *Pycrarmon caberalis* Gnen (Lepidoptera: Pyraustidae) Entomon, 9:223.

12. Mohanadas, K., and Varma, R. V. 1984. A new host record for *Atteva fabriciella* (Lepidoptera: yponomeutidae), a pest of *Ailanthus*. J. Tree Sci. 3(1&2) : 128.

13. Mohanan, C. and Sharma, J. K. 1984 *Calonectria theae* and its anamorph *Cylindrocladium theae* - a new record on *Eucalyptus* from India – Curr. Sci. 53: 824-825.

14. Mohanan, C. and Sharma, J. K. 1984. A serious disease of *Anacardium occidentale* caused by *Cylindrocladium camelliae* and its possible control. PLACROSYM V. 1982: 527-535.

15. Nair, K. K. N., 1984. Nomenclatural correction in the Indo-Ceylonese *Mesua ferrea* complex. Indian Journal of Forestry, 7: 79-81.

16. Nair, K. S. S., and Mathew, G. 1984. Dried tapioca tuber for laboratory rearing of the bamboo borer, *Dinoderus minutus* Fabr. (Coleoptera : Bostrychidae). Material und Organismen, 19: 49-54.

17. Sankaran, K. V., Maria Florence, E. J. and Sharma J. K. 1984. Two new diseases of forest tree seedlings caused by *Sclerotium colfsii* in India. Eur. J. For. path. 14: 318-320.

18. Sharma, J. K., Maria Florence, E. J. and Mohanan, C. 1984. A shot hole disease of *Ailanthus triphysa* caused by *Glomerella cingulata*. Trans. Br. mycol. Soc. 82: 344-345.

19. Sharma, J. K., Mohanan C. and Maria Florence E. J. 1984. Nursery diseases of Eucalyptus in Kerala, India. Eur. J. For. Path. 14 77-89.

20. Sharma, J. K, Mohanan, C. and Maria Florence, E. J. 1984. A new stem canker disease of Eucalyptus caused by *Botryodiplodia theobromae* in India. Trans. Br. mycol. soc. 83: 162-163.

21. Sharma, J. K., Mohanan, C. and Maria Florence, E. J. 1984. Two mycelia sterilia parasitic on foliage of hardwood seedlings in Kerala State, India. Trans. Br. mycol. Soc. 82: 342-343.

22. Sharma, J. K., Mohanan, C. and Maria Florence, E. J. 1984. Outbreak of pink disease caused by *Corticuim Salmonicolor* in Eucalyptus grandis in Kerala, India. Trop. Pest Manage. 30: 253–255.

23. Sharma, J. K. and Sankaran, K. V. 1984. *Rhizoctonia* Web blight of *Albizia falcataria* in India. Eur. J. For. Path. 14: 261-264.

24. Varma, R. V., and Mohanan, C. 1984. *Paecilomyces farinosus*, a potential biological control agent for major pests of *Ailanthus* in Kerala, India, In Proc. British Crop. Prot. Conf., Brighton, England. pp.277-282.

25. Varma R. V., Reghunandanan, V. R. and Ambika B. 1984. Response of the Subterranean termite, *Odontotermes guptai* extracts of *Eucalyptus* root and certain other plant materials Material und Organismen 19: 283-290.

STAFF AS ON 31—3—1985

Dr. S. Kedharnath, FNA, FASc. Director

Administration

1.	Shri. M. Muhammed Usman	Registrar
2.	,, C. D. Johny	Dy. Registrar (Admn) (Joined on 15-10-84)
3.	,, P. K. Balan	Dy. Registrar (Fin.)
4.	,, P. Achuthankutty	P. A. to Director
5.	,, N. V. Narayanan Elayath	Internal Auditor (Joined on 2-11-84)
6.	,, M. K. Aravindakshan	Office Assistant
7.	,, M. S. Sukumaran	,,
8.	,, V. K. Mohanan	,,
9.	Smt. K. M. Suseela	,,
10.	Shri E. V. Eshac	,,
11.	,, K. K. Thomas	,,
12.	,, P. V. Sankaranunni	,,
13.	Smt. M. Kamalamma	,,
14.	Shri T. J. Alfred Headisjis	Stenographer
15.	Smt. Mary Kuruvilla	Receptionist
16.	Shri. P. M. Venugopalan	Typist
17.	,, T. Chandran	Driver
18.	,, P. Mohandas	,,
19.	,, A. V. Velayudhan	Attender
20.	,, A. S. Srinivasan	,,
21.	,, E. P. Somasekharan Nair	,,
22.	,, M. C. Mohandas	,,
23.	,, E. T. Kuttykrishnan	,,

Engineering

24.	Shri K. R. Mukundan	Engineer
25.	Kum. V. K. Leela	Office Assistant
26.	Shri P. R. Jose	Sergeant
27.	,, K. S. Gopalan	Overseer
28.	,, U. Y. John	,,
29.	,, P. P. Sunny	Skilled Maintenance Assistant
30.	Smt. T. V. Chandrika	Typist
31.	Shri. P. I. Madhavan	Driver
32.	,, K. Girijavallabhan	,,
33.	,, Dhorairaj	,,
34.	,, S. Shahul Hameed	,,
35.	,, V. D. Johny	,,
36.	Shri K. Vijayan	Driver
37.	,, M. B. Dasan	Attender

38.	,, M. K. Krishnankutty	Watcher
39.	,, P. M. Vasu	,,
40.	,, V. N. Balakrishnan	,,
41.	,, K. C. Subramanian	,,
42.	,, A. C. Antony	,,
43.	,, C. K. Vincent	Cleaner
44.	,, V. A. Sudhakaran	Pump Operator / plumber
45.	,, D. Skariah	,,
46.	Smt. V. M. Amminy	Full-time Sweeper
47.	,, K. D. Chinnamma	,,

Library

48.	ShrijK. Ravindran	Librarian
49.	,, K. Sankara Pillai	Asst. Librarian
50.	,, Subash Kuriakose	Artist photographer
51.	Smt. N. Sarojam	Library Asst.
52.	Shri K. H. Hussain	,,
53.	Smt. K. N. Rajamma	Office Asst.
54.	Shri V. Asokan	Typist
55.	,, C. A. Jose	Binder
56.	,, K. R. Sevaraman	Attender
57.	,, K. S. Karunakaran	,,

Botany (Physiology)

58.	Dr. K. K. Seethalakshmi	Scientist Grade E
59.	Shri T. Surendran	,,
60.	,, C. K. Soman	Field Asst.
61.	,, P. S. Raman	Attender

Botany (Taxonomy)

62.	Shri N. Gopalakrishnan Nair	Scientist Grade D
63.	Dr. K. K. Narayanan Nair	,,
64.	Shri N. Sasidharan	,,
65.	Dr. C. Renuka	,,
66.	Shri M. S. Muktesh Kumar	Scientist Grade E
67.	,, K. K. Unni	Field Asst.
68.	,, T. Prabhakaran	Gardener
69.	,, C. Radhakrishnan	Attender

Ecology

70.	Dr. K. Balasubramanyan	Scientist Grade C
71.	Shri K. Sworupanandan	Scientist Grade E
72.	Dr. A. R. Ramachandra Menon	,,
73.	Shri P. K. Chandrasekhara Pillai	Field Asst.
74.	,, B. P. Sreedharan	Attender

Economics

75.	Dr. C. T. S. Nair	Forest Economist
76.	Shri P. K. Muraleedharan	Scientist Grade E
77.	,, Mammen Chundamannil	,,

Entomology

78.	Dr. K. S. S. Nair	Scientist Grade B
79.	Dr. R. Venugopal Varma	Scientist Grade D
80.	Dr. George Mathew	,,
81.	Shri V. V. Sudheendrakumar	Scientist Grade E
82.	,, K. Mohandas	Scientist Grade E
83.	,, P. Padmanabhan	Field Asst.
84.	Smt. K. Annapoorni	Stenographer
85.	Shri K. K. Ahammed	Attender

Genetics

86.	Shri Mathew P. Koshy	Scientist Grade E
87.	Smt. E. P. Indira	,,
88.	Shri K. K. Ramesh	Field Asst.
89.	,, M. C. Reghunathan	Attender

Pathology (Fungal Diseases)

90.	Dr. J. K. Sharma	Scientist Grade B
91.	Shri C. Mohanan	Scientist Grade E
92.	Smt. E. J. Maria Florence	,,
93.	Dr. K. V. Sankaran	,,
94.	Shri K. Yesodharan	Field Asst.
95.	,, K. Chandran	Attender

Pathology (Non-Fungal Diseases)

96.	Shri M. Balasundran	Scientist Grade E
97.	,, M. I. Mohammed Ali	,,
98.	,, K. R. George	Attender

Silviculture

99.	Shri E. Muhammed	Silviculturist (left on 30-6-84)
100.	,, K. Shanmughanathan	Silviculturist (joined on 4-3-85)
101.	, K. C. Chacko	Junior Silviculturist
102.	Dr. R. Chandrasekhara Pandalai	Scientist Grade E
103.	Shri Nandakumar U Narath	Scientist Grade E

104.	,, M. Cherukunhan Nair	Attender (Nilambur)
105.	,, P. V. Subramanian	Attender
106.	,, P. Avunni	Watcher (Nilambur)
107.	,, K. Mohanan	,,
108.	,, A. K. Sulaiman	Cook-cum-Attendant (joined on 24-10-84)

Soil Science

109.	Dr. T. G. Alexander	Scientist Grade B
110.	Dr. S. Sankar	Scientist Grade D
111.	Shri M. Balagopalan	,,
112.	,, Thomas P. Thomas	Scientist Grade E
113.	Kum. M. V. Mary	,,
114.	Shri P. A. Sankarankutty	Attender

Statistics

115.	Dr. K. Jayaraman	Statistician (joined on 2-5-84)
116.	Smt. P. Rugmini	Scientist Grade D
117.	Shri C. N. Krishnankutty	Scientist Grade E
118.	,, A. R. Rajan	Field Asst.
119.	,, A. Ramakrishnan	Stenographer
120.	,, E. O. James Tidode	Typist
121.	,, K. V. Sidharthan	Attender

Wildlife Biology

122.	Dr. P Vijayakumaran Nair	Scientist Grade D
123.	Shri K. K. Ramachandran	Scientist Grade D
124.	,, P. S. Easa	Scientist Grade E
125.	,, E. A. Jayson	Scientist Grade E
126.	,, V. S. Neelakantan	Attender

Wood Science

127.	Dr. R. Gnanaharan	Scientist Grade C
128.	Dr. K. Mahabala Bhat	Scientist Grade D
129.	Dr. K. Vishnu Bhat	Scientist Grade E
130.	Shri T. K. Dhamodaran	,,
131.	,, P. K. Thulasidasan	Laboratory Asst. (joined on 28-6-84)
132.	,, M. A. Sankarankutty	Attender

61731
Office : 75888

Phone

72545
Res. : 75457

U. Parasurama Iyer & Co.
Chartered Accountants

6/869, Cherooty Road,
Calicut-673 001.

AUDITORS' REPORT

We have audited the accounts of the KERALA FOREST RESEARCH INSTITUTE SOCIETY, Peechi, Trichur District, for the year ended 31st March 1985 with the books of accounts and the records maintained by the Institute and subject to facts contained in notes regarding.

1. Valuation of Current Assets, Loans and Advances.
2. Non-capitalisation of IIIrd phase quarters.
3. Providing same depreciation rates as in previous year.
4. Non-adjustment of expenditure as reflected in the Bank Statements (Note 5)
5. Wrong classification of Bank Balances (Note 6).

We report that:-

(a) 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.

(b) The balance sheet and Income and Expenditure Account dealt with by this report are in agreement with the books of account and

(c) In our opinion and to the best of our information and according to the explanation given to us the accounts give a true and fair view:

i. In the case of Balance Sheet of the state of affairs of the Institute as at 31st March 1985; and

ii. In the case of the Income & Expenditure account of the excess of expenditure over income for the year ended on that date.

Place : Calicut
Date : 5-9-1985

For U. PARASURAMA IYER & Co.,
CHARTERED ACCOUNTANTS,

Sd/-
(M. V. VENUGOPAL)
Partner

Notes attached to and forming part of the Balance Sheet as at 31st March, 1985

1 In the opinion of the committee members, current Assets, Loans and advances have the value at which they are stated in the Balance Sheet in the ordinary course of business.

2 The cost of construction of quarters Type I & II under IIIrd phase let out to employees has been capitalised during the year. In respect of Type III quarters even though the construction was completed and let out to the employees, the cost of construction is not capitalised in the absence of final bill of the contractors, namely, Kerala State Construction Corporation. For the above reasons depreciation on these quarters have not been provided.

3 Depreciation has been calculated at the rates as applied during the previous year.

4 The previous year figures were regrouped/recast wherever necessary to suit current years lay out.

5 The following amounts have been debited by the Bank for which no corresponding entry has been passed in the Institutes books during the year.

Postage & Commission	Rs. 45.25
Slide Cabinet	Rs.2,431.00
Payment made for Fire Extinguisher	Rs.1,311.80
	Rs.3,788.05

6 Interest of Rs. 80,033-40 has been credited by the Bank. However in the Balance Sheet it is included under the head interest accrued instead of under bank balances.

Place : Calicut

Date : 5-9-1985

For U. PARASURAMA IYER & CO.
CHARTERED ACCOUNTANTS

Sd/-
(M. V. VENUGOPAL)
Partner

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR

Income & Expenditure Account for the year Ended 31st March, 1985

	Current Year Rs. Ps.	Previous Year Rs. Ps.
INCOME		
Interest on Savings Bank a/c. & F.D.	80,035.90	1,15,495.90
Service charges from Research Projects	...	...
Miscellaneous income as per schedule	1,79,691.38	65,366.22
Provision for contribution to employees Provident Fund written back	...	...
Excess of Expenditure over income	41,28,097.76	39,56,176.77
	43,87,825.04	41,37,038.89
EXPENDITURE		
Salary and Allowances	21,63,371.26	20,80,280.38
Contribution to employees provident fund	1,35,876.00	1,25,679.00
Leave Travel Concession	15,686.30	6,361.35
Group Gratuity Assurance	23,577.86	24,864.16
Travelling expenses (including Rs. 16,517.40 to Governing Body members previous year Rs. 14, 933.90)	1,04,706.24	1,07,322.95
Medical Reimbursement	47,045.99	41,991.56
Leave Salary & Pension Contribution	16,428.00	26,829.83
Postage	14,588.05	11,741.85
Telephone Charges	36,526.75	33,899.40
Bank Charges	111.00	2,159.00
Rent	11,550.00	11,767.70
Printing & Stationery	60,566.43	38,259.71
C/o	26,30,033.88	25,11,156.89

	Current Year	Previous Year
	Rs. Ps.	Rs. Ps.
B/F	26,30,033.88	25,11,156.89
Subscription to journals and periodicals	1,31,756.99	94,192.39
Repairs & Maintenance of Vehicles	3,30,725.58	2,34,161.74
Potting Shed	...	...
Consumables including stores & chemicals	2,10,589.33	2,91,302.13
Repairs & Maintenance of Building & Equipments	1,73,328.46	2,63,027.25
Advertisement charges	8,749.00	17,883.25
Staff welfare expenses (uniform)	14,186.49	2,841.41
Garden development expenses	9,979.18	17,168.59
Audit fee (for audit)	6,000.00	6,000.00
Professional charges - (Legal Charges)	9,785.00	20,325.00
Electricity charges	41,642.57	43,430.26
Panchayat & Municipal Property Taxes	18,455.09	20,677.40
Lease Rent of Land	2.00	2.00
Miscellaneous expenses	34,485.05	22,928.50
Depreciation on Fixed Assets	6,41,941.10	5,28,042.41
Campus Development	1,528 89	2,503.70
Seminar and Symposia	70,976.58	61,395.97
Interest income provided in excess during the preceeding year adjusted	44,659.85	...
	43,87,825.04	41,37,038.89

Sd/-
CHAIRMAN
Executive Committee

Sd/-
DIRECTOR
KERALA FOREST RESEARCH INSTITUTE SOCIETY

As per our report of even date

For U. PARASURAMA IYER & CO.,
CHATERED ACCOUNTANTS

Sd/-
(M.V. VENUGOPAL)
PARTNER

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR

	Rs. Current Year	Total Rs. Previous Year
SCHEDULE - A		
General Fund		
Balance as per last Balance Sheet	1,70,84,625.50	1.50,45,230.98
Add: Grant received from Govt. of Kerala	60,84,069.44	59,95,571.29
	2,31,68,694.94	2,10,40,802.27
Less: Excess of expenditure over income	41,28,097.76	39,56,176.77
	1,90,40,597.18	1,70,84,625.50
SCHEDULE - B		
CAPITAL RESERVE:		
Surplus in grants received over the expenditure incurred, in respect of projects sponsored and financed by the following external agencies:–		
Federation of Indian Panel & Plywood Industries	3,183.51	3,183.51
Food and Agricultural Organisation	1,06,520.17	1,06,520.17
	1,09,703.68	1,09,703.68
SCHEDULE - C		
Current Liabilities & Provisions		
A. Current Liabilities		
Grant for Research work in progress	16,87,866.35	12,47,084.10
Security Deposit from Customers	24,877.00	2,318.00
Other Liabilities	2,28,261.21	2,33,593.06
	19,41,004.56	14,82,995.16

	Rs. Current Year	Total Rs. Previous Year
SCHEDULE - E		
Capital Work in Progress		
Peechi Building III Phase	65,12,908.24	79,34,433.61
Nilambur	2,86,396.00	Nil
Teak Museum	6,35,223.13	13,114.13
	74,34,527.37	79,47,547.74
SCHEDULE - F		
Current Assets, Loans & Advances		
A. Current Assets		
1. Research Work in Progress	12,31,788.78	10,88,890.28
2. Stocks as per inventory taken, valued and certified by the Directors:		
a) Stock of Stationery	16,423.54	19,998.57
b) Stores and Chemicals	37,731.20	30,325.41
c) Unused stamps	692.15	13.75
3. a) Cash on hand	4,343.02	3,180.92
b) With Scheduled Bank:		
i) in savings bank a/c	1,23,459.25	2,39,123.16
ii) in Fixed deposit (being security for obtaining gurantee facility from SBT)	36,500.00	23,500.00
iii) in current account	1,995.15	4,599.77
iv) Fixed deposit in Sub-Treasury	1,09,700.00	1,09,700.00
c) With Sub-Treasury S.B. a/c	6,52,054.94	3,22,087.85
	22,14,688.03	18,41,419.71

	Rs. Current Year	Total Rs. Previous Year
B. Loans & Advances		
Advance receivable in cash or in kind or value to be received. (Unsecured considered good)	1,19.507.63	72,328.00
Prepaid expenses	17,74,430.00	18,51,871.00
Advance for capital work in progress	1,18,895.05	6,98,686.87
Other Advances	5,800.00	5,800.00
Telephone deposit	80,033.40	1,06,829.90
Accrued Interest	20,98,666.08	27,35,515.77
Summary (A & B)		
Current Assets	22,14,688.03	18,41,419.71
Loans & Advances	20,98,666.08	27,35,515.77
	43,13,354.11	45,76,935.48
Other Advances		
T. A. Advance	5,725.00	3,803.00
Work Advance - given to Institute	14,081.55	19,270.39
Scientists for Research work	9,672.50	4,950.00
Kerala Govt. (National Seminar)	21,393.60	24,585.25
Leave Salary advance to Deputationist	1,047.90	1,155.70
INSDOC Bangalore	4,050.00	4,250.00
Telephone deposit	20,765.00	11'200.00
Deposit with K.S.E.B.	195.00	195.00
" " I.O.C.	100.00	100.00
" " DFO Nilambur	840.00	840.00
Chithra Sales Corporation	77,870.55	70,349.34

C/O

	Rs. Current Year	Total Rs. Previous Year
B/F	77,870.55	70,349.34
DFO Arunachal Pradesh	...	22.65
Private Trunk Call Charges	517.50	242.00
Macneil and Magor Ltd. Cochin	...	400.00
Festival Advance		180.00
Rent Advance-Director residance	5,000.00	5,000.00
Bharath Pumps and Compressors, Allahabad	536.00	536.00
P.S. Krishna Iyer	175.00	175.00
Weather Measure Corporation U.S.A.	...	20,953.78
M/s. E.I.DU DONT BE NEMOURS and Company U S.A.		5,94,538·10
Director Central Scientific Instruments	140.00	140.00
Motor Cycle Advance	25,176.00	4,233.00
Marriage Advance	6,008.00	1,917.00
LIC, Advance	1,910.00	...
C.W.R.D.M.	1,386.00	
M/s Vermiculate Products, Madras	176.00	...
	1,18,895.05	6,98,686.87

Grant for Research work in Progress

Forest Department	1,85,444.10	1,85,444.10
Govt. of India for MRV Project	5,33,800.00	4,38,800.00
Gwalior Rayons - Wood - 04	15,000.00	15,000.00
Advance from H.P.C. Reeds	8,500.00	8,500.00
Grant from Govt. of Kerala towards Teak Museum	2,00,000.00	2,00,000.00
,, ,, ,, of India for Preservation of Dalbargia-BOT-06	16,500.00	16,500.00
C/O	9,59,244.10	8,64,244.10

	Rs.	Total Rs.
	Current Year	**Previous Year**
B/F	9,59,244.10	8,64,244.10
Grant from Govt. of India for Impact of selection Felling in Forest eco system - Ecol - 06	2,28,700.00	2,28,700.00
Grant from Food and Agricultural Organisation - Econ 03 & Econ-04-(Rural Institution for development of appropriate Forestry enterprises and case study on multiple use of Forest Management in Evergreen Forests and Teak plantations)	1,54,140.00	1,54,140.00
Pooyamkutty (General-03)	2,88,300.00	...
Grant from Social Forestry	20,000.00	...
Grant from Coconut Development Board (Wood-08)	34,000.00	...
C.S.I.R. (Collection of Pollen)	3,482.25	
	16,87,866.35	12,47,084.10
Advance for Capital Work in Progress		
Kerala State Construction Corporation	3,42,930.00	6,20,371.00
Public Health Engineering Department	14,31,500.00	12,31,500.00
	17,74,430.00	18,51,871.00

	Rs.	Total Rs.
Prepaid Expenses	**Current Year**	**Previous Year**
Journal Subscription	1,16,553.63	70,536.24
Advance for books and micro-films	...	1,047.76
Insurance of Vehicle	2,954.00	744.00
	1,19,507.63	72,328.00
Research Work in Progress		
CSIR Collection of Pollen	2,458.06	
Pooyamkutty Project	4,027.34	
Assessment of consumption of wood in Kerala (Social Forestry)	1,708.74	
Coconut Development Board-wood/08	17,087.90	
Genetic Improvement of Teak in Kerala	2,36,796.41	2,36,796.41
Thekkady Wildlife Project	3,04,055.89	3'00,796.40
Multi Purpose River Valley Project	4,47,339.96	4,10,053.76
Wood-04 (Gwalior Rayons)	3,809.91	3,809 91
Control of insects damaging stored reeds-Entom-04(HPC)	6,831.79	5,234.79
F.A.O. Project - Econ-03	2,399.10	2,189 70
F.A.O. Project Econ-04	10,183.43	8,774.38
Preservation of Dalbergia Bot-06		
Govt. of India Project	9,487.63	3,722.17
Impact of selection Felling in forest Eco system in Kerala Western Ghats Ecol-06		
	1,85,602.62	1,17,512.76
	12,31,788.78	10,88,890 28

	Rs. Current Year	Total Rs. Previous Year
SCHEDULE - C		
Miscellaneous income		
Application fee	245.00	206.00
House Rent Recovery from staff	38,703.30	35,347.05
Sale Proceeds of Tender Documents	2,030 00	2,305.00
Rest House rent recovered from third parties	3,251.10	2,511.35
Hire charges of vehicles	24,307.87	24,198.70
National seminar on Eucalyptus	19,462.00	...
National Seminar on Western Ghats	89,185.00	
Sundry	2,507.11	798.12
	1,79,791.38	65,366.22
Other Liabilities		
Salary Payable	1,63,978.10	1,74,008.80
T. A. Payable	10,463.10	7,924.40
Medical Re-imbursement payable	4,572.76	2,897.15
Rent payable	1,000.00	1,450.00
Lease Rent payable to Govt. of Kerala	16.00	14.00
G.P.F. Collected not remitted	719.00	512.00
G.P.F. loan collected not remitted	500.00	50 00
Electricity charges payable	2,478.20	11,696.26
Advertisement charges payable	...	2,650.00
Audit fee payable	6,000.00	6,000 00
Life Insurance Premium collected from staff	487.30	69.50
Caution Money deposit for Library Membership	150.00	150.00
Income-tax T.D.S.	13,678.00	3,944.00
Sales Tax	...	0.70
Suspense account (cement)	20,556.00	20,556 00
Telephone charges payable	2,830.00	733.00
Co-operative Society recoveries pending remittance	442.75	466.25
E.M.D. of Contractors	390.00	390.00
	2,28,261.21	2,33,593.06

THE KERALA FOREST RESEARCH INSTITUTE, PEECHI-TRICHUR

SCHEDULE D

Sl.No.	DISCRIPTION OF ASSETS	Rate%	GROSS BLOCK As at 1-4-84	Additions	Sales	Total	DEPRECIATION Till 31-3-84	For the year	Till 31-3-85	NET BLOCK As at 31-3-84	As at 31-3-85
			Rs. P.	Rs. P.	Rs. P.	Rs. P.	Rs. P.	Rs. P.	Rs. P.	Rs. P.	Rs. P.
1	Building-Office	2.5	2664752.45	...	...	2664752.45	393955.70	56769.92	450725.62	2270796.75	2214026.83
2	Building Quarters-Type I & II	2.5	.....	2827005.13	...	2827005.13	.....	70675.12	70675.12	.....	2756330.01
3	Compound Wall & Fencing	7.5	579872.24	... ...	...	579872.24	134384.66	33411.56	167796.22	445487.58	412076.02
4	Nilambur Nursery Fencing	10	12990.77	... ..	...	12990.77	7398.67	559.21	7957.88	5592.10	5032.89
5	Roads	...	304271.84	.. ...	...	304271.84	.....	.. ...	.....	304271.84	304271.84
6	Well	...	26295.73	.....	...	26295.73	.....	. ...	.....	26295.73	26295.73
7	Cycles	20	1034.63	.....	...	1034.63	850.36	36.85	887.21	184.27	147.42
8	Bus, Jeeps & Trailers	30	471388.44	... ..	...	471388.44	405060.36	19898.42	424958.78	66328.08	46429.66
9	Boat	10	32219.81	.....	...	32219 81	12801.63	1941.82	14743.45	19418.18	17476.36
10	Cars & Motor Cycles	20	96577.26	... ..	...	96577.26	76007.57	4113.93	80121.50	20569.69	16455.76
11	Electric Fittings	15	303553.98	17134.55	...	320688.53	131002.03	28452.97	159455.00	172551.95	161233.53
12	Motor Pumps & Fittings	10	33290.10	.....	...	33290.10	15121.28	1816.88	16938.16	18168.82	16351.94
13	Spectro Photometre	10	230113.83	.....	...	230113.83	95599.37	13451.45	109050.82	134514.46	121063.01
14	Microscopes	15	280414.01	...	...	280414.01	157340.33	18461.05	175801.38	123073.68	104612.63
15	Laboratory Equipments	10	1266624.74	57544.72	...	1324169.46	451621.42	87254.80	538876 22	815003.32	785293.24
16	Library Books	15	1235476.89	102100.80	..	1337577.69	651034.23	102981.51	754015.74	584442.66	583561.95
17	Typewriters, Duplicators and Calculators	15	114679.58	2581.18	...	117260.76	56192.57	9160 23	65352.80	58487.01	51907·96
18	Furniture & Fittings	10	903599.79	19035.49	..	922635.28	363042.65	55959.26	419001.91	540557.14	503633.37
19	Refregerators	10	52968.70	...	...	52968.70	22612.51	3035.62	25648.13	30356.19	27320.57
20	Air Conditioners	15	68301.51	16700.00	....	85001.51	23412.68	9238.32	32651.00	44888.83	52350.51
21	Office Equipments	10	11520.77	.....	...	11520.77	5203.84	631.69	5835.53	6316.93	5685.24
22	Micro Computer	15	67833.98	.....	...	67833.98	42250.43	3837.53	46087.96	25583.55	21746.02
23	Research Binocular Microscope	15	170209.01	.....	...	170209.01	65679.77	15679.35	81359.12	104529.24	88849.89
24	Insectorium	5	115367.88	.....	...	115367.88	16445.32	4946.13	21391.45	98922.56	93976.43
25	Area Metre	10	78920.65	.....	...	78920.65	21387.49	5753.32	27140.81	57533.16	51779.84
26	Wood Seazoning Plant	10	124831.25	... ..	...	124831.25	23031.69	10179.96	33211.65	101799.56	91619 60
27	Electronic Balance	10	13027.80	3675.00	...	16702.80	1302.78	1540.00	2842.78	11725.02	13860.02
28	Potting Shed	5	64522.00	.....	...	64522.00	3226.10	3064.80	6290.90	61295.90	58231.10
29	Utencils	10	4607.68	11761.06	...	16368.74	460.76	1590.80	2051.56	4146.92	14317.18
30	Microtome Sharpener	10	.....	69692.04	...	69692.04	..	6969.20	6969.20	.....	62722.84
31	Centrifuge	10	.....	594538.10	...	594538.10	.....	59453.81	59453.81	.....	535084 29
32	Shigometer	10	.....	30771.85	...	30771.85	... ..	3077.19	3077.19	.....	27694.66
33	Computer	10	.....	79984.00	...	79984.00	.. ...	7998.40	7998.40	.....	71985.60
			9329267.32	3832523.92	...	13161791.24	3176426·20	641941.10	3818367.30	6152841.12	9343423.94

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR

BALANCE SHEET AS AT 31ST MARCH, 1985

	As per Schedule	Current Year	Previous Year
LIABILITIES			
General Fund	A	1,90,40,597,18	1,70,84,625,50
Reserves and Surplus	B	1,09,703.68	1,09,703,68
Current Liabilities and Provisions	C	19,41,004.56	14,82,995,16
		2,10,91,305.42	1,86,77,324,34
ASSETS			
Fixed Assets	A	93,43,423.94	61,52,841,12
Capital Work in Progress	E	74,34,527.37	79,47,547,74
Current Assets, Loans and Advances	F	43,13,354.11	45,76,935.48
		2,10,91,305.42	1,86,77,324.34

Sd/-

CHAIRMAN
EXECUTIVE COMMITTEE

Sd/-

DIRECTOR
KERALA FOREST RESEARCH INSTITUTE SOCIETY

As per our report of even date.

For U. PARASURAMA IYER & Co.,
CHARTERED ACCOUNTANTS

Calicut

5-9-1985

Sd/-
(M. V. VENUGOPAL)
PARTNER