CHAPTER II

INSTITUTE OF FOREST GENETICS AND TREE BREEDING, COIMBATORE

The Institute of Forest Genetics and Tree Breeding is a national Institute formed in April, 1988 under the Indian Council of Forestry Research and Education, an autonomous Council under the Ministry of Environment and Forests, Government of India. It was formed by up-gradation of the Forest Research Centre, Coimbatore under the Forest Research Institute and College existing since 15.12.1959. Certain other organizations and schemes viz., Forest Soil cum Vegetation Survey, Coimbatore; Disease and Insect Survey, Coimbatore; Indo-Danish project on Seed Procurement and Tree Improvement; Tropical Pines Research Centre, Kodaikanal; Eucalyptus Research Centre, Ooty and Environmental Research Station, Ooty were also merged with the Forest Research Centre to form the Institute.

PROJECTS COMPLETED DURING THE YEAR 2002-2003

Project 1: Socio-economics of some important medicinal plants in the tribal belts of Tamil Nadu [IFGTB/BIOD/1997-2002]. *For technical report contact, Principal Investigator - Mr. D. Rajasugunasekar.*

Findings: The study on demand and supply of medicinal plants revealed that their annual requirement in increasing however the profits are not as per the expectations of farmers due to lack of standardized cultivation practices, fixed price policy by the industry and proper marketing channel etc.

Project 2: Phyto-sociological and socio-economic impact of Joint Forest Management in Tamil Nadu [IFGTB/RP26/2000-2003]. *For technical report contact, Principal Investigator - Mr. D. Rajasugunasekar.*

Findings: During the course of study, a set of questionnaire was evolved to assess the phyto-socio-economic changes and the impact on socio-economics in the three villages. The questionnaire can be used as an effective tool to assess the phyto-socio-economic impact in JFM areas.

PROJECTS CONTINUED DURING THE YEAR 2002-2003

Project 1: Genetic variability and selection in natural population of *Artocarpus* species [IFGTB/RP1/2000-2005]. *Principal Investigator- Dr. Maheshwar Hegde.*

Status : Patches of natural population of *Artocarpus integrifolia* are located in Nilgiri hills (Kothagiria and Barliar), Kolli hills and Valparai. The variations in characteristics of fruits and seeds within populations and between populations have been recorded. Seedlings have been raised in nursery and isozyme characterization has been done to study the genetic structure and variation between populations.

Spreading type of *A. integrifolia* tree with fruits on main stem, secondary and tertiary branches at Panrutti, Tamil Nadu

Project 2: Evolving clonal propagation technology for teak to improve productivity [IFGTB/RP2/2000-2005]. *Principal Investigator- Dr. K. Palanisamy.*

Status : Clonal propagation technology for teak has been standardized to produce quality planting stock. The quality seedlings from clonal seed orchard of Maharashtra and Tamil Nadu were also multiplied vegetatively.

Clonal multiplication of superior trees of teak

Project 3: Variability studies with special emphasis on physiology, biometry and biochemistry in selected tree species for tree improvement [IFGTB/RP4/2000-2005]. *Principal Investigator- Mr. Kannan Chandra Sekhara Warrier.*

Status: Seventy three casuarina clones are being screened for salt tolerance in a sodic site at Trichy. Inter clonal variation with respect to salt stress is evident from the experiments with respect to biometric and physiological characters.

Project 4: Identification and cloning of gene(s) encoding protein(s) toxic to *Trichosporium vesiculosum* Butler [IFGTB/RP5/2000-2005]. *Principal Investigator - Dr. Modhumita Ghosh.*

Status: The 39.5 KD antifungal protein purified from the leaves of *Andrographis paniculata* was found to be highly toxic to spore germination and hyphal extension of two pathogens, *Macrophomina phaseolina* and *Aspergillus flavus*. High resolution microphotographs revealed that in both the pathogens there was no tip lysis. The hyphae of both the pathogens showed increased vacuolation when compared to the control hyphae.

Project 5: Genetic transformation of *Eucalyptus* and *Casuarina* to enhance salinity tolerance [IFGTB/RP6/2000-2005]. *Principal Investigator - Mr. N.V Mathish.*

Status: To study organogenesis in *Casuarina equisetifolia,* callusing of dewinged seeds was induced in MS media containing 0.5 ppm benzyl amino purine and 0.01 ppm naphthalene acetic acid and subjected to different sequences of growth hormones concentrations. Organogenesis was observed in three sequences of media compositions. For deducing kanamycin concentrations to be used in the selection media for screening transformants, experiments were also carried out to determine lethal concentrations of kanamycin on callus tissues. It was observed that kanamycin at 50 and 100 ppm inhibited callogenesis. However, organogenesis was observed at 50 ppm kanamycin implying that kanamycin concentrations above 50 ppm and below 100 ppm could be used for screening transformants.

Project 6: Impact assessment of intensive silvicultural practices on seed production in seed orchards/seed production areas in south India with reference to teak [IFGTB/RP9/1999-2003]. *Principal Investigator - Mr. K.S. Balakrishnan.*

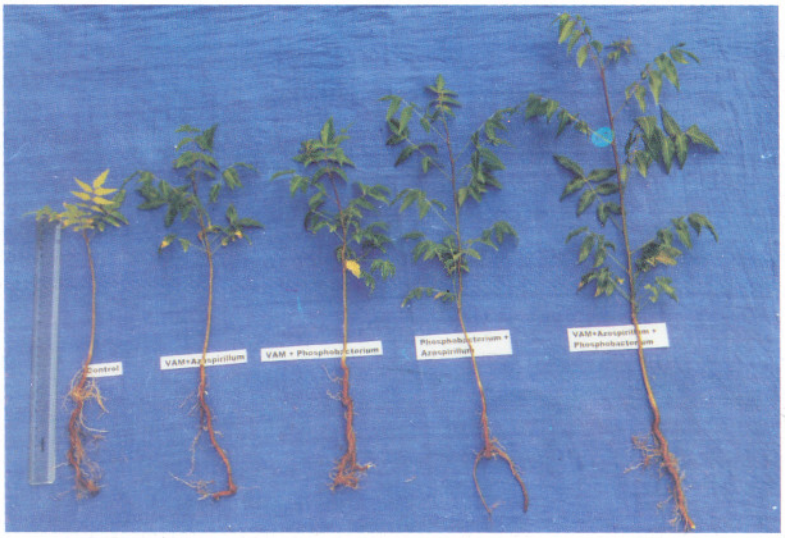
Status: Soil samples were collected from these SPAs and analyzed for various nutrients. Details on rainfall, year of formation and number of trees of the SPAs were also collected.

Project 7: Afforestation and productivity studies in the problem soils of Tamil Nadu [IFGTB/RP10/1999-2003]. *Principal Investigator- Mr. P.V. Krishna Rao.*

Status: Under the afforestation, the problem soils of ACC Madukkarai and Magnesite mine spoils of burn standard, Salem have been reclaimed through consultancy and guidance by planting tree species such as *Acacia auriculiformis, Casuarina equisetifolia, Cassia fistula, Delonix regia, Eucalyptus tereticornis, Azadirachta indica* (neem), *Muntingia calabora, Syzygium cumini* (naval), *Leucaena leucocephala* (subabul), *Ailanthus excelsa, Cassia siamea,* and *Samanea saman*. Application of bio-manure, bio-fertilizers and proper irrigation during rain failure has resulted in satisfactory performance under adverse soil conditions.

Project 8: Standardization of containerized nursery practices for selected forest tree species [IFGTB/RP11/1999-2003]. *Principal Investigator- Mr. M. Maria Dominic Savio.*

Status: Nursery trials to study the effect of potting media, standardized by various Forest Departments and Forest Development Corporations and the container types and sizes on *Acacia nilotica, Acacia leucopholea, Acacia auriculiformis, Albizzia amara* and *Azadirachta indica* were completed. Nursery trials to study the effect of different potting media along with bio-fertilizers on teak, *Pongamia pinnata, Dalbergia latifolia* and *Sapindus emarginatus* were laid out.



Inoculations of bio-fertilizers to *Azadirachta indica*

Project 9: Standardization of seed handling procedures for commercially important medicinal plants of forest ecosystems [IFGTB/RP13/1999-2004]. *Principal Investigator- Ms. Rekha R. Warrier.*

Status: Seed extraction, pretreatment and germination methods for the medicinal plants such as *Aegle marmelos, Feronia elephantum, Emblica officinalis, Oroxylum indicum, Pterocarpus marsupium, Syzigium cumini, Strychnos nux-vomica* and *Terminalia bellerica* have been standardized. Storage techniques for *Aegle marmelos, Feronia elephantum, Emblica officinalis, Oroxylum indicum* and *Pterocarpus marsupium* have been optimized.

Germination methods for the medicinal plants

Project 10: Standardization of seed handling techniques for tropical recalcitrant seeds [IFGTB/RP14/1999-2003]. *Principal Investigator - Mr. V. Sivakumar.*

Status: Seed maturity studies, desiccation, low temperature tolerance and seeds storage studies were carried out on *Hopea parviflora* and *Vateria indica*. Seeds of *Madhuca longifolia* were collected and studied for the effect of moisture content and temperature to improve the longevity of seeds.

Project 11: Investigations on wood properties of teak in relation to variation in age and site factors [IFGTB/RP15/1998-2003]. *Principal Investigator- Mr. C. Buvaneswaran.*

Status: The studies showed that among physical properties of soil, electrical conductivity and bulk density were found to have significant correlation with wood properties. Among various soil chemical properties, nitrogen, potassium and calcium registered significant correlation with wood properties.

Project 12: Studies on productivity of *Acacia mangium* plantations in Kerala [IFGTB/RP16/2000-2005]. *Principal Investigator - Mr. C. Buvaneswaran.*

Status: Information on extent and location of existing *Acacia mangium* plantations were collected from Agricultural Offices/Institutions. *Acacia mangium* plantations were identified in central and southern agro-climatic zones for further studies.

Acacia mangium seedling seed orchard at Nilambur, Kerala (4 years old)

Project 13: Management of *Casuarina equisetifolia* in agroforestry systems for sustainable economic returns [IFGTB/RP17/1999-2003]. *Principal Investigator - Dr. Syam Viswanath.*

Status: Different root and canopy management treatments were imposed and the performance of different agricultural crops as intercrops is being monitored in wide row intercropping system with *Casuarina* in two on-farm trials. The biomass sampling under different treatments was done after felling of trees and root distribution patterns were also mapped. Financial analysis of the agroforestry model under different situations is under progress.

Project 14: Productivity and nutrient dynamics in agroforestry system [IFGTB/RP18/1999-2004]. *Principal Investigator - Dr. M. George.*

Status: Sample plots laid out in the agroforestry plantations of Casuarina and teak in farmers field were maintained and data on growth performances were recorded. Periodical collection of litter was made and processed for further analysis in the laboratory. Interception studies were initiated to estimate the nutrient return through rain-wash. All the data on observations were recorded and analysis of the samples in under different stages of progress.

Project 15: Study of market dynamics relating to important Non Timber Forest Produce (NTFP) in Tamil Nadu [IFGTB/RP19/2001-2004]. *Principal Investigator - Mr. S. Saravanan.*

Status: Information on LAMP societies was collected. Questionnaire was prepared. Information on important NTFP was collected.

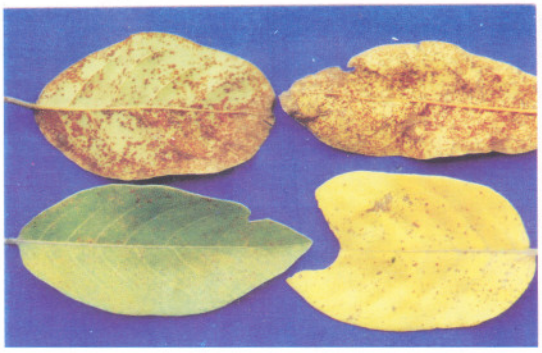
Project 16: Development of package of practices for management of nursery pests/diseases [IFGTB/RP20/2000-2003]. *Principal Investigator- Dr. J.P. Jacob.*

Status: Investigation on the pest and disease problems was carried out in modern nurseries in and around Coimbatore. Low to moderate level incidence of *Myllocerus* sp. (beetle) was observed through out the year on neem, *Acacia feruginia, Pongamia pinnata, Emblica officinalis, Casuarina, Cassia, Acacia, Syzygium, Samania saman, Ceiba*, teak, *Gmelina arborea, Dalbergia latifolia* and *Sapindus emerginata*. Minor incidences of the scale insect, *Megapulvinaria maxima* on neem seedlings were recorded during April to June and October to December in Coimbatore and Bhavanisagar, respectively. *Ferronia limonia* seedlings had the infestation of *Papilio demoleus* during April to June in Coimbatore. Severe attack of *Aphis* sp. on *Emblica* in Bhavanisagar was recorded during July to September. Low to moderate incidence of defoliator *Achea janta* on *Tamarind* and *Ascotis* sp. and *Delonix regia* was also recorded in Coimbatore. Periodical surveys were made to record the incidence of pathological problems and are as follows:

Scale insect, *Megapulvinaria maxima* atttack on neem

Leaf rust: Severe attack (95%) of leaf rust disease symptom was recorded on a clonal bank of *Terminalia chebula* by *Uredo terminaliae*. Application of biocontrol agents (*Trichoderma viride* and *Pseudomonas fluorescence*) and sulphur fungicide (Sulfax @ 0.1% a.i.) were found effective to manage the disease.

Leaf spot and blight: Severe incidence (75%) of both leaf spot and blight diseases caused by a species of *Alternaria* on red sanders was observed. Application of Indofil M-45 as foliar spray was found effective in containing the disease problem.



Leaf rust disease on clonal plants of *Terminalia chebula*. Infected leaves showed brown coloured rusty fungal structures on ventral side and yellowing of foliage.

Healthy plants of *Terminalia chebula* after treatment with the fungicide and bio-control agents.

Infected clonal plants of *Terminalia chebula* by leaf rust diease and the infected plants showed yellowing of foliage.

Powdery mildew: Severe incidence (90%) of powdery mildew on 2 months old tamarind seedlings was observed. However the attack was not severe on seedlings more than six months old. Application of sulphur fungicide (Sulfax @ 0.1% a.i) as well as bio-control agent (*Trichoderma viride* and *Pseudomonas fluorescence*) as foliar spray were effective against the disease.

Rot/Decay of cuttings: Rotting or decaying of cuttings of *Acacia mangium* and *Prosopis alba* caused by *Fusarium oxysporum* was recorded as a major disease problem in the mist chambers. Sterilization of potting media, implementation of sanitation measures and application of fungicide were effective in management of the disease.

Project 17: Identification, isolation, evaluation and mass production of native fungi for the management of teak and Casuarina stem borers [IFGTB/RP21/2000-2005]. *Principal Investigator - Dr. A. Balu.*

Status: About 150 soil samples were collected from Casuarina costal plantations and subjected to insect bait method to trap naturally occurring entomopathogenic fungi in the soil. Four new strains of entomopathogenic fungi (unidentified) were isolated from the soil samples collected from forest areas of Western ghats and stored for the pathogenicity studies envisaged under the project.

Project 18: Testing of promising plant derived chemicals against key pests [Component : Bioactive compounds from *Acacia nilotica* (babul) against the major defoliators of forestry tree species) [IFGTB/RP22/ 2000-2005]. *Principal Investigator - Dr. S. Murugesan.*

Status: The crude water and methanol extracts of *A. nilotica* leaves have shown biopesticidal properties in terms of antifeedancy, ovicidal, pupal and larval mortality against teak and pongamia defoliators viz. *Ascotis selenaria, Tephrina pulinda* and *Epicrocis lateralis*.

Project 19: Selection of pest resistant trees from wild population, provenances and exotic trials and progeny tests [IFGTB/RP23/1994-2004]. *Principal Investigator - Mr. K.R. Sasidharan.*

Status: Three species of insects viz. *Sinoxylon* sp. (stem borer), *Anomalococcus indicus* (scale insect - sap sucker) and *Selepa celtis* (defoliator) were found to be serious pests, attacking young plantations of *Acacia nilotica* sp. *indica*. Insignificant difference in terms of the stem borer (*Sinoxylon* sp.) attack was observed on provenance trail for six seed sources. The seed source, "Ayyampulli" was found to be least susceptible to the scale insect *Anomalococcus indicus* as well as to the defoliator, *Selepa celtis*. The seed source, "Devadanam" was found to be highly susceptible to both the pests.

The incidence of the bark caterpillar generally came down in the International Provenance Trial of Casuarina established at Neyveli, owing to the full rotation period attained by the trees. The Indian seed sources continued to exhibit high level of susceptibility to the bark caterpillar.

Project 20: Testing and evaluation of selected existing control methods for key diseases of *Casuarina* sp. with specific reference to blister bark and root-rot [IFGTB/RP24/ 2000-2005]. *Principal Investigator - Dr. V. Mohan.*

Status: A field trial in respect of developing integrated methods of management of blister bark or stem wilt disease caused by *Trichosporium vesiculosum* and root-rot disease caused by *Ganoderma lucidum* has been laid out. Biofertilizers (VAM and Ectomycorrhizal fungi), biocontrol agent (*Trichoderma viride*) and chemical fungicide (Bavistin) were mass produced and applied to the seedlings of *Casuarina equisetifolia*. Incidence of targeted diseases, *Trichosproium vesiculosum* has not been noticed so far.

Project 21: Studies on mycorrhizal fungi (biofertilizers) and their application in nursery and field [IFGTB/RP25/2000-2005]. *Principal Investigator - Dr. V. Mohan.*

Status: Studies on mycorrhizal fungi association with *Casuarina equisetifolia* revealed the occurrence of different species of VAM fungi belonging to the genera viz., *Acaulospora, Gigaspora, Glomus* and *Scutellospora*. *Glomus* was found more dominant and followed by *Gigaspora*.

An ectomycorrhizal fungus, *Thelephora ramarioides* was recorded for the first time in association with *Casuarina equisetifolia* in field conditions. Frequency distribution of basidomata of the fungus *T. ramarioides* in *C. equisetifolia* and *C. junghuniana* plantations varied with sites. It was observed

that 100 per cent distribution in *C. equisetifolia* plantations and 80% in *C. junghuhniana* plantations.

Studies on the effect of VAM, ectomycorrhiza (*P. tinctoria*) and phosphobacterium individually and in combination in the seedlings of *C. equisetifolia* exhibited the positive effect on better growth performances. The treated seedlings had increased plant height (30-50%) and shoot and root biomass and collar diameter.

Project 22: Development of a database on biodiversity [IFGTB/RP27/ 1999-2004]. *Principal Investigator - Mr. Raman Nautiyal.*

Status: Seventy detailed records on various plant species have been collected for the preparation of the initial database. Nine tables from the records have been prepared. Data entry in the main table consisting of basic detail is completed. Data entry into other tables is in progress.

Project 23: Development of a database on tree improvement on mandatory species in Tamil Nadu and Kerala [IFGTB/RP28/2001-2004]. *Principal Investigator - Mr. R. Vivekanandan.*

Status: Forms and reports are designed and improved. Data entry continued from secondary sources for the following components: Plus Tree / CSO / SSO / SPA. Software is being procured for further development.

Project 24. Modeling the growth of Eucalyptus in Tamil Nadu [IFGTB/RP29/2001-2004]. *Principal Investigator - Raman Nautiyal.*

Status: Collection of secondary data from existing field trials has been initiated. Secondary data on growth variable have been obtained. A validation set of data has been built up. Data analysis is in progress.

NEW PROJECTS INITIATED DURING THE YEAR 2002-2003

Project 1: Genetic improvement of *Eucalyptus tereticornis* through controlled pollination and molecular characteri-zation [IFGTB /RP3 2002-2005]. *Principal Investigator- Mr. B. Nagarajan.*

Status: Phenology of flowering and overlapping in *Eucalyptus tereticornis*, *E. citriodara, E. alba, E. grandis, E. robusta, E. globulus, E. resinifera* and *E. torelliana* were studied. A pollen collection was done from species and provenance trial plots.

Controlled pollination work in *Eucalyptus tereticornis* at Sadivayal,Coimbatore

Based on flowering phenology and overlap inter-specific, controlled pollination was conducted in seedling seed orchard of *E. tereticornis* with *E. grandis* and *E. alba* and *E. citriodara x E. torelliana* (a putative hybrid) as pollen parents.

Project 2: Development of protoplast regeneration system for Eucalyptus [IFGTB/RP7/2002-2005]. *Principal Investigator - Mr. R. Yasodha.*

Status: Seedling explants and *in vitro* grown leaves of *Eucalyptus camaldulensis* clones were used to produce somatic embryogenesis callus. Suspension cultures established from callus are useful in the production of actively dividing protoplasts. To find the effective conditions for obtaining protoplasts from *in vitro* leaves, the effect of enzyme combinations and length of incubation period on protoplast yield were examined after 12 and 24 hours of incubation.

Project 3: Isolation of soma-clonal variants of *Casuarina equisetifolia* for salinity tolerance [IFGTB/RP8/2002-2007]. *Principal Investigator- Mr. Santan Barthwal.*

Status: Standardization of protocol for callus culture is under progress. Various basal media were tested for optimizing the callus growth in *Casuarina equisetifolia* cotyledons. Growth hormones and their concentrations were tested to induce morphogenetic callus from seedling explants. Around 95 media combination containing various hormone concentrations of 2,4-dichlorophenoxyacetic acid, kinetin and NAA for callus initiation from cotyledon explant are under observation. Initial results indicated that cotyledonary explants were found to responce best for callus production. The media with 2,4-D in absence of kinetin is showing best results in concentration range of 2.5 ppm to 3 ppm. In presence of kinetin callus initiation is late and only in some combination callus growth is visible.

Project 4: Selection of potential mycorrhizas and other beneficial microbes for the reclamation of bauxite mine spoils [IFGTB/RP10a/2002-2005]. *Principal Investigator- Dr. A. Karthikeyan.*

Status: The study area was selected at MALCO, bauxite mines, Yercaud hills and samples of mine spoils were collected for analysis. The native VAM fungi were isolated, cultured in the laboratory and the nutrient status of the mine spoils was analyzed. Nursery experiments to study the establishment of seedlings in the bauxite mine spoils were carried out. The seedlings of *Acacia auriculiformis, A. mangium*, *Eucalyptus tereticornis* and *E. camaldulensis* were inoculated with suitable bio-fertilizers and raised in the bauxite mine spoils. *A. auriculiformis* inoculated with VAM and *Rhizobium* sp. was found to perform well.

Project 5: Utilization of fly ash dumps to study soil amelioration and recuperation [IFGTB/RP12/2002-2005]. *Principal Investigator- Dr. Lalit Narayan.*

Status: The approach involved in the project is to gainfully utilize the fly ash through blending it with soil and biofertilizers. Experiments to develop different blends and combinations are initiated. The successful combinations will help ameliorate the soil in wastelands to make it productive.

EXTERNALLY AIDED PROJECTS

PROJECTS COMPLETED DURING THE YEAR 2002-2003

NIL.

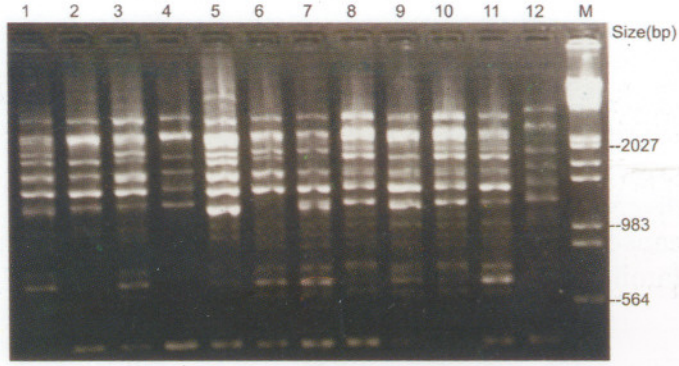
PROJECTS CONTINUED DURING THE YEAR 2002-2003

Project 1: Development of neem in various agro-ecological regions of India (Tamil Nadu, Andhra Pradesh and Karnataka) [IFGTB/EF-RP1/1999-2003]. *Principal Investigator - Mr. B. Gurudev Singh.*

Status: Neem seeds were collected from selected 117 CPTs (which were identified as rich in Azadirachtin and oil contents, 10 provenances as follows: Kalangal - 10 CPTs; Mangarai - 9 CPTs; Pudukottai - 8 CPTs; Pollachi - 13 CPTs; Palladam - 12 CPTs; Madurai - 21 CPTs; Udumalpet - 10 CPTs; Thanjavur - 19 CPTs; Karur - 5 CPTs and Karamadai - 10 CPTs. 250 grams of the seeds from 102 CPTs were collected and being analysed for chemical composition and oil yield. Seed storage trials revealed that neem seeds could be successfully stored for 20 months (27% germination) at optimum temperature and moisture content.

Project 2: Fingerprinting of economically important clones of *Eucalyptus* and *Casuarina* [IFGTB/EF-RP2/2000-2004]. *Principal Investigator- Dr. K. Gurumurthi.*

Status: Twelve clones of *Casuarina equisetifolia*, identified by IFGTB as superior performers were selected for fingerprinting using RAPD and AFLP techniques. A total of 20 primers selected from the preliminary studies were tested with the 12 clones of *C. equisetifolia*. RAPD amplification of 12 clones of *C. equisetifolia* with 15 primers produced a total of 118 bands of which 57 bands (48%) were polymorphic. The minimum and maximum number of bands observed were 3 (primer OPC 12) and 13 (primer OPC 08) with an average of 8.5 bands per primer. The amplification products considered for scoring data ranged in size from 250 bp to 2150 bp shows the RAPD pattern obtained for the 12 clones with the primer OPE 02. To study the genetic diversity within and among the provenances of *C. equisetifolia* ten prove-nances have been selected from the populations available in the Casuarina network in Andhra Pradesh Forest Department at Rajahmundry. The cladode cuttings were brought to IFGTB, rooted and the stock plants were established. Genomic DNA was isolated from five plants in each provenance, which will be used in the RAPD analysis. In the case of Eucalyptus, twenty provenances



RAPD fingerprinting pattern generated (primer OPE-02) for the clones of *Casuarina equisetifolia*.

obtained from CSIRO, Australia and IFGTB, Coimbatore was used for estimation of genetic diversity. Out of twelve AFLP primer combinations that have been used so far, eight combinations gave good banding patterns with silver staining. Out of these, 4 primer combinations were rated excellent due to their high multiplex ratio.

Project 3: Threatened species recovery research for Silent valley and Kolli hills MPCAs of Kerala and Tamil Nadu [IFGTB/EF-RP3/2000-2003]. *Principal Investigator - Dr. C. Kunhikannan.*

Status: Distribution mapping assessment of population status studies on reproductive biology and seed handling techniques of some threatened medicinal plants have been carried out. A total of 124 and 102 woody species including the threatened species were enumerated in surveyed area of Silent valley and Kolli hills, respectively. Regeneration status and population structure of these threatened medicinal plants showed that *Myristica dactyloides, Persea macrantha* and *Garcinia morella* showed greater proportion of individuals in lower classes like seedlings, sapling and 10-30 cm girth classe and lesser number in larger girth class. In species like *Aphanamixis polystachya*, *Canarium*

Fully opened flower of *A. tagala*

Fruit after 6 months maturation in *A. tagala*

strictum, Hydnocarpus alpina, Garcinia gummi-gutta, and *Cinnamomum sulphuratum* seedling or sapling classes are missing. Marked phenological variations exist between plant populations of *Aristolochia tagala* and *Smilax zeylanica*. *Smilax zeylanica* populations flowers during late February in Silent valley and during June and August in Kolli hills.

Project 4: Evaluation of breeding efficiency and genetic gain in seedling seed orchards of Eucalyptus and Casuarina in south India [IFGTB/EF-RP4/2002-2005]. *Principal Investigator - Dr. Mohan Varghese.*

Status: A first generation progeny trial of *Eucalyptus tereticornis* was evaluated for growth traits at 4 years of age. Three hypothetical selection strategies were applied, based only on the height growth of the trees without any consideration for the flowering and fruiting traits. Simple phenotypic selection based on height growth was found to be a safe strategy offering substantial gain at a given diversity level. Index selection gave maximum gain but was not good in conserving diversity. Restricting the number of families and individuals in each family was not as useful as phenotypic selection.

NEW PROJECTS INITIATED DURING THE YEAR 2002-2003

NIL.

Research achievements

Name of state	No. of projects completed in 2002-2003	No. of on-going projects in 2002-2003	No. of projects initiated in 2002-2003
Tamil Nadu	2	21	5
Kerala	-	16	3
Pondicherry	-	11	2
Andaman & Nicobar	-	2	-

Technologies assessed and transferred

1. Seed production systems for the production of quality seeds was established. Quality seeds were collected and supplied to the forest departments, industries, NGOs and farmers.

2. Neem seed handling procedures were standardized. Hands on training given to staff of Tamil Nadu Forest Department and farmers. The technique adopted had helped the farmers in fetching better price for the neem seeds.

Education and trainings

Trainings organised

Sl.	Subject	Duration	Target group
1.	Advanced forest technologies.	24.9.2002 to 25.9.2002	Forest officers of Kerala Forest Department (Social Forestry Wing).
2.	Modern nursery practices.	19.02.2003 to 21.02.2003	Farmers, NGO's, Forest and Agriculture Department officials, Pondicherry.
3.	Tree improvement and nursery technology.	28.11.2002	Forest officials of Social Forestry wing, Kerala Forest Department.

Trainings received

Sl.	Name	Training	Place of trainings	Duration
1.	R. Vivekanandan, Raman Nautiyal and P.M. Manickam	National Training on Linux operation system	ACCEL IT Academy, Coimbatore, India	April to July, 2002 (36 hrs.)
2.	R. Vivekanandan, Raman Nautiyal and C.K. Jagannath	National training on Visual basic	SSI, Coimbatore, India	April to June, 2002 (20 hrs.)

Publications

Books/Proceedings

1. Casuarina : Improvement and Utilization (2002). Gurumurthi, K.; A. Nicodemus and Siddappa. (Ed.), ICFRE publication 218 p.

2. Rajagopal, K.; George, M. and Buvaneswaran, C. (2002). Litter production and nutrient return in teak plantation. Advances in Forestry Research in India, 29: 136-150.

3. Varghese, M. Ravi, N., Son, S.G. and Lindgren, D. (2002). Optimising selection in an open pollinated progeny trial of *Eucalyptus tereticornis*. Proc. International Conference on eucalypt productivity, Hobart, Australia, 10-15, November 2002, pp., 26-29.

4. Warrier, K.C.S. and Venkataramanan, K.S. (2003). Screening for salt tolerance in clones of *Casuarina equisetifolia*. In: Abstracts, National Seminar on Management of Degraded Forests for Productivity Enhancement and Carbon Sink Expansion, Tropical Forest Research Institute, Jabalpur, 15-16, January, 2003.

Research papers

1. Viswanath, S.; Singh, R.P. and Thapliyal, R.C. (2002). Seed germination patterns in a Himalayan moist temperate forest. *Tropical Ecology*, 43 (2).

2. Manimuthu, L.; Sivakumar, V. Singh, B. Gurudev and Vanangamudi, K. (2002). Preliminary studies on desiccation and storage of *Symplocos racemosa* Roxb. seeds. Danida Forest Seed Centre. Newsletter, pp.35-36.

3. Sathyakumar, S. and Viswanath, S. (2002). Observations on food habits of Asiatic black bear in Kedarnath Wild life Sanctuary, India and Preliminary evidence on their role in enhancing seed germination and dispersal. *URSUS Journal*, 13.

Brochures / Reports

- Under the Shanthi Ashram-UNDP project on participatory agro-forestry for poverty alleviation and environmental restoration in Perur block, Coimbatore, the following 17 Technical bulletins were published in english and vernacular languages.
- Agroforestry models for different situations
- Maintenance of agroforestry plantations
- Marketing of agroforestry produce
- Establishing library (documentation) and information service center
- Value addition of agroforestry products
- Biotechnology for agroforestry
- Natural resource management through agroforestry
- Sustainable fuel and fodder production from agroforestry
- Trees of agroforestry importance Nelli (*Emblica officinalis*)
- Trees of agroforestry importance Silk cotton (*Ceiba pentandra*)
- Trees of agroforestry importance Naval (*Syzygium cumini*)
- Trees of agroforestry importance *Jatropha curcas* (Kattamanaku)
- Trees of agroforestry importance Agathi (*Sesbania grandiflora*)
- Trees of agroforestry importance Velvelam (*Acacia leucophloea*)
- Trees of agroforestry importance Eruthalaimaram (*Gliricidia sepium*)
- Trees of agroforestry importance *Cassia siamea*
- Trees of agroforestry importance Karuveppilai (*Murraya koenigii*).

Conferences/meetings/workshops/seminars/symposia

1. Barthwal, S.; Tripathi, S.B.; Nautiyal, R.; Pant, R.C. and Gurumurthi, K. (2003). Photosynthesis as selection criteria for rapid screening of *Eucalyptus* clones for salt tolerance. In Abstracts of the 2nd International Congress of Plant Physiology on Sustainable Plant Productivity under Changing Environment, 8-12 January 2003, New Delhi, India, pp. 245.

2. George, M. and Buvaneswaran, C. (2003). Eco-Restoration Model for Degraded Forests to Meet Ecological and Social Needs. Paper presented in National seminar on Management of Degraded Forests for Productivity Enhancement and Carbon Sink Expansion, TFRI, Jabalpur (M.P.) 15-16, January, 2003.

3. Mahadevan, N.P.; Vijayachandran, S.N.; Rekha, R.; Warrier, V.; Sivakumar and Gurudev Singh, B. (2003). Seed Storage studies in *Bambusa arundinacea*, Willd. Paper presented in National Symposium on Conservation, Management and Utilization of Bamboo and Rattan Resources 2003 at College of Forestry, Sirsi, and Karnataka from 25 to 27 Feb., 2003.

4. Varghese, M. (2002). Variation in fertility and its impact on gene diversity in a seedling seed orchard of *Eucalyptus tereticornis*. Paper presented at the International Symposium on Eucalyptus plantations held at Guangdong, China from September, 1-6, 2002,

5. Viswanath, S.; George, M. and Buvaneswaran, C. (2003). Extension approaches for promoting woody perennials in homesteads of Perur block, Coimbatore: A case study. Paper presented in National Workshop on Homestead Farming at Kerala Agricultural University, Vellainikkara, Thrissur, 6-7 March, 2003.

Sl.	Subject	Duration	Target group
1	2	3	4
1.	National workshop on agroforestry-prospects and challenges.	22.11.2002	Officials from State Forest Departments, Farmers, NGOs, Scientists from different Research Organisations and Universities.
2.	Village seminar, Technical Workshops under the Project Participatory agro-forestry for poverty alleviation and environmental restoration in Perur block, Coimbatore.	Seven workshops during the year.	Farmers, NGOs, Tree Co-operatives, Village Panjayat, Women self-help grops, School children.
3.	Workshop on Sustainable Mountain Development.	16.08.2002	Kodaikana.
4.	Workshop on Forestry and climate change assessing mitigation potential and cost.	23.09.2002 to 28.09.2002	New Delhi.
5.	Annual Research Seminar of SACON	16.11.2002	Anaikatti.
6.	Workshop on Biodiversity of Tamil Nadu.	15.12.2002	Chennai.
7.	Workshop on Medicinal plants prospects and challenges'.	21.12.2002	Periyar College of Pharmaceutical Sciences for Girls, Thiruchirapalli.
8.	National Symposium on Conservation, Management and Utilization of Bamboo and Rattan Resources	25.02.2003 to 27.02.2003	College of Forestry, Sirsi, Karnataka.
9.	Roundtable consultation on *Gmelina arborea* Improvement Programme	04.03.2003 to 06.03.2003	RFRI, Jorhat
10.	National Workshop on Homestead Farming	06.03.2003 to 07-03-2003	KAU, Vellanikara, Trichur.

1	2	3	4
11.	FORSPA - Bangkok sponsored National Workshop on Technological Innovation and Research Advancements for application in Joint Forest Management	03.02.2003 to 04.02.2003	FRI, Dehra Dun.

Consultancy

Consultancy for sub-programme on participatory agroforestry for poverty alleviation and environmental restoration in Perur block, Coimbatore sponsored by Shanthi Ashram, Coimbatore.

Exhibitions

1. A total of 10 different poster exhibits were prepared depicting achievements of various research projects of the Institute, participated in National workshop on "Technological innovation and research advancement for application in Joint Forest Management" during 3.2.2003 to 4.2.2003 at Dehra Dun.

2. Exhibition materials have been prepared and provided on research highlights of IFGTB for Conference on Climate change from 23.10.2002 to 1.11.2002 at Vigyan Bhavan, New Delhi.

3. Exhibition materials have been prepared and provided on research highlights of IFGTB for Indian Science Congress at Bangalore during January 2003.