annual report

1981-82

kerala forest
research institute

ANNUAL REPORT

April 1981 March 1982

kerala forest research institute

Peechi, Trichur 680 653, Kerala

INTRODUCTION

The organisation of laboratories with equipment and other facilities for research investigations, was continued. Senior Scientists with supporting staff were positioned in most of the Divisions and research activities were intensified. Nine research projects, viz.

1 Properties of soils under teak
2 Properties of soils under eucalyptus
3 A Handbook of Kerala timbers
4 Study on medicinal plants of Kerala forests (Phase I)
5 A field key to the identification of indigenous arborescent species of Kerala based on eco-taxonomic features (Phase I)
6 Investigation and the possibility of non-insecticidal control of termites
7 A survey of beetles damaging commercially important stored timber in Kerala
8 Seasonal incidence, host range and control of the teak sapling borer, *Sahyadrassus malabaricus*

and

9 Preservative treatment of rubber wood, *Hevea braziliensis*,

two research projects funded by the Kerala Forest Department, viz.

1 Genetic improvement of teak in Kerala

and

2 An ecological study in Periyar Tiger Reserve with special refrence to wildlife

and another project "Protection of fibrous rawmaterial in storage against deterioration by biological organisms" funded by Gwalior Rayons, Mavoor, initiated during earlier years were completed and final reports were either published or processed for publication. Two information bulletins, viz. "Termite control in eucalypt plantations" and "Tentative check list of medicinal plants of Kerala forests" were brought out. Scientific papers were contributed to Journals, National and International Seminars, Symposia etc. Field studies were augmented and several experimental plots were established in forest areas. More projects relevant to scientific forestry management were identified and preliminary exploratory studies were taken up.

The development of residential complex received greater attention and 23 quarters in the campus were allotted to the staff for occupation.

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 consist of the following members :

Ex-officio :

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

Scientists :

8 Shri K. K. Nair,
Managing Director, Kerala Wood Industries Ltd , Calicut.
9 Shri Hari Singh,
Rtd. Inspector General of Forests, Bangalore.
10 Shri Y. M. L. Sharma,
International Forestry Consultant, Bangalore.
11 Shri J. C. Varmah,
Ex-President, Forest Research Institute & Colleges, Dehra Dun.

Representative of forest-based industry :

12 Shri A. K. Kaderkutty,
Managing Director, Western India Plywoods Ltd., Baliapatiam.

The Governing Body met once during the year.

EXECUTIVE COMMITTEE

The Executive Committee consisting of the following members continued during the year.

1. Chairman,
State Committee on Science & Technology (Kerala)
2. Commissioner for Economic Development and Special Secretary to Government of Kerala, Planning & Economic Affairs Department. Chairman
3. Chief Conservator of Forests, Kerala,
4. Shri K. K. Nair,
Managing Director,
Kerala Wood Industries Ltd., Calicut.
5. Shri A. K. Kaderkutty,
Managing Director,
Western India Plywoods Ltd., Baliapattam.
6. Director, Kerala Forest Research Institute.

The Executive Committee met on three occasions.

CAMPUS DEVELOPMENT

The Institute campus is located at Peechi in 28 174 ha. of forest land leased out by the Kerala Forest Department for a period of 99 years The construction of laboratory blocks. library and administration building was completed in the previous years.

The work of construction of auditorium with water tank on top of it. entrusted to the Kerala State Construction Corporation for execution. is in progress. The structural part is over The work on acoustic arrangement and other fittings within the auditorium remain to be done. This work is being arranged by the Corporation.

The construction of 20 Nos. of type II quarters in the campus at Peechi undertaken by the Corporation was over and the quarters were allotted for occupation. The construction of 15 Nos. of Type III quarters was also completed of which three were allotted for occupation The remaining quarters will be allotted as soon as electrification work is over.

The work of providing barbed wire fence to the campus was also completed.

It is proposed to entrust construction of 10 Nos. of Type I quarters to the Corporation. This work is expected to be commenced shortly.

The construction of Insectarium (2 Nos.) was completed during the period.

There is proposal to construct a glass house. The estimate has been approved by the Executive Committee (cost Rs. 4.10 lakhs) A suitable agency to do the work is being identified.

WATER SUPPLY TO THE INSTITUTE CAMPUS

The work of permanent water supply system to the campus at Peechi entrusted to the Kerala P. H E. Department has not been completed. The construction of water treatment plant is to be undertaken. The works such as construction of infiltration well-cum-pump house, pumping main, erection of pump set and receiving chamber have already been completed. Thedepartment had invited tenders for the remaining work and the tender received has been submitted to Government for approval, as the rate quoted was much higher than the estimate rate.

The Institute is already making use of the system. Water from the well is pumped to temporary water tanks erected on the hill top and supplied to the quarters, laboratory etc. through the distribution lines already laid.

ESTABLISHMENT OF SUB-CENTRES

The Institute has developed a Sub-Centre at Nilambur in 43.358 ha of forest land leased out by the Kerala Forest Department for 99 years Office-cum-labaratory building, staff quarters and a rest house have already been constructed there. Necessary experimental plots are being developed on a phased manner.

The Division of Wildlife Biology of the Institute is functioning at Thekkady in connection with a project financed by the Kerala Forest Department. The Institute is to develop a Sub-Centre at Thekkady and for this purpose 1.5 ha. of forest land has already been leased out. The plans, estimates etc. for constructing the required buildings are ready But construction could not be started as the site has not been handed over to the Institute. This matter is under correspondance with the Forest Department.

TEAK MUSEUM AND STUDY CENTRE

In July 1981, Government ordered that no undertaking need be obtained from the Institute agreeing to abide by the terms and conditions prescribed by them in the matter of establishment of the museum. In the light of the above decision, the question of entrusting the construction work to the KSCC was considered by the Executive Committee and was approved in principle, subject to reaching a mutually acceptable agreement with the Corporation. The Corporation has already agreed to undertake the work. The work is expected to be commenced shortly.

STAFF

The staff in position as on 31.3.1982 is shown in Appendix I.

The Institute could position a Forest Economist during the year. Dr. C. T. S. Nair, Conservator of Forests (an Officer of Kerala Cadre of Indian Forest Service) joined as Forest Economist in Nov. '81 on deputation for a period of two years.

The post of Statistician could not be filled up so far. Since Dr. P. U. Surendran, Professor of Statistics, Kerala Agricultural University, was not willing to come on deputation on usual terms and conditions, that proposal had to be dropped.

So also, the post of Plant Physiologist which is vacant since May 1980 could not be filled up. The post was advertised and interview of the candidates was arranged during the year.

Shri M. Muhammed Usman, Addl. Secretary to Government of Kerala, joined the Institute as Registrar in Aug. '81 on deputation for a period of one year.

FINANCE

The budget approved by the Governing Body for 1981-82 was for Rs. 85 lakhs. Application for grant was accordingly made to Government. The provision made in the State Budget was only Rs. 65 lakhs. The Government released Rs. 57.29 lakhs during the year. The year started with a cash balance of Rs. 7.71 lakhs. The expenditure incurred was Rs. 58.60 lakhs. The cash balance at the close of the year was Rs. 6.40 lakhs.

M/s. Joseph & Joseph, Trichur, audited accounts of the Institute for the year. The audited Statement of accounts is in Appendix II.

REVIEW COMMITTEE

The Review Committee submitted its report to the Governing Body in Nov. '81. The report was considered by the Executive Committee and it was proposed to place it before the Governing Body for appropriate decision on the various recommendations of the Review Committee.

LIBRARY

Acquisition of Documents

The following are the details of books and other documents acquired in the Library during the year and the progressive total.

Item	Nos. acquired during the period under report	Total acquisition in the Library
Books	672	7,714
Photostats	134	681
Reprints	517	2,442
Journals	10	212
Back volumes	81	748
TOTAL	1,414	11,797

Documentation Work

The catalogue of journal holdings in the Library was revised incorporating new additions as on June 1981. The catalogue is under print.

The release of Fortnightly, KFRI Library News release continued during the year.

A classified catalogue of reprints available in the Library has been prepared. This will be published soon.

RESEARCH

During the year the final reports of the following projects were published as KFRI research reports:

1 Soils 02/1977 Properties of soils under teak
2 Soils 03/1977 Properties of soils under eucalyptus
3 Wood 01/1979 A Handbook of Kerala Timbers

The following projects were completed and reports are under preparation or being processed for publication:

1.	Bot 01/1979	Study on medicinal plants of Kerala forests (Phase I).
2.	Ecol 02 1979	A field key to the identification of indigenous arborescent species of Kerala based on eco-taxonomic features (Phase I).
3.	Entom 06/1979	Investigation and the possibility of non-insecticidal control of termites.
4.	Entom 07/1979	A survey of beetles damaging commercially important stored timber in Kerala.
5.	Entom 03/1979	Seasonal incidence, host range and control of the teak sepling borer, *Sahyadrassus malabaricus*
6.	Genet 01/1979	Genetic improvement of teak in Kerala.
7.	Wild 02/1977	An ecological study in Periyar Tiger Reserve with special reference to wildlife
8.	Wood 03/1979	Preservative treatment of rubber wood. *Hevea braziliensis*.
9.	Wood 04/1980	Protection of fibrous raw material in storage against deterioration by biological organisms.

Two Information Bulletins, viz. 'Termite control in eucalypt plantations' and 'Tentative check list of medicinal plants of Kerala Forest' were brought out. Scientific papers on results of some of our findings of academic interest were published in journals.

Progress achieved in respect of the various projects undertaken is summarised below.

BOTANY (PHYSIOLOGY)

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

This project has been initiated with the objective of studying the rooting behaviour of stem cuttings of economically important timber species, and the effect of different growth regulators on induction of roots.

Preliminary trials conducted last year using stem cuttings of *Tectona grandis*, *Melia composita* and *Swietenia macrophylla* gave good response in sprouting and callus formation. Trials are being repeated every month starting from June 1981, at Nilambur Sub Centre with the stem cuttings of *Tectona grandis*, *Swietenia macrophylla*, *Gmelina arborea*, *Xylia xylocarpa*, *Hopea parviflora* and *melia composita*. Treatments were given to the cuttings by dip method using different auxinic and non-auxinic chemical solutions, both singly and in combination. Regular monthly trials is being continued to identify possible seasonal effects on root induction. Experiments are now in progress with growth regulating substances along with nutrient substances to induce the callused and shy-to root species to root profusely. Also, an experiment was set-up to study the effects of various photoperiods and light intensities on root induction in cuttings.

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

Bamboos and reeds are important sources of raw material for the pulp and paper industry. Traditional cottage industries such as basket making, mat making etc. depend on bamboos and reeds. As flowering and fruiting takes place at long time intervals, it is necessary to resort to vegetative propagation. This project was initiated to investigate the possibilities of rooting stem cuttings of bamboos and reeds using auxinic and non-auxinic growth regulators.

Regular monthly trials were conducted using culm cuttings of *Bambusa arundinacea*, *Dendrocalamus strictus*, *Ochlandra travancorica* and *Ochlandra scriptoria*, both at Nilambur and at Peechi simultaneously, to study the seasonal effect, effect of site differences, planting media etc., on root induction. *Bambusa arundinacea* and *Ochlandra travancorica* gave good sprouting and rooting response. Rooted culm cuttings of *Bambusa arundinacea* were planted out in the field both at Nilambur and Peechi to see their field performance and these are under observation. Experiments with culm 'Chips' (nodal buds with a bit of culm material) of *bambusa arundinacea*, conducted at Nilambur with different auxinic solutions also gave encouraging responses. Trials in this direction are continuing.

Physiol 03/1979 - Studies on the Physiology of induction of flowers in teak and Eucalyptus

The objectives of the study are (a) to induce flowering in profusion before the stage of natural flowering and (b) to study the effect of certain growth regulators and physical treatments like girdling, pinching etc. on growth and development of young seedlings.

Due to unforeseen difficulties not much progress has been possible on this project.

BOTANY (TAXONOMY)

Bot. 01/1979: Study on medicinal plants of Kerala forests.

The Project involves (a) the listing of medicinal plants, (b) habitat studies of some selected medicinal plants, (c) collection and display of samples of raw materials used in medicines (d) organising a live collection of medicinal plants and (e) building up of a herbarium of medicinal plants.

Propagation studies were undertaken in four species of medicinal plants during the previous year. Some medicinal species were also collected and grown in the garden.

A tentative check list of medicinal plants of Kerala forest has been published as KFRI Information Bulletin No. 4. The final list incorporating scientific names, synonyms, common names, distribution details, short description and reported uses, is getting ready.

Propagation studies using stem and root cuttings were conducted on *Ipomoea mauritiana*, *Hemidesmus indicus*, and *Plumbago indica*. Seed germination trials were carried out in *Clitoria ternatea* (white and blue varieties) and *Cassia alata*. Methods were perfected for propagation through stem cuttings in *Ipomoea mauritiana* and *Hemidesmus indicus* and through stem as well as root cuttings in *plumbago indica*. *Alpinia galanga*, *Coleus vettiveroides* and *Plumbago indica* can be grown as intercrop in plantations.

Raw material collections are being built up gradually. A one day seminar on medicinal plants was conducted in the Institute on 17-12-'81. The proceedings of the seminar is being published.

Bot 02/1979: Establishment of an orchidarium in the Institute Campus.

This project has been initiated with the objective of collecting and identifying orchids of Kerala forests and growing them in the Institute Campus.

250 species of orchids available in South India have been listed already. A list of 155 species available in the Kerala forests has also been prepared. Index cards for the available species updating their nomenclature have been prepared. Collection of orchids were made from Silent Valley, Arippa, Ponmudi, Sholayar, Manantoddy, Devicolam and Thenmala. Details regarding distribution of South Indian Orchids were compiled from different sources. The endangered orchid species *Vanilla wightiana* was relocated during recent explorations.

Bot. 03/1980: Distribution of important forest tree species in Kerala (Central Circle)

A knowledge of the distribution of important forest tree species in the different forest ranges will be of considerable value in the preparation of working plans. This project is aimed at the collection of data on the distribution of important forest tree species of central circle, and to resolve the nomenclatural problems.

The project was identified only in January 1981. Preliminary data for the commencement of the project was gathered.

Several tree species were collected from Peechi, Pattikad, Vazhachal and Sholayar. Endemic trees of expected timber potential like *Maranthes travancorica* (Bedd.) Kosterm. (*Parinarium travancoricum* Bedd) were collected. Seedlings of *Ormosia travancorica* were raised in the garden for detailed studies.

Other activities

Organisation of a herbarium in the Institute:

The Institute herbarium which has at present about 3,000 plant specimens of Kerala forests is being enriched with fresh collections. Index cards for the species in the herbarium were prepared. Incorporation of the new accessions is in progress.

Supply of seedlings:

Seedlings of medicinal species raised in poly pots were supplied to the Kerala Forest Department, Central Institute of Medicinal and Aromatic plants Lucknow and Forest Research Centre, Coimbatore Enquiries regarding botanical aspects of several timber yielding species, from different organisations were attended to.

ECOLOGY

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

Soil-cum-vegetation maps provide valuable information for the preparation of management plans. This project has been initiated with the objective of preparing soil-cum-vegetation maps in respect of the forests of Trichur Division.

From the latest working plan, the precise extent of the reserved forests and plantations were gathered.

The three types of forests that occur in Trichur division are (1) moist deciduous, (2) semi-evergreen and (3) evergreen. Moist deciduous type which account for more than 60% of the forests is found upto an elevation of 450 metres. The higher reaches are covered by semi-evergreen type while the evergreens are confined to patches along depressions. Important species in the moist deciduous forests are: *Tectona grandis, Terminalia tomentosa, Lagerstroemia lanceolata, Xylia xylocarpa* etc. Among the evergreen and semi-evergreen species *Dipterocarpus indicus, Veteria indica* and *Myristica dactyloides* are worth mentioning.

As a preliminary reconnaissance three field trips were made by foot, one to Pattikkad range, the other from Peechi to Palapally and the third from Vazhani to Wadakkancherry. Areas for intensive study have been identified.

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

The project aims at the preparation of a key to facilitate easy identification of the arborescent species in the field.

The project is being taken up in two phases. The first phase, preparation of a draft handbook pertaining to about 125 commercially important species, has been completed. Work on the second phase is also progressing simultaneously.

Based on the information gathered, a new type of identification key has been prepared and published.

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

Correct identification of seedlings is of paramount importance in natural regeneration operations in evergreen forests. The main objective of this project is the preparation of a field key to facilitate easy identification of seedlings of some of the commercially important evergreen species.

Seedling collections were enriched from the forests at Moozhiyar, Chandanathoda and Peechi. So far drawings of about 50 species have been made and diagnostic characters for each species noted. Preparation of a key will be attempted after further collections are made.

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

The objectives of the project are (a) to determine the frequency and the peak season for flowering, fruiting and defoliation of principal arborescent species, (b) to correlate this data with the local climatic conditions and (c) to quantify the total production of flowers, fruits and leaf litter. The data obtained from this study will be useful in understanding the autecology of the species and in the management of evergreen forests.

Litter collections from the three phenological plots have commenced. From Chandanathode in the Northern Circle four collections were made during November and December 1981 and February and March 1982. Similarly collections from Sholayar Central Circle have been made during November and December 1981 and January and February 1982. For Moozhiyar, in the southern circle only three trips could be made during June, September and November 1981. Although the plot chosen is to remain undisturb for about five years, selection felling had started since 1981 and inroads were made in the plots causing damage to the litter traps. As an alternative area, an undisturbed patch of evergreen forest around Idukki is proposed to be selected, the data for which could be made use of for another ongoing project also.

ECONOMICS

After the Forest Economist joined the Institute in November, 1981 preliminary organisational matters were attended to. A project titled 'A socio-economic study of farm forestry in Kerala' aimed at identifying the socio-economic factors that favour the introduction of tree crops of forestry importance in the farm lands and homesteads in Kerala has been formulated. The study involves a detailed household survey of selected villages in the principal agroclimatic zones in the State. Preliminary works such as preparation of questionnaire, testing the response etc. were undertaken.

ENTOMOLOGY

Entom. 02,1977: Studies on the seasonal incidence of teak defoliators and the effect of defoliation on volume increment of teak.

Although defoliator attack in teak plantations is common, it is necessary to gather data on increment loss in order to decide whether any control measures are required, and whether the additional cost involved can be justified in terms of the volume gains. This project was taken up to determine the effect of insect defoliation on wood volume increment of teak in order to assess possible economic loss and to study the ecology and seasonal incidence of the skeletonizer-defoliator complex, *Pyrausta machaeralis* and *Hyblaea puera*, with a view to develop population management techniques.

Experimental plots were laid out in 1974 teak plantation in Karulai Range and the plants were exposed to various levels of natural insect infestation from 1978 onwards by appropriate prophylactic insecticidal treatments. Growth parameters were measured in 1978, at the time of first mechanical thinning in order to estimate the initial standing volume of trees. Defoliation intensity has been monitored continuously. Final tree measurements are scheduled to be taken at the time of second mechanical thinning in 1982, to calculate differences in volume increment.

During the current year the intensity of defoliation was scored at fortnightly intervals in all the 12 experimental plots. As in previous years, prophylactic application of insecticide was made as necessary. During the year, damage was caused mainly by *Hyblaea puera*. Preliminary analysis of annual GBH data indicated that protected trees gained about 1 cm additional girth annually over unprotected trees, with no noticeable difference between trees protected throughout the year and those protected only during the early part of the year when *Hyblaea* larvae are active.

Entom. 04/1979: Preliminary investigations on the biology and control of beetles damaging stored reed

This project aims at studying the biology and seasonal population trends of *Dinoderus* beetles under laboratory condition and screening various insecticides under laboratory conditions for control of the insect.

Previous studies have established that *Dinoderus* beetles damaging reeds could be reared successfully on dried tapioca in which a generation was completed in about 2 months. Laboratory experiments showed no survival of this insect in reeds collected in January, February and March. In addition, reeds collected from some localities did not support growth throughout the year. Investigations are being continued to confirm these results.

In field trials laid out at Peechi campus, reeds were not attacked by the beetles. In field trials at Velloor (HPC storage yard) very little damage was caused by beetles. However, deterioration occurred due to fungal attack. Two fungi viz. *Trichurus* sp. which degrade lignin and *Lenzites* sp which degrade cellulose (identified by the

Pathology (F) Division) were predominent. Monthly spray of boric acid-borax mixture to exposed surfaces gave apparent protection from fungal damage. The results are being analysed.

Entom 05/1977: Biology and control of insect pests of fast-growing hard wood species.

An understanding of the biology and ecology of insect pests of fast-growing hard. woods is necessary to assess the significance of damage and to develop suitable pest management techniques. This project has been initiated with the above objective.

Observations on seasonal incidence of the bagworm, *Pteroma plagiophleps*, on *Albizia falcataria* initiated previously at Vazhachal were continued. A fungal parasite was found to cause heavy mortality to the bagworm larvae. The usefulness of this fungus, whose identity is yet to be confirmed, for control of the insect is being studied with the help of the Pathology (F) Division.

Entom. 06/1979: Investigations on the possibility of non-insecticidal control of termites.

This project was initiated with the objective of investigating the nature of termite attractant substance (s) present in eucalypt roots, if any, and to study the attractant or deterrent effect of some plant extracts to termites. This project has been completed and the final report prepared. The study showed that eucalypt roots contain some substance which acted as an attractant to termites. Root extract of rubber seedlings did not have this property. Extracts of some other plant materials showed no effect on termites. Isolation and chemical characterisation of the attractants present in eucalypt roots showed it to be a phenolic acid. The potency of the substance isolated, however, was not sufficient for use under field conditions.

The effect of juvenile hormone analogues on the development and survival of termite colonies was also studied.

No satisfactory non-insecticidal method has been found for control of termites.

Entom. 07/1979: A survey of beetles damaging commercially important stored timber in Kerala

This survey was undertaken to identify the coleopterous wood borers of stored timber in Kerala with a view to establish their taxonomic identity and the nature of damage and to prepare an identification key.

The project has been completed and the final report prepared. 40 species of timber stored in depots were found to be attacked by various insects, totalling about 50 species. Insects attacking each species have been identified and reference collections built up.

Major pest insects included some cerambycoid beetles and several smaller beetles belonging to the families Bostrychidae, Lyctidae, Platypodidae and Scolytidae. Low

density timbers were the most heavily damaged apart from damage to sapwood of almost all timbers.

Entom. 08/1979-Seasonal incidence, host-range and control of the teak sapling borer, Sahyadrassus malabaricus

This project was initiated to develop suitable control measures for the teak sapling borer based on information on its seasonal incidence and host-range.

Final report of this project is under prepration. Results obtained were reported previously.

Other activities.

In addition to these projects, the Division of Entomology worked in collaboration with the Wood Science Division in the projects Woods 03/1979 (Preservative treatment of rubber wood) and Woods 04/1980 (Protection of fibrous raw material in storage against deterioration by biological organisms).

An information bulletin giving details of practical method for control of termites in eucalypts, was prepared and printed based on results achieved in the completed project Entom. 01/76. Employing this method, a demonstration plot of 10 ha. was planted *Eucalyptus grandis* at Mavinhalla, in collaboration with the Forest Department Regular observations are being carried out, jointly by representatives of Conservator of Forests, Northern Circle and the Entomology Division. The treatment has been found effective

The following extension services were also rendered upon request from the concerned beneficiaries. (1) Gave recommendations for termite proofing of indoor stadium for Sports Council, Trichur (2) Investigated insect attack of cashew plantations at Puthur (Peechi Range). The damage was caused by the cashew stem/root borer *Plocoederus ferrugineus*. Recommendations for control were given. (3) Investigated insect damage to castor plantation at Chinnar, Marayoor Range. Damage was caused by white grubs damage and leaf-feeding caterpillars. Recommendations for control were made (4) Investigated and gave advice on control of skeletoniser *(Pyrausta machaeralis)* damage to teak nursery at Walayar, Olavakkode Range. (5) Gave information and advice on control of termites attacking eucalyptus in Bhuj, Katchch Dist. (Bihar).

GENETICS

Genet. 01/1979-Genetic improvement of teak in Kerala

Improving the genetic quality of teak seeds used for raising plantation in the State will have a marked influence on enhancing the quality and quantity of timber output. This project aims at enhancing the supply of quality seeds by establishment of seed orchards and carrying out progeny trials.

Prebudded plus tree container plants were prepared in nurseries at Nilambur, Peechi and Arippa and duly establised in two additional seed orchards — a 20—clone seed orchard at Palapally near Trichur, in Central Kerala, and a 25-clone orchard at Arippa in Southern Kerala near Trivandrum. For both orchards, randomized polycross designs were adopted with 8 - 8 m. quincuncial spacing.

A follow-up project entitled 'Managment practices for teak seed orchards' was prepared with a view to evolve a package of practices aimed at ensuring early flowering and maximising seed production from them.

Selection of new plus trees and their registration continues.

Suitable stands were jointly inspected with the State Silvicultural Research Officer and approved for conversion and management as seed production areas.

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

The project was initiated with the objective of genetic improvement of eucalyptus through hybridisation. However, due to unexpected difficulties, not much progress was made in implementing the project during the year.

Genet. 03/1979 Genetic improvement of important matchwood species Ailanthus triphysa and Bombax ceiba.

Ailanthus triphysa and *Bombax ceiba* are two important matchwood species in the State. Genetic improvement could considerably enhance the yield and will be helpful in reducing the rotation. This project was taken up with the above objective.

Different techniques of vegetative propagation were attempted in *Ailanthus triphysa*.

Seeds of five high seed yielding clones of *Bombax ceiba* viz. H, I, J, K and L, from Campierganj seed orchard near Gorakhpur (U. P.) were obtained and sown in nursery beds at Nilambur Sub Centre. Line sowing 5 cm. apart was done with 2 seeds per sowing point and 40 seeds per row. The germination percentage varied with the clone. The progenies are proposed to be planted out in progeny trial plots.

Genet. 04/1979-Provenance trial and floral biological studies of Gmelina arborea Roxb.

Gmelina arborea is an important indigenous hardwood species with multiple end uses. Several provenances which differ in growth and overall performance exist. This project aims at the isolation of the provenances most suitable for the conditions in Kerala.

Regular height and diameter measurements were continued in the provenance trials of *Gmelina arborea* at Nilambur. The Cachar and Meghalaya provenances

respectively stood first and second best in growth superiority. In due course plus trees within these two good provenances are proposed to be selected for clonal multiplication as well as for orchard establishment

Studies on floral biology were made on trees of *Gmelina arborea* growing naturally at Peechi. Observations indicated that pollen shedding from anthers and receptivity of the bifid stigma closely synchronise and the flowers thereby get self-pollinated regularly.

PLANT PATHOLOGY (FUNGAL DISEASES)

Pathol. (F) 01/1979 Survey of representative plantations in the State for leaf, stem and root diseases of forest trees and assessment of level of infection.

The project has been taken up with the objective of preparing a checklist of pathogens responsible for causing various diseases in plantations of eucalypt, teak, balsa rosewood, *Gmelina arborea*, *Bombax ceiba*, and *Ailanthus triphysa*, and to assess the level of infection of major diseases.

During the reporting period second observation on the occurrence of various diseases and their level of infection was completed in all the representative plantations of eucalypt, teak, balsa *Bombax*, *Gmelina* and rosewood and nurseries of eucalypt, teak and *Gmelina*. New diseases were recorded in all the tree species. Taxonomical characters of 37 cultures and 17 herbarium specimens were studied and referred to CMI, UK for specific identification; authentic identification of twenty seven pathogens were received

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

The important objectives of the study are to identify (1) the prevalent species of *Cylindrocladium* in Kerala and its distribution (2) the host-pathogen relationships, mode of infection, survival capability and genetical variability in the pathogen (3) the diurnal and seasonal variations in the incidence of conidia and its relation to disease severity and climate and (4) to indentify appropriate chemical control methods.

Besides the six species of *Cylindrocladium* already isolated, two more species, *C. clavatum* *C. camelliae*, were isolated. The former is a new record for India while the latter is a new pathogen for *Eucalyptus*.

Laboratory studies

Previous preliminary results on conidial inhibition of *C.quinqueseptatum* were repeated and confirmed. Following 'Poison-bait technique' 22 fungicides were evaluated

against *C. quinqueseptatum, C. ilicicola, C. floridanum* and *C. parvum*. Fifteen fungicides found effective in conidial inhibition and poison-bait techniques were also screened by 'soil method' against *C. quinqueseptatum* and *C. ilicicola*. Only Bavistin was found to be effective in bringing about total inhibition of both the fungal species at 500 ppm. Eleven fungicides were screened for their efficacy against the web-blight pathogen *Rhizoctonia solani* following the 'soil method'. Only five fungicides (Agrosil Busane-30, Captan, Terrachlor Super-X and Vitavax) gave promising results; Captan was the best which gave total inhibition of the pathogen.

Field trials:

The chemical control experiments continued from the last reporting period. To confirm the results of the best treatments of Benlate, Bavistin, Difolatan, Fytolan and Brassicol obtained last year, a nursery of *E. grandis* and *E. tereticornis* was raised again at the previous site with a larger number of replications. Effect of fungicidal treatments at pre and post as well as at the time of sowing were conducted employing only the selective fungicides. The dosage and number of applications of fertilizer for increasing growth and vigour of seedlings were standardized. An experiment was initiated to study the effect of direct sowing in the standard containers (12 × 9 cm) simultaneous to sowing in seed beds as well as in small containers (9 × 5 cm) after 1½ months of sowing in seed beds.

Other activities

1. Stump planning trial at Nilambur: To protect stumps of *E. tereticornis* from possible fungal decay an experiment involving a total of 10 treatments of systemic and non-systemic fungicides and fertilizers was conducted.

2. Extension: Nineteen disease problems in various host species were referred to this Division by the Kerala Forest Department, including one from Tamilnadu in clove and *Albizia* plantations. Recommendation for the control of the disease was sent in extension reports

PLANT PATHOLOGY (NON-FUNGAL DISEASES)

Pathol. (NF) 01/1979: Studies on the host-parasite relationship of phanerogamic parasite(s) on teak.

Some of the phanerogamic parasites cause extensive damage to teak plantations in the State. Development of an effective and economic method for control of these parasites requires a thorough understanding of the host-parasite relationship, assessment of the loss, factors responsible for the spread and establishment of the parasites etc. This project has been initiated to study the above details.

Girth measurements of parasite-affected trees in two experimental plots showed reduced growth rate. Effect of the parasite on young trees is more prominent. Wood samples from healthy and parasite-infested trees were collected and processed, to test

the physical and anatomical properties. Phenological data on both host and parasite at monthly interval is being collected from different areas to study the epidemiology of this parasite attack. Out of 18 weedicides screened for selective killing of the parasite Gramoxone, Diuron, Dalapon, Sencor, Afalon and Tolkan gave encouraging results. On further screening of these chemical, Sencor (Metribuzim) was found to be the best. The chemical was infused to the trees using the injection technique developed in this Division (Ghosh S. K. and M. Balasundaran, 1980). No harmful effects of the above compounds were found on the host tree, even one year after the treatment.

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

The objectives of the study are (1) to find out the nature of causal agent of the disease and its mode of transmission, and (2) to develop a method of detection of diseased trees in the field.

The disease could not be transmitted to the healthy plants by different methods of grafting. Fluorescent microscopy of sections of healthy and infected twigs of eucalypts stained in 0.1%. Aniline blue showed bright yellow-green fluorescence in the outer phloem region of infected material whereas the sections from healthy twigs exhibited no fluorescence at all. Fluorescence Microscopy with DNA specific fluorochrome is in progress.

Electron Microscopic work is in progress in collaboration with Dr. M. Lakshmanan of Madurai Kamaraj University.

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

This study aims at the isolation, characterisation and identification of the causal agent and at evolving possible control measures for the spike disease of sandal.

Diseased area in Marayoor sandal reserve has been extensively surveyed to find out the concentration of the diseased trees and spread of the disease. It is noted that the disease is spreading gradually out of the spiked area to the sandal in the nearby areas. Three blocks have been selected for monitoring the disease spread in Marayoor. All trees in each block have been marked and observations on individual trees are being taken once in every three months.

In the preliminary experiment on chemical control, the diseased trees injected with Tetracycline hydrochloride and Oxytetracycline hydrochloride showed remission of the disease symptom. A pilot scale field experiment on chemical control is in progress.

Pathol. (NF) 04/1982-Root nodulation potentialities of Leucaena Leucocephala (Subabul) in Kerala.

The project has been taken up with the objective of acquiring and isolating suitable rhizobial strains and to investigate their effectiveness on the growth of *Leucaena leucocephala*. Cultures of *Rhizobium* strain suitable for subabul have been procured from various sources. Some local strains have also been isolated.

In a preliminary nursery trial five different strains of *Rhizobium* were used. The best result was given by seeds pelletted with local strain. Nodulation in control seedlings were poor and dry weight of the seedlings were also found to be less.

Other activities

The division is also associated with the projects Silvi. 05/1981: *Studies on the effect of slash burning on planting site for teak* and Wood. 05/1980. *Natural durability of commercial timbers of Kerala with reference to decay.* In Silvi. 05/81 soil samples collected from experimental plots before and after burning are being analysed for microbial population count. Wood.05/80 is in progress with a set of wood samples exposed to various wood rotting fungi by the Accelerated Laboratory Test.

SILVICULTURE

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

Important objectives of the project are (a) to study natural variability and to locate good seed stands of *Gmelina arborea, Anthocephalus chinensis* and *Melia composite* (b) to study seed viability and standardise nursery practices and (c) to provide technical guidance to raise plantations.

Experimental plots laid out in 1977 and 1978 to study performance of different provenances of *Gmelina arborea,* were maintained and measurements taken regularly. Another plot of *G. arborea* laid out in 1978 to study the effect of different spacings on growth was also maintained and regular measurements taken.

Observations with regard to germination of *Melia composite* seeds subjected to 4 pre-treatments were taken.

A simple method for extraction of seeds from fruits of *Anthocephalus chinensis* was developed and details were made available to users through the Sept. 1981 issue of 'Evergreen'.

Silvi. 02/1977- Study of afforestation techniques in grasslands of Kerala.

The project aims to carry out field trials to identify commercially valuable species for afforestation of grasslands and to standardise the technique for raising plantations.

The following three species were planted in the grass-lands of Chandanathode under species elimination trials.

1. *Acacia nilotica*
2. *Calliandra calothyrsus*
3. *Leucaena leucocephala*

However, none of the above species showed promise. Another set of 5 species have been planted and they are under observation.

The following are 5 species:

1. *Casuarina equisitifolia*
2. *Swietenia macrophylla*
3. *Grevellia robusta*
4. *Dalbergia latifolia*
5. *Aegle marmelos*

Casuarina equisitifolia and *Grevellia robusta* so far gave a survival percentage of over 90 and their growth was also seen satisfactory

Arrangements for raising seedling of *pinus caribaea* var. *hondurensis* (TPRC/17) and *Santalum album*, for planting out in the experimental area, during 1982-83, were done.

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

Considering the cost involved in raising eucalypt plantations adopting the existing techniques, it is desirable to evolve simpler and cheaper techniques. This project aims to explore the possibility of raising *E. tereticornis* using stumps. Eight experimental plots (6 for Silvicultural studies, 1 for anti-termite treatment studies, and 1 for anti-fungal treatment studies) were laid out at Nilambur Sub Centre. Regular observation were taken.

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

The study aims at finding out whether slash burning is a pre-requisite operation for raising plantations and to explore the feasibility of evolving an appropriate practice which will not be detrimental to the growth of plants and at the same time increasing the output of firewood.

An area of 8.0275 ha. has been selected in 1981-82 teak final felling area at Mundakkadavu in Karulai Range (Nilambur Division). The entire area was divided into 19 plots of 65 m × 65 m for different treatments. The following treatments were tried.

1. Slash burning as practised currently, where all material having a grith of 30 cm at the thicker end are burnt.
2. Burning material below 10 cm at the thicker end.
3. No burning, and leaving all material below 10 cm at the thicker end at site.

Treatments 2 and 3 increase the saleable quantity of firewood. However, there is a reduction in taungya lease rent obtainable for 2 and 3. This, however is partly compensated by the income from the additional quantity of fuelwood collected. Monitoring the effect of different intensities of burning on growth will commence immediately after the area is planted up with teak in May 1982.

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

The project aims at the collection, identification and establishment of most of the bamboo species in India at a central place. This is being established in the Nilambur Sub Centre of the institute. Collection and cultivation is in progress.

Other activities:

Plots were laid out in Nilambur Sub Centre to study the effect of lime, cowdung and Mussorie Phos on growth of *Leucaena leucocephala* and observations were taken regularly.

In addition, this division, in collaboration with other divisions in the Institute, attended to the various problems referred to by the Kerala Forest Department.

SOIL SCIENCE

Soils. 02/1977- Properties of soils under teak

The objective of the study was to evaluate changes in soil properties due to continuous monoculture of teak.

Soil profiles were chosen from teak preservation plots of Perinthomuzhi, Elencheri and Begur for comparative study of first and second rotation profiles. One hundred and two surface samples (0-20 cm) were also taken at random from several plantations for overall evaluation of soil properties in first and second rotation teak plantations. Particle-size, PH, organic carbon and carbon and cation exchange capacity analyses were done.

The data indicated similarity of the first and second rotations profiles of Perinthomuzhi and Begur in relation to distribution of particle-size separates, PH, organic carbon and cation exchange capacity. Although the second rotation Elencheri profiles had a different distribution of these properties, increased levels of organic carbon and cation exchange capacity in it demonstrated no deterioration of these integrative properties. In fact, the profile data revealed recuperation of these soil parameters during the long rotation of 60-70 years. Also, the relatively higher levels of organic carbon and cation exchange capacity in the surface horizons of profiles and in the surface samples suggested that soil parameters should not limit growth of teak in first and second rotation plantations.

The findings have been published in June 1981 as KFRI Research Report No. 7.

Soils. 03/1977- Properties of soils under eucalypts

As eucalypt plantations are managed on short rotations, it is necessary to study whether monoculture of eucalypts can cause soil deterioration. This project had the objective of evaluating changes in soil properties due to continuous eucalypt cropping.

Since most of the eucalypt plantations are in uncoppiced stage, comparative profile studies to establish soil changes due to monoculture of eucalypts was premature. One profile each was chosen from six eucalypt sites to study the properties in general and 62 surface samples (0–20 cm) were taken at random from several eucalypt plantations for overall evaluation of soil properties in uncoppiced and first coppiced plantations. Particle-size, PH, organic carbon and cation exchange capacity analyses were carried out.

Profile data revealed relatively higher levels of organic carbon and cation exchange capacity indicating the generally high fertility of soils under eucalypts. Surface sample data supported the profile data and coppice-wise results also demonstrated higher levels of these integrative parameters in uncoppiced and first coppiced soils. These trends combined with the presence of well-established root system of seedling tree for the coppice trees suggest that the chances of soil deterioration due to continuous eucalypt cropping would be less. Also, the relatively higher levels of organic carbon and cation exchange capacity in the surface horizons of profiles and in the surface samples imply that soil parameters should not limit growth of eucalypts in uncoppiced and first coppiced plantations.

The findings have been published in June 1981 as KFRI Research Report No 8.

Soils.04/1979-Influence of site factors in *Bombax Ceiba plantations.*

Generally, Bombax trees seem to get stunted after a time in several plantations and it is not known whether such stunting is due to site factors, especially soil. The objective of this study is to examine whether site factors, in particular soil, cause stunting of *Bombax*.

164 surface soil samples were taken from 31 plantations having stunted as well as non-stunted Bombax trees. Height and girth measurements of five dominant trees at each sampling site were taken. Particle-size, PH, organic carbon and cation exchanges capacity analyses were done on all soil samples. Analysis of data is in progress.

Soils. 05/1981-Cultural practices for managing soil erosion in forest plantations: State - of - knowledge report.

Soil erosion is the detachment and transport of soil constituents by water, wind and gravity. It is a natural process that has existed throughout geological time, but lately, human activities have accelerated this process. Although there is minimal erosion in natural forests, several factors such as lack of funds for erosion-control practices, intensification of silvicultural operations through reduction of rotation cycles and human disturbances in many forms promote erosion in forest plantations. This project was initiated for preparation of a state - of - knowledge report on cultural practices suitable for managing soil erosion in forest plantations, with particular reference to Kerala. Collection of information from various sources is in progress.

Soils. 08/1981- Organic matter dynamics in teak and eucalypt plantations.

Besides being a storehouse for several essential elements, organic matter has pronounced influence on the physical, chemical and biological activities in soil. A knowledge of the pattern of changes in organic matter due to plantation activities would be helpful for managing soil organic matter in teak and eucalypt plantations. This study aims at evaluating changes in the distribution of organic matter in teak and eucalypt plantations due to plantation activities.

Study areas were selected at Konni, Vazhachal and Nilambur for teak and Punalur and Wynad for eucalypt. Soil sampling was done at 200 m intervals in a sequence of 3 km originating from natural forest and running through plantations. At every sampling site, samples from 0-20, 20-40 and 40-60 cm were taken from a central pit and 15 surface samples (0 20 cm) were taken within a radius of 10 m from the pit. Sampling was completed at Punalur, Vazhachal and Wynad areas (810 samples)

Soils. 07/1981- Effect of Mussorie Phos on the growth of eucalypt seedlings.

Preliminary studies have indicated positive effect of phosphorus addition and liming on the growth and vigour of eucalypt seedlings. Since Mussorie phos is a highly recommended fertilizer for acidic soils and as it is a source of phosphorus as well as calcium, a study of its effect on the growth would be useful for recommending its use in younger eucalypt plantations. As Mussorie Phos is indigenously available, its use is being popularised in agriculture, plantation crops and to some extent in forest plantations. This investigation aims at evaluating the effect of Mussorie Phos on the growth of eucalypt seedlings.

Growth trials of *Eucalyptus tereticornis* were completed in plastic pots (1 Kg soil) containing soils from Thenmala, Alimukku, Muthanga and Thirunelli plantations for assaying Mussorie Phos dosage. Detailed studies in cement pots (25 kg soil) using soil from peechi were begun. Four doses of Mussorie Phos are being tried in these pots approximating field conditions: 50, 100, 150 and 200 g at 10, 20 and 30 cm depths.

The Division collaborated in Bot.01/77, Ecol.01/79, Pathol. (F)02/79, Silvi. 02/77 and Silvi. 05/81 projects of Botany (Taxonomy), Ecology; Pathology (Fungal Diseases) and Silviculture Divisions.

STATISTICS

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

The project was initiated with the objective of providing relevant data as regards all forestry and allied activities in the State. It envisages the systematic collection and storage of information so as to facilitate their easy retrieval as and when required. Since man-made forestry is an important activity undertaken by the forest department, during the year, attention was concentrated on preparing list of plantations raised in the State. Most of the data pertaining to this has been obtained from the Divisional Forest offices

and the Range offices. Since certain discrepancies with respect to the area have been noticed at the time of compilation, the list can be finalised only after rectifying the discrepancies through field checking. This work is to be undertaken.

Another aspect being studied is the variation in yield from the eucalypt plantations in the State. Although the area under eucalypt plantations has increased considerably, no information is readily available on the yield obtainable from the different regions, and whether the yield is likely to decline or increase, during the subsequent coppice rotations. In order to get a clear picture, yield from the areas coppiced during the last 10 years is being collected. So far information pertaining to the plantations in Trichur, Wynad and Kozhikode Divisions has been gathered.

Stat. 05/1979 Analysis of factors influeucing timber prices in Kerala.

A study of temporal and spatial variation in timber prices and analysing the causes of such variations are important in planning the strategy for timber sales. This project is aimed at identifying the factors that influence prices of timber sold from the government depots.

The price data on the sale of timber obtained from Chalakudy and Nedungayam depots has been analysed. Using the index for wholesale commodity prices, current prices were deflated to ascertain the trend in the real prices of all important timber species over time. The analysis indicates a sharp and distinct upward trend in real prices, particularly during the period 1977-78 to 1978-79. To confirm whether the above trend is applicable for the State as a whole, data have been collected from 16 timber depots in the different forest circles in Kerala. The price data is being analysed to identify the temporal and spatial variations in prices.

Other activities:

A study was carried out on relationship between volume and weight of eucalypt wood and the findings were reported to the Chief Conservator of Forests.

The division also attended to the statistical analysis of data pertaining to the research projects undertaken in other divisions as indicated below:

a. Shoot and root growth of *Eucalyptus tereticornis* seedlings (Soil Science Division)

b. Effect of lime on the growth of *Eucalyptus grandis* seedlings (Soil Science Division).

c. Single and multiple choice bioassay to evaluate the attractant/ repellant effects of different plant extracts on termites (Entomology Division).

d. Height and diameter growth in *Eucalyptus* for the paper 'Superior early growth performance of *Eucalyptus camaldulensis*' (Genetics Division).

e. Relationship between number of sprouts and the different dosages of insecticides in the stump planting trial of *Eucalyptus tereticornis* (Silviculture Division).

WILDLIFE BIOLOGY

Wild. 02/1977: 'An ecological study in Periyar liger Reserve with special reference to Wildlife'.

Preparation of management plans for wildlife sancturies requires a thorough knowledge on the population status of different species etc. This project has been formulated to undertake such studies in the Periyar Tiger Reserve in Kerala.

Estimation of animal population, estimation of resources and documentation of the intensity of biotic disturbances were carried out during the year. Population studies were based on indirect evidences such as sample counts of pellets/dung in systematically laid out plots, during both rainy season and dry season. Availability of fodder during different periods were done in exclusion trenches. Defection rates, food preference, pellet/dung size etc. were studied on captive animals. Data analysis is in progress.

The very low proportion of adult elephant tuskers in the total elephant population and the high incidence of biotic disturbance are worth mentioning. Based on photographic identification' the earlier estimate of 29 number of tuskers had to be revised as 3. Biotic disturbance have increased considerably, particularly due to the influx of tourists, whose requirements for accommodation, food etc. have a direct and indirect effect in the forests in the sanctuary. Some of the changes are more or less irrevocable. Illicit fuel wood collection from the forests is resorted to by a large number of people. Poaching, illicit collections of cinnammon bark, cane, cardamom, timber etc. are widespread

Wild. 03/1980: 'Long term envrionmental and ecological impacts of multi-purpose river valley projects – A comprehensive study in Western Ghats 'Wildlife studies'.

This project is taken up as a component of the major project to study the long term environmental impacts of multi-purpose river valley projects and aims at identifying the direct and indirect effect of river valley schemes on wildlife. The study aims at identifying the structure of mammalian and avian community in disturbed and undisturbed ecosystems and to assess the behavioural changes, if any, consequent to habitat alterations.

Animal density and the impact of reservoir on surroundings were the main components studied during this period. Species such as gaur, malabar squirral, tiger, leopard etc. seems to have been eliminated during the period of construction of the dam. Habitat studies indicate that the area has been heavily damaged even to repopulate animals an aspect worth noting since the area has been declared as a wildlife sanctuary. Many of the construction workers encroached nearby areas and settled. Information on forest destruction, present habitation pattern etc. are being collected.

WOOD SCIENCE

Wood. 01/1979: A handbook of Kerala timbers

The objectives of the project are the compilation of information pertaining to physical characteristics, gross structure, properties and utilisation of Kerala timbers and the preparation of a key for field identification of timbers of the State.

The project has been completed and the report published (KFRI Research Report No. 9) Information egarding physical characteristics, distribution physical properties, gross structure, processing and utilisation of 162 species of Kerala timbers is given in the report.

Wood. 02/1979- Structural variability in the wood of Eucalyptus grendis and E. tereticornis in relation to age and locality.

Being an important pulping raw material, it is necessary to identify the structural variability in *Eucalyptus* wood particularly with referance to age and site. This project aims at studying the pulping properties of *E. grendis* and *E. tereticornis* and to identify the magnitude of variation in structural characteristics.

Till last year, the only work that could be carried out was the collection of specimens from the plantations in Central Circle. As the laboratory was not fully equipped, not much progress was achieved. Work on bark/wood ratio, basic density and incidence of Kino veins, fibre morphology (fibre length, cell wall thickness, lumen diameter and fibre diameter) have been completed for the first set of samples collected.

Wood. 03/1979- Preservative treatment of rubber wood (Hevea breziliensis)

Rubber plantations in the State are an important source of wood, and the project has been taken up to enhance the durability of rubber wood to facilitate its wider utilisation.

Preliminary trials of diffusion process were extended to planks of 25 to 50 mm thickness. Different fungicides were tried to control the fungal growth on planks during diffusion period. Culturing of borers which attack rubber wood was standardised under laboratory conditions.

It was found that only sodium pentachlorophenate gave satisfactory results in containing fungal growth on planks kept for diffusion. Method of dip diffusion treatment was standardised. A simple dip treatment to protect rubber wood packing case material against fungal and insect damage was standardised.

Wood. 04/1980- Protection of fibrous raw material in storage against deterioration by biological organisms

Cashew wood and reed are important fibrous raw material used by the pulp and paper industry in the State. To ensure an even supply of raw material, the manufacturing units have to store a large quantity of the material. During storage they are susceptible

to insect and fungal attacks The project was formulated with the objective of evolving appropriate treatments to minimise such damages.

Cashew wood was damaged mainly by insect borers. Three species of beetles were involved, viz. *Batocera ruformaculata* (Cerambycidae) *Sinoxylon anale* (Bostrychidae) and *Xyleborus similis* (Scolytidae). Debarked billets suffered less damage than billets stored with bark. Monthly spraying of BHC or borax-boric acid did not give effective protection. The results suggest that more frequent application of chemicals is necessary to prevent establishment of the borers. Debarking the material before stacking and application of BHC at fortnightly intervals is suggested

Reed was damaged by fungi; no insect attack occurred although *Dinoderus* beetles are known to cause damage. Although vertical stacking is more cumber some, due to better drainage of water reeds stacked vertically suffered less fungal damage than horizontally stacked material. Treatment with borax boric acid at monthly intervals resulted in substantial gain in pulp yield

The cost of the suggested chemicals for prophylactic treatment for a 6 month storage period will be about Rs. 1.20 per tonne for cashew wood and about Rs 1.75 per tonne for reed. The total cost including labour, equipment etc will be low when compared with the considerable saving in wood substance and gain in pulp yield.

The project has been completed and the report is under preparation.

Wood. 05/1980– Natural durability of Commercial timbers of Kerala with reference to decay.

The project aims at assessing the resistance of commercial timbers of Kerala against decay caused by wood-rotting fungi and to rate these timbers into different durability classes.

Wood samples of five species were collected from Southern Circle After air seasoning. wood of *Mesua nagessarium* was sampled into test blocks to standardise the technique.

Air-seasoned *Bombax ceiba* was sampled into feeder strips and reference blocks.

Culture of 15 wood-rotting fungi were procured from various sources and are maintained in 2 malt agar medium.

Experiment to test the natural durability of *M. nagassarium* is in progress.

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

The objectives of the project are (1) to determine the physical properties such as basic density, moisture content and bark percentage of branches and to compare with those of stems, (2) to measure basic density and moisture content of bark, and (3) to investigate the anatomical properties viz. percentages of heartwood (if distinct) and different tissues (fibres, vessels' rays and parenchyma) and fibre dimensions.

Arrangements have been made to collect the sample material from different forest areas in the State

Wood. 07/1982- Establishment of Xylarium

The objectives of the project are (a) identification and collection of woodsamples of timber species of Kerala, (b) collection of voucher herbarium specimens and (c) preparation and collection of authentic slides of wood samples.

Samples from 50 species have been made already in the previous years. Arrangements are being made to collect further samples for this recently approved project.

PARTICIPATION IN SYMPOSIA/ CONFERENCES/ SEMINARS

The Institute was represanted by

1. Shri M. Balagopalan in the 46th Annual Convention of Indian Society of Soil Science held at IARI, New Delhi (August 7-9, 1981).
2. Dr. J. K. Sharma in the XVII IUFRO Congress held at Japan (September 6-12, 1981) as a NORAD Fellow; lecture tour in Forest Research Institute, Las Banos, Philippines
3. Dr. K. Balasubramanyan in the Silver Jubilee Symposium on International Society for Tropical Ecology held at Bhopal (October 5-10, 1981).
4. Shri. N G. Nair in the Seminar on Island Biology held at Port Blair (November 10-12, 1981).
5. Dr. P. M. Ganapathy, Dr. C. T. S. Nair, Dr. K. S. S. Nair and Dr. K. Balasurbamanyan in the Seminar on Resource potential of Kerala held at Calicut (November 19-20, 1981).
6. Dr. J. K Sharma in the III International Symposium on plant pathology held at IARI, New Delhi (December 14-18, 1981).
7. Shri. K. C. Chacko in the workshop on Modern Techniques of site identification for afforestation and pasture development organised by the Indian Society of Photointerpretation and Remote Sensing at Dehra Dun (December 21-22, 1981).
8. Kum. C. Renuka, N. Sasidharan and M. S. Muktesh Kumar in the IV All India Botanical Conference held at Calicut University (December 28-30, 1981).
9. Shri. K. K Ramachandran in the Workshop on Wild Life study techniques held at Khanha National park (January 4-20, 1982).
10. Dr. C. T. S. Nair and Shri K. Ravindran in the Seminar on Resource sharing among Social Science Research Libraries held at the Centre for Development Studies, Trivandrum (February 23-24, 1982).

11. Dr K. S S. Nair, Dr. J. K. Sharma and Dr. S. K Ghosh in the All India Symposium on Vector and Vector borne diseases held at Medical College, Trivandrum (February 26-28 1982)

12. Dr. K. Balasubramanyan in the Indo-US binational workshop on conservation of Biological Diversity held at Bangalore (March 2-6, 1982).

13. Dr. J. K. Sharma in the National Seminar on Advanced Studies in Botany, Madras University (March 29, 1982).

PAPERS PRESENTED AT SYMPOSIA' CONFERENCE/ SEMINARS

1. C. Renuka (with Prof. K. S. Manilal of Calicut University). Floral anatomy of *Calamus travancorica* Bedd. (51 st Annual session of National Academy of Science, India).

2. N. G. Nair-Anthropogenic influence on the Flora of Car Nicobar Island (Seminar on Island Biology, Port Blair)

3. K Balasubramanyan - Management of Tropical Moist Evergreen Forest - Certain biological lacunae (Silver Jubilee Symposium of International Society for Tropical Ecology, Bhopal)

4. K Balasubramanyan – Is the term tropical dry evergreen forest justified?- A case study of Marakkanam R. F., Tamil Nadu (Silver Jubilee Symposium of International Society of Tropical Ecology, Bhopal).

5. C. T. S. Nair- Forest Resources of Kerala (Seminar on Resource Potential of Kerala, Calicut).

6. Sharma J. K. and C. Mohanan - Chemical control of *Cylindrocladium* causing damping off, seedling and shoot blights of *Eucalyptus* in nursery (XVII IUFRO Congress, Tokyo)

7. Sharma J. K and Mohanan, C.-*Cylindrocladium* spp. Associated with various diseases of *Eucalyptus* in Kerala (XVII IUFRO Congress, Tokyo).

8. Sharma J. K. and Mohanan C. – A disease complex of *Eucalyptus* caused by *Pythium, Rhizoctonia* and *Cylindrocladium* and the possible control (III International Symposium on Plant Pathology, New Delhi) (Poster).

9. Sharma J. K., Mohanan C. and Maria Florence, E J – Possible role of insects in spreading diseases of trees caused by fungi in Kerala (All India Symposium on Vector and Vector – borne diseases, Trivandrum).

10. Balagopalan M. - Effect of lime on the growth of *Eucalyptus grandis* seedling (46th Annual Convention of Indian Society of Soil Science, New Delhi).

PUBLICATIONS

1. Ghosh, S. K., Balasundaram, M. and Gnanaharan, R. (1981). Sandal Spike diagnosis by visual observation and electrical resistance - A preliminary study in the field. Proc. XVII IUFRO World Congress, Japan.

2. Sasidharan, N. and Nambiar, V P. K. (1981). *Eleutheranthera ruderalis* (sw) Sch. - Bip (Compositae) a new record for South India. Ind. J. For 4: 240-41.

3. Seethalakshmi, K. K., C. S. Venkatesh and T. Surendran Vegetative propagation of bamboos using growth promoting substances-1. *Bambusa balcoa* Roxb (under publication in the Indian Journal of Forestry).

4. Sharma, J. K. and Mohanan, C. (1981). An unrecorded leaf spot disease of *Eucalyptus* in Kerala caused by *Phaeoseptoria eucalypti* (Hansf.) Walker. Current Science 50: 565-566.

5. Sharma, J. K. and Mohanan, *C. Cylindrocladium* spp. associated with various diseases of Eucalyptus in Kerala (Accepted for publication in European Journal For. Pathol.).

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Appendix I

INSTITUTE STAFF AS ON 31ST MARCH 1983

Dr. P. M. Ganapathy - Director

Administration

1.	Shri M. Mohammed Usman	Registrar
2.	Shri P. Viswanathan	Dy. Registrar (Admn.)
3.	Shri P. K. Balan	Dy. Registrar (Fin.)
4.	Shri R. K. Padmanabhan	Office Assistant
5.	Shri M. S. Sukumaran	—do—
6.	Shri M. K Aravindakshan	—do—
7.	Shri T. G. Ananthanarayanan	—do—
8.	Smt. K. M. Suseela	—do—
9.	Shri E. V. Eshac	—do—
10.	Shri K. K. Thomas	—do—
11.	Shri P. V. Sankaranunni	—do—
12.	Smt Mary Kuruvilla	Receptionist-cum-Telephone Operator
13.	Shri T. J. Alfred Headisjis	Stenographer
14.	Shri P. C. Shelly	—do—
15.	Smt. T. V. Chandrika	Typist
16.	Shri M. A. Sankarakutty	Attender
17.	Shri P. A. Sankarankutty	Attender
18.	Shri K. S. Karunakaran	Attender
19.	Shri E. P. Somasekharan Nair	Attender
20.	Shri K. K. Ahammed	Attender
21.	Shri T. Chandran	Driver
22.	Shri K. Dorai Raj	Driver
23.	Shri C. K. Vincent	Cleaner

Engineering

24.	Shri K. R. Mukundan	Engineer
25.	Kum. V. K. Leela	Office Assistant
26.	Shri K. S. Gopalan	Overseer
27.	Shri U. Y. John	Overseer
28.	Shri P. P. Sunny	Skilled Maintenance Assistant
29.	Shri E. T. Kuttykrishnan	Attender
30.	Shri M. B. Dasan	Watcher
31.	Shri P. M. Venugopalan	Watcher
32.	Shri M. K. Krishnankutty	Watcher
33.	Shri V. N. Balakrishnan	Watcher
34.	Smt K. D. Chinnama	Part-time Sweeper
35.	Smt. V. M Ammini	—do—
36.	Smt. T. R Chellamma	—do—
37.	Smt. K. R Omana	—do—
38.	Smt. K. K Radha	—do—
39.	Smt K. Thankamani	—do—
40.	Smt V. K. Karthiayani	—do—
41.	Smt. P. R Madhavi	—do—
42.	Smt T. K. Vijayalakshmi	—do—

Library		
43	Shri K. Ravindran	Librarian
44.	Shri K. Sankara Pillai	Assistant Librarian
45.	Shri Subash Kuriakose	Artist Photographer
46.	Smt N. Sarojam	Library Assistant
47.	Shri K. H. Hussain	Library Assistant
48	Kum. K. N. Rajamma	Office Assistant
49.	Shri V. Asokan	Typist
50	Shri C. A. Jose	Binder
51	Shri A. S. Sreenivasan	Attender
52.	Shri M. C. MohanDas	Attender
Botany (Physiology)		
53.	Smt. K. K. Seethalakshmi	Research Assistant
54.	Shri T. Surendran	Research Assistant
55.	Shri C. K. Soman	Field Assistant
56.	Shri B. Sreedharan	Attender
Botany (Taxonomy)		
57.	Shri N. Gopalakrishnan Nair	Scientist Grade D
58.	Shri N. Sasidharan	Research Assistant
59	Kum. C. Renuka	Research Assistant
60.	Shri M. S. Muktesh Kumar	Research Assistant
61.	Shri K. K. Unni	Field Assistant
62	Shri T. Prabhakaran	Gardener
63.	Shri K. R. Sevaraman	Attender
Ecology		
64.	Dr. K. Balasubramanyan	Scientist Grade C
65.	Shri K. Sworrupanandan	Research Assistant
66.	Dr. A. R. Ramachandra Menon	Research Assistant
67.	Shri S. Shahul Hameed	Driver
68.	Shri A. V. Velayudhan	Attender
Economics		
69.	Dr. C. T. S. Nair	Forest Economist
Entomology		
70.	Dr. K. S. S. Nair	Scientist Grade C
71.	Dr. R. Venugopal Varma	Scientist Grade D
72.	Shri George Mathew	Research Assistant
73.	Shri V. V. Sudheendra Kumar	Research Assistant (Nilambur)
74.	Shri P. Padmanabhan	Field Assistant
75.	Shri P. I. Madhavan	Driver
76.	Shri P. S. Raman	Attender
Genetics		
77.	Dr. C. S. Venkatesh	Scientist Grade B
78.	Shri Mathew P. Koshy	Research Assistant
79.	Smt. E. P. Indira	Research Assistant
80.	Shri P. V. Subramanian	Attender
Pathology (Fungal Diseases)		
81.	Dr. J. K. Sharma	Scientist Grade C
82.	Shri C. Mohanan	Research Assistant
83.	Smt. E. J. Maria Florence	Research Assistant

84.	Shri K. Yesodharan	Field Assistant
85	Shri K. Girijavallabhan	Driver
86.	Shri V. S. Neelakantan	Attender
Pathology (Non Fungal Diseases)		
87.	Dr S K Ghosh	Scientist Grade C
88.	Shri M Balasundaran	Research Assistant
89.	Shri M. I Mohamad Ali	Research Assistant
90.	Shri E O James Irdode	Attender
Silviculture		
91.	Shri E. Muhammad	Silviculturist
92.	Shri K. C. Chacko	Junior Silviculturist (Nilambur)
93.	Shri Sathish Williams	Silvicultural Assistant
94.	Shri M. Cherukunhan Nair	Attender (Nilambur)
95	Shri C Radhakrishnan	Attender
96.	Shri P. Avunni	Watcher (Nilambur)
97.	Shri K. T. Balan	Cook-cum-Attendant (Nilambur)
Soil Science		
98.	Dr. T G. Alexander	Scientist Grade C
99	Dr. S Sankar	Scientist Grade D
100.	Shri M. Balagopalan	Research Assistant
101.	Shri Thomas P. Thomas	Research Assistant
102.	Kum M. V. Mary	Research Assistant
103.	Shri K Chandran	Attender
Statistics		
104.	Kum. P. Rugmini	Research Assistant
105.	Shri C. N. Krishnankutty	Research Assistant
106.	Shri A. R. Rajan	Field Assistant
107.	Shri A Ramakrishnan	Stenographer
108	Shri K. R. George	Attender
Wildlife Biology (Thekkady)		
109.	Dr V S Vijayan	Scientist Grade C
110.	Shri P. Vijayakumaran Nair	Scientist Grade D
111.	Shri P. S. Easa	Research Assistant
112.	Shri K. K. Ramachandran	Research Assistant
113.	Shri E A Jayson	Research Assistant
114.	Shri V. K. Mohanan	Office Assistant
115.	M. C. Reghunathan	Attender
116.	Shri P. M. Vasu	Watcher
117.	Shri K. Mohan	Motor Boat Driver
Wood Science		
118.	Dr. R. Gnanaharan	Scientist Grade C
119.	Dr K Mahabala Bhat	Scientist Grade D
120	Dr. (Mrs Nazma	Scientist Grade D
121.	Shri K. V. Sidharthan	Attender
General Project		
122.	Shri K. Sasidharan	Research Fellow
123.	K. Somasekharan Unnithan	"
124.	Shri Y. Salahudin	"
125.	Shri P. V. Unneenkutty	"
126.	Shri M. K Ravindranathan	"
127.	Shri P. K. Subramanian	"
128.	Shri James Mathew	Field Assistant
129.	Shri K. Vijayan	Driver

Appendix II

Audited statement of Accounts 1981-82

JOSEPH & JOSEPH
CHARTERD ACCOUNTANTS

P. C. V. Building, Rice Bazaar
TRICHUR
Date: 30 OCT., 1982

AUDITORS' REPORT

We have audited the accounts of the Kerela Forest Research Institute Society, Peechi, Trichur District for the year ended 31st March, 1982 with the books of accounts and other records maintained by the Institute and report that:-

1 We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit;

2 The Balance Sheet and the Income and Expenditure Account dealt with by the the report are in agreement with the books of accounts; and

3 In our opinion and to the best of our information and according to the explanations given to us, and subject to the limitations contained in the notes, the accounts give a true and fair view;

(a) in the case of the Balance Sheet of the state of affairs of the Institute as at 31st March, 1982 and,

(b) in the case of the Income and Expenditure account of the excess of expenditure over income for the year ended on that date.

For JOSEPH & JOSEPH
Chartered Accountants,
Sd/

P. L. Paulose, F. C. A.,
Partner
Chartered Accountants.

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR (DT).

BALANCE SHEET AS AT 31ST MARCH, 1982

	As per Schedule	Figures as at 31—3—1982	Figures as at 31—3—1981
LIABILITIES:-			
GENERAL FUND	A	1,38,14,630.24	1,10,45,164.86
RESERVES & SURPLUS	B	1,09,703 68	1,09,703.68
CURRENT LIABILITIES & PROVISIONS	C	9,13,136.17	8,51,339.88
TOTAL :		1 48,37,470.09	1,20,06,208.42
ASSESTS:-			
FIXED ASSESTS	D	58,86,414.15	49,35,088.86
CAPITAL WORK-IN-PROGRESS	E	61,44,921.69	42,01,174.79
CURRENT ASSESTS, LOANS & ADVANCES	F	28,06,134.25	28,699,44.77
TOTAL :		1,48,37,470.09	1,20,06 208.42

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR (DT)

	31-3-1982 Rs. Ps.	31-3-1981 Rs. Ps.
INCOME:-		
Interest on Savings Bank A/c & F.D.	61,203.12	15,493 85
Service charge from research projects	87,072.00	70,776.00
Miscellaneous Income	36 003.08	25,779 35
Excess of Expenditure over income	29,59,278.22	23,07,939.23
TOTAL	31,44 056 42	24 19 988 43
EXPENDITURE:-		
Salary and Allowances	13,73,456.40	10,84 858.77
Contribution to employees provident Fund	79,519.00	65,723.00
Leave Travel Concession	6,292.20	1,995 45
Group gratuity assurance	39,505.72	.....
Travelling Expenses (incldng Rs. 4,767-03 to Governing Body members)	1,01,969.29	78,909.31
Medical Reimbursement	25,579.25	18,032.65
Leave Salary & Pension contribution	19,916.35	22,289 00
Telephone Charges	35,583.30	31,050.65
Postage	8,591.90	6,650.30
Bank Charges	1,177.51	.675 95
Rent	8,850.00	9,000.00
Printing and Stationery	40,238.38	19,419 29
Subscription to Journals & Periodicals	96,566.81	81,589.67
Repairs & Maintenance of Vehicles	2,29,578.44	1,58,767.22
Repairs & Maintenance of Buildings and Equipments	1,16,251.94	1,30,055.21
Research Expenses including Stores and Chemicals	3,25,139.81	2,00,090.16
Advertisement Charges	21,804.62	28,934.10
Staff Welfare Expenses	11,682.52	6,372.70
Garden Development Expenses	7,753.41	8,067.95
Audit Fees: For Audit	6,600.00	6,000.00
Professional Charges	4,850.00	9,132.00
Electricity Charges	17,859,30	13,414.05
Panchayath & Municipal Property Tax	6,941,16	5,385.96
Lease Rent of Land	2 00	2 00
Miscellaneous Expenses	11,223.41	11,977 90
Depreciation on Fixed Assets	5 37,610 01	4,15,412,44
Campus Development	.....	688 00
Seminar & Symposia	11,523.69	4,494 70
TOTAL	31,44,056,42	24,19,988 43

	Current year figures Rs. Ps.	Previous year figures Rs. Ps.
SCHEDULE: A		
General Fund:-		
Balance as per last Balance Sheet	1,10,45,164,86	78,60,478.09
Add: Grant received from Govt. of Kerala	57 28,743.60	54.92 626.00
	1,67,73,908.46	1,33.53,104.09
Less:- Excess of expenditure over income	29,59.278 22	23,07,939.23
TOTAL	1.38,14,630.24	1,10,45,164.86
SCHEDULE B:		
Captial 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 & Agricultural Organisation	1, 06, 520.17	1, 06,520.17
TOTAL	1, 09, 703.68	1, 09, 703.68
SCHEDULE: C		
Current Liabilities and Provision:		
A. Current Liabilities:-		
Grant for Research project in progress	7, 01, 844.10	6, 95, 844.10
Security Deposit from Customers	18, 233,00	6, 389.00
Other Liabilities	1, 41, 700,87	1, 22, 466.78
Letter of Credit	21, 718.20	.....
TOTAL	8, 86, 496.17	8, 24, 699.88
B. Provisions:-		
Employees Provident Fund	26, 640.00	26, 640.00
TOTAL	9, 13 136 17	8, 51, 339.88

SCHEDULES ATTACHED TO AND FORMING PART OF THE BALANCE SHEET FOR THE FINANCIAL YEAR 1981-'82.

	Current year figures Rs. Ps.	Previous year figures Rs. Ps.
SCHEDULE: D		
(See separate Sheet Attached)		
SCHEDULE E		
Capital Work in progress:-	61, 31, 807.56	40, 97, 232.60
Peechi Building-III Phase	13, 114-13	13, 114.13
Teak Museum		26, 368.29
Cost of plywood supplied to M/s. Chic	.....	64 459.77
Furniture for making furniture	.....	
Insectorium		
TOTAL	61, 44, 921.69	42, 01, 174.79
SCHEDULE F:		
Current assets, loans & advances:-		
A. Current assets	7, 93, 080.15	5, 08, 632.02
1 Research work in progress		
2 Stocks as per inventory taken valued and certified by the Directors:-		
a) Stock of stationery	21, 946.42	13, 864.72
b) Stores and Chemicals	38, 351.26	91, 170.61
c) Cement	450 00	975 00
3 a) Cash on hand including stamps Rs. 27-45	237.54	82, 813.67
b) With Scheduled banks:-	43, 300.84	5, 14. 968.78
i) In Savings Bank Account	1, 292 31	5, 380 49
ii) In Current Account		
iii) In Fixed Deposit (Being security for obtaining guarantee facility from S. B. T)	30, 000.00	30, 000.00
	1. 09, 700.00	1.09, 700.00
iv) Fixed Deposit with Sub Treasury	5. 13,948.34	3. 48, 969.40
c) With Sub-Treasury - S. B.	—	21,00
4 Telephone charges Recoverable TOTAL	15. 52. 306.86	17, 06 495 69

B. LOANS & ADVANCES:-

Advance Receivable in cash or in kind or for value to be received. (Unsecured Considered good)			
Prepaid expenses		61,913.50	71,746.79
Advance for Capital work-in-progress		9,31,500.00	9,49,813.00
Accrued interest		51,455.17	11,967.50
Other advances		2,03,158.72	1,24,121.79
Telephone Deposit		5,800.00	5,800.00
	TOTAL	12,53,827.39	11,63,449.08

SUMMARY (A & B):-

Current Assets		15,52,306.86	17,06,495.69
Loans and Advances		12,53,827.39	11,63,449.08
	TOTAL	28,06,134.25	28,69,944.77

OTHER ADVANCES	31-3-1982 Rs Ps	31-3 1981 Rs. Ps.
T. A. Advance	2,081.75	3,066.50
Advance given to Institute Scientists for research work	38,101.63	22,314 29
Trans Electricals, Cochin	6.00	6.00
Govt. of India, Department of Science & Technology	...	2.127 00
New Bold Bulford Ltd , U K.	...	1,729 15
Leave Salary advance to deputationists	32,119.49	23,618.99
Leaue Salary advance to Dr. V. N. Vapiche	...	1,725.0
Godrej & Boyce Manufacturin Company Ltd. Coching	...	3,780.80
Leave travel concession advance	450.00	400.00
Tourism Department	...	131.16
ASCU HICKSON, Calcutta (Treatment Plant)	1,07,333.75	55,812.50
INSDOC, Bangalore	1,038.90	1,123.30
Telephone Deposit	4,200.00	4,100.00
A. C. Sukumaran (Rent advance)	...	900 00
Deposit with K. S. E. B.	2,900.00	2,150.00
Deposit with I. O. C.	195.00	195.00
D. F. O. Nilambur	100.00	100.00
Tempo Industrial Corporation, Bombay	...	27.10
Thomsons, Trichur	...	75 00
Chitra Sales Corporation, Trichur	740 00	740.00
D. F. O., Arunachal Pradesh	22 65	...
Private Trunk call Charges	124.90	...
Central Transport of India. Calcutta	6.202 00	...
Chakkiat Agencies, Cochin	329.50	...
M/s. C. P. N. Industries, New Delhi	1,926.00	...
Dy. Conservator of Forests, Coimbatore	212.15	...
Macneil & Magor Ltd. Cochin	400 00	...
Chhotalal Keshavjee Shah & Sons, Bombay	1,000.00	...
Festival Advance	3,675.00	...
TOTAL	2,03,158.72	1,24,121.79

GROUPINGS OF SCHEDULES.

	31--3—1982	31--3—1981
	Rs. Ps.	Rs. Ps.
GRANT FOR RESEARCH PROJECTS-IN-PROGRESS:		
Advance from H. P. C.	8,000.00	2,000.00
Grant from Forest Department	1,35,444.10	1,35,444.10
Grant from Govt. of India for MRV Project	2,50,000.00	2,50,000.00
Grant from Govt. of Kerala towards Teak Museum	2,00,000.00	2,00,000 00
Grant from Govt. of India for M. A. B. Project	93,400.00	93,400.00
Gwalior Rayons, Woods 04	15,000 00	15,000.00
TOTAL	7,01,844 10	6,95,844.10
ADVANCES FOR CAPITAL WORK-IN-PROGRESS:		
Kerala State Construction Corporation	.....	18,313.00
Public Health Engineering Department (Government of Kerala)	9,31,500.00	9,31,500.00
TOTAL	9,31,500.00	9,49,813.00
PREPAID EXPENSES:		
Journal Subscription	53,112.27	60,966.00
Advance for books and microfilms	6,325.23	9,142 79
Insurance of Vehicles	2,476.00	1,639.00
TOTAL	61,913.50	71,746.79

GROUPINGS OF SCHEDULES

	Current year Figures	Previous year Figures
	Rs. P.	Rs. P.
RESEARCH WORK-IN-PROGRESS:		
Genetic improvement of Teak in Kerala	1,89,240.81	98,255.22
Multi-Purpose River Valley Project	2,13,567.35	1,03,476.01
Man and Bio-Sphere Project	93,400.00	91,227.58
Woods (Gwalior Royons)	3,801 91	3,785.41
Thekkady wild life Projects	2,88,358.68	2,10,540.92
Control of insects damaging stored reeds-Entom 04	4,711.40	1,346.88
TOTAL	7,93,080 15	5,08,632 02

GROUPINGS OF SCHEDULES

	31 - 3 - 1982	31—3—1981
	Rs. P.	Rs. P.
OTHER LIABILITIES		
Salary Payable	98,420.60	1,04,082.75
T. A. Payable	7,699 51	5,501.75
Medical reimbursement Payable	4,447.60	1,119.40
Advertisement charges Payable	1,155.00	505.75
Excess of house rent collected	.....	221.00
Rent Payable	300.00	1,950.00
Lease Rent Payable to Govt. of Kerala	10.00	8.00
C. P. F. Collected not remitted	728.00	41.00
C. P. F. Loan collected not remitted	164.00	——
Electricity charges Payable	2,407.39	1,016.38
Audit fee Payable	6,000 00	6,000.00
Bank Commission Payable	35 95	1,672.75
Life Insurance contribution collected from staff	47.20	——
Caution Money deposit for library membership	150.00	150.00
Tax deducted at source:- Income-tax	4,051.00	198.00
Sales-tax	8.62	——
Suspense Account	18,750.00	——
Kerala Construction Corporation	326.00	——
	1, 44, 700.87	1, 22, 466.78

Schedules Attached to and forming part of the Income and Expenditure Account for the financial year 1981-1982.

	Current year Figures	Previous year Figures
	Rs. P.	Rs. P.
SCHEDULE G:		
Miscellaneous Income:-		
Application fees	1, 360.00	1, 500.00
House Rent recovered from staff	11, 090.25	7, 104.30
Sale proceeds of tender documets	195.00	120.00
Cost of service book collected	53.20	79.80
Rest House rent recovered from third parties	2, 034.50	1, 824.75
Sundry	2, 530.13	642.95
Hire Charges of Vehicles	18, 720.00	14, 507.55
	36, 003.08	25, 779.35

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR DISTRICT

Description of assets		GROSS BLOCK				DEPRECIATION			NET BLOCK	
	Rate %	As at 1-4-81	Additions	Sales	Total	Till 31-3-81	For the year	Till 31-3-82	As at 31-3-82	As at 31-3-81
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.
Building - Office	2.5	2650801.47	.....	.....	2650801.47	215119 58	60892.04	276011.62	2374789.85	2435681.89
Compound wall & Fencing	7.5	155105.86	320926.36	.....	476032.22	25418.70	33796.04	59214.74	416817.48	129687.16
Nilambur Nursery Fencing	10	12990.77	.....	.....	12990.77	5319.85	767.09	6086.94	6903.83	7670 92
Roads	...	45668.41	.....	.....	45668.41	.....	.....	.....	45668.41	45668.41
Well	...	26295.73	.....	.....	26295.73	.....	.....	.....	26295.73	26295.73
Cycles	20	1034.63	.....	.....	1034.63	674.73	71.98	746.71	287.92	359.90
us, Jeeps & Trailers	30	376382.05	95006.39	.....	471388.44	278012.12	58012.90	336025.02	135363.42	98369.93
oat	10	19339.81	14380.00	1500.00	32219.81	5583.08	2663.67	8246.75	23973.06	13756.73
ars & Motor Cycles	20	96577.26	.....	.....	96577.26	56402.12	8035.03	64437.15	32140.11	40175.14
lectric Fittings	15	134229.85	33533.35	.....	167763.20	50642.88	17568.05	68210.93	99552.27	83586.97
Motor pump & Fittings	10	33290.10	.....	.....	33290.10	8367.23	2492.29	10859.52	22430.58	24922.87
pectro Photometer	10	227892.23	2221.60	.....	230113.83	45594.68	18451.92	64046.60	166067.23	182297.55
Microscopes	15	247682.39	6852.54	.....	254534.93	89182.59	24802.85	113985.44	140549.49	158499.80
esearch Equipments	10	740517.01	383899.74	.....	1124416.75	174606.97	94980.98	269587.95	854828.80	565910.04
Library Books	15	847156.75	130274.89	1026.14	976405.50	359227.96	92576.63	451804.59	524600.91	487928.79
Type writers, Calculaters & Duplicator	15	66867.73	7857.15	.....	74724.88	32718.18	6301.01	39010.19	35705.69	34149.55
Furniture & Fittings	10	702336.49	82692.41	.....	785028.90	179221.31	60580.76	239802.07	545226.83	523115.18
Refrigerators	10	31505.58	21463 12	.....	52968.70	11327.83	4164 09	15491 92	37476.78	20177.75
Air Conditioners	15	12465.04	27856.35	.....	40321.39	5954.24	5155.07	11109.31	292.2 08	6510.80
Office Equipments	10	11520.77	.....	.....	11520.77	2855.57	866 52	3722 09	7798.68	8665.20
Micro Computor	15	67833.98	.....	.....	67833.98	26175.43	6248.78	32424.21	35409.77	41658.55
sectorium	5	.....	115367.88	.....	115367.88	.....	5758.39	5758.39	109609.49	.....
esearch Binocular Microscope	15	.....	170209.01	.....	170209.01	.....	5531.85	25531.85	144677.16	.....
eaf Area Meter	10	.....	78920.65	.....	78920.65	.....	27892.07	7892.07	71028.58	.....
TOTAL		6507493.91	14911401.44	2526.14	7996429.21	1572405.05	537610.01	21100615.06	5886414.15	4935088.86

THE KERALA FOREST RESEARCH INSTITUTE SOCIETY, PEECHI, TRICHUR DISTRICT

. Description of assets		GROSS BLOCK				DEPRECIATION			NET BLOCK	
o.	Rate %	As at 1-4-81	Additions	Sales	Total	Till 31-3-81	For the year	Till 31-3-82	As at 31-3-82	As at 31-3-8
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. Ps.	Rs. P
1. Building - Office	2.5	2650801.47	.....	.....	2650801.47	215119 58	60892.04	276011.62	2374789.85	2435681.8
2. Compound wall & Fencing	7.5	155105.86	320926.36	.....	476032.22	25418.70	33796.04	59214.74	416817.48	129687.1
3. Nilambur Nursery Fencing	10	12990.77	.....	.....	12990.77	5319.85	767.09	6086.94	6903.83	7670 9
4. Roads	...	45668.41	.....	.....	45668.41	.....	.....	.....	45668.41	45668.4
5. Well	...	26295.73	.....	.....	26295.73	.....	.....	.....	26295.73	26295.7
6. Cycles	20	1034.63	.....	.....	1034.63	674.73	71.98	746.71	287.92	359.9
7. Bus, Jeeps & Trailers	30	376382.05	95006.39	.....	471388.44	278012.12	58012.90	336025.02	135363.42	98369.9
8. Boat	10	19339.81	14380.00	1500.00	32219.81	5583.08	2663.67	8246.75	23973.06	13756.7
9. Cars & Motor Cycles	20	96577.26	.....	.....	96577.26	56402.12	8035.03	64437.15	32140.11	40175.1
10. Electric Fittings	15	134229.85	33533.35	.....	167763.20	50642.88	17568.05	68210.93	99552.27	83586.9
11. Motor pump & Fittings	10	33290.10	.....	.....	33290.10	8367.23	2492.29	10859.52	22430.58	24922.8
12. Spectro Photometer	10	227892.23	2221.60	.....	230113.83	45594.68	18451 92	64046.60	166067.23	182297.5
13. Microscopes	15	247682.39	6852.54	.....	254534.93	89182.59	24802.85	113985.44	140549.49	158499.8
14. Research Equipments	10	740517.01	383899.74	.....	1124416.75	174606.97	94980.98	269587.95	854828.80	565910.0
15. Library Books	15	847156.75	130274.89	1026.14	976405.50	359227.96	92576.63	451804.59	524600.91	487928.7
16. Type writers, Calculaters & Duplicator	15	66867.73	7857.15	.....	74724.88	32718.18	6301.01	39010.19	35705.69	34149.5
17. Furniture & Fittings	10	702336.49	82692.41	.....	785028.90	179221.31	60580.76	239802.07	545226.83	523115.1
18. Refrigerators	10	31505.58	21463 12	.....	52968.70	11327.83	4164 09	15491 92	37476.78	20177.7
19. Air Conditioners	15	12465.04	27856.35	.....	40321.39	5954.24	5155.07	11109.31	292.2 08	6510.8
20. Office Equipments	10	11520.77	.....	.....	11520.77	2855.57	866 52	3722 09	7798.68	8665.2
21. Micro Computor	15	67833.98	.....	.....	67833.98	26175.43	6248.78	32424.21	35409.77	41658.5
22. Insectorium	5	.....	115367.88	.....	115367.88	.....	5758.39	5758.39	109609.49	.....
23. Research Binocular Microscope	15	.....	170209.01	.....	170209.01	.....	5531.85	25531.85	144677.16	.....
24. Leaf Area Meter	10	.....	78920.65	.....	78920.65	.....	27892.07	7892.07	71028.58	.....
TOTAL		6507493.91	14911401.44	2526.14	7996429.21	1572405.05	537610.01	21100615.06	5886414.15	4935088.8