



INSTITUTE OF FOREST GENETICS AND TREE BREEDING

(Indian Council of Forestry Research and Education)

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From the Director's Desk

One of the most challenging tasks before an institute like ours is to identify and prioritise forestry problems and issues which need urgent attention. ICFRE has devised a transparent method to identify and prioritise research problems. This is achieved by involvement of stakeholders right from the beginning of identifying projects through implementation and finally transmission of findings. The exercise of project planning, formulation and its acceptance is through rigorous interactive meetings with stakeholders. We have completed stakeholder deliberations with state forest departments of TN, Kerala, ANI and Puducherry. The broad areas identified for research as prioritized by the departments are eco-restoration of degraded forest types including mangroves, species recovery programmes, natural stand density initiatives, site specific agroforestry models and climate change related issues, quality planting stock production, tree improvement programmes for productivity and forest health monitoring. The identified problems very much fit into the mandate and core competency of the scientific research team and identifying forestry associated problems and providing appropriate solutions on a time bound basis to stakeholders is the core value of our Institute.

Director, IFGTB

Forest Genetics and Tree Breeding in the Era of Climate Change

Climate change affects the environment in various manners and forestry is no exception. Forests respond to climate change in many ways. The forest ecosystems are either positively or negatively affected; the species exhibit differential response depending on their genetic nature and the populations of species exhibit varied response. The biodiversity at all levels - ecosystem, species and populations of species (inter-specific) suffer to varied degrees. The science of forest genetics and the art of tree breeding have a pivotal role to play in both conservation and utilization of forest resources in this era of climate change.

Role of Forest Genetics: How species and populations respond to climate change depends on the extent to which the response is under genetic control. Those species or populations that have strong genetic control over the adaptive traits evolve and adjust themselves to the changing climate through genetic modification over a long period of time. On the other hand those that are phenotypically plastic, i.e., with less genetic control over the adaptive traits, adjust to changing climate by appropriate change of phenotype. Within a species, the populations also vary in the same manner.

Genetic studies through field trials or genomics are required to differentiate subspecies and their populations for conservation and use. The genotypically stable populations

have to be conserved at multiple locations so that certain genotypes are not lost in the process of genotypic modification. The phenotypically plastic species and populations are useful for forest productivity, especially of plantations, by being suitable for species-site, population-site or clone-site matching.

The genetic bottlenecks that arise due to climate change owing to changes in reproductive biology, plant-pollinator relationships, dispersal agents, seed biology, seedling response, etc. need to be studied for the purpose of maintaining genetically viable populations. Understanding this needs a thorough study of the **population genetics** of forest species.

The species that are threatened due to the complex effects of climate change on interspecific interactions, need to be recovered through appropriate methods of **conservation genetics**. The physiological and biochemical responses of species and populations to climate change can be elicited through ecophysiological studies and the results can provide clues to the genetic make-up that determines adaptations, through appropriate **functional genomic** studies. Such studies can also lead to sequencing of whole genomes of plant species, which will make their conservation and use focused and targeted.

Role of Tree Breeding: Climate change has the effect of exacerbating all the physico-

chemical and biological stresses that tree species and populations face. Tolerance / Resistance to these stresses will be an advantage in production forestry. Efforts are needed for characterization of genotypes already selected, for their response to various stress conditions. New selections are required for stress tolerance / resistance.

In view of the need for greater carbon sequestration than at present to offset the increasing emissions, breeding directed at greater carbon sequestration potential would be necessary. To afforest more areas that are degraded by various physico-chemical stresses, breeding targeted at stress tolerance rather than just productivity, has to be taken up. One of the strategies to contain the release of Greenhouse gases from the fossil fuel use is use of biomass as source of energy. This calls for breeding aimed at production of high calorific value wood. This will also take care of the need of fuelwood in the world, which is almost half of all the wood that is extracted from the forests and plantations.

Conclusion: All these call for greater efforts at selection and breeding of populations that can withstand the vagaries of climate change and aid carbon sequestration in large measures. Since most of the areas to be planted in the future are going to be those under stress, greater attention to silviculture would also be necessary. Appropriate methods of seed collections, seed handling, seed treatment, nursery practices, plantation practices, post plantation care and harvesting procedures comprise the elements of silviculture that needs attention.

The threat that agriculture faces are more severe. The chances of failure of agriculture are to be offset by incorporating tree species into agriculture in the form of agroforestry systems. This also calls for studies on tree crop - agri crop - soil interactions under conditions of climate change and ideotype breeding to meet the special needs of agroforestry.

Thus, forests would be able to combat the negative effects of climate change only by appropriate research in forest genetics, tree breeding, silviculture and agroforestry and their integration at various levels.

R.S.C. Jayaraj

Consultancies

IFGTB successfully completed the evaluation of captive plantations raised by Tamilnadu News Print Limited, Karur under their Farm Forestry programme.

Interactive Meetings

An interactive meeting was held on 28.04.2010 with the officials of the Tamilnadu Forest Department in the Office of the Principal Chief Conservator of Forests, Chennai. The main objective of the meeting was how best the effective collaboration can be made between IFGTB and the Department on Forestry Research and Extension. The following points were discussed:

- 1 Some funds may be made available in 13th Finance commission plan for Research.
- 2 CAMPA funds cannot be spared to IFGTB at present since funds received has been already earmarked for various activities of the Forest Department. CAMPA funds can be spared to IFGTB for research, at a later date.
- 3 Issues regarding permission to enter forest areas for Research by IFGTB officers/Scientists can be resolved and suggested the director to send proposals.
- 4 Permission to revisit the establishment trials can be given.
- 5 The main focus should be developing core competencies of both the institutions.
- 6 Basic research should be carried out by IFGTB and the Field oriented

research should be taken up by the Department for successful forestry research and extension.

Two books Manual of economically important forestry species in South India and Tree Borne Oil Seeds of Tamil Nadu (Tamil) were released.



A Stakeholder's workshop on Forest research and extension was conducted on 19.05.2010 with the Kerala Forest Department. The meeting was chaired by the PCCF, Kerala and attended by senior forest officials besides a team of officers and scientists from IFGTB. The following decisions were taken:-

1. To select sites for establishing Teak Seed Orchards and inspect the existing Teak Seed Production Areas including the 60 ha established by IFGTB; identify and select potential ones and suggest management practices for enhancing seed production (to be jointly undertaken by KFRI, IFGTB & KFD).
2. To sort out hurdles if any for carrying out scientific research in forest areas.
3. To formulate a project on conservation of mangroves, with the active participation of the local people
4. To look into the problems of Sandal regeneration and suggest suitable remedial measures.
5. To develop fast growing clones of *Gmelina arborea* and other indigenous species for growing in homesteads.
6. To continuously monitor the Permanent Preservation Plots

(PPP). The CCF (Research) shall provide the information about the PPP, so that a team of Scientists can visit and suggest what could be done in future. The Scientists can visit frequently and collect data from the PPP and monitor these plots.

- To earmark some fund for research projects from CAMPA fund, wood based industries etc.

The Stakeholder's workshop with the Department of Environment and Forests, Andaman and Nicobar Islands on Forest research and extension was conducted on 31.05.2010. The meeting was chaired by the PCCF, A&N Islands and attended by PCCF (WL), APCCF (Planning and Development), CCF (Research) and other senior forest officials besides a team of officers and scientists from IFGTB. The following decisions were taken.

- Restoration of Degraded Mangroves and reclamation of elevated mangrove areas
- Conversion of Teak plantations into mixed forests and bring them into natural profile
- Studies on Agroforestry systems
- Short rotation fast growing native species as pole crop to meet the local demand
- Biodiversity Assessment studies
- Studies on NTFP
- Organising Capacity building programmes for frontline staff and farmers
- Conducting EIA studies on land based development projects



Also discussed with the Director, Science and Technology and explored the possibilities of collaborations. It has been agreed to collaborate in climate change related research and knowledge centres to be created by the DST, A&N Islands.

An interactive workshop with farmers was organised which was attended by representatives from industries, farmers, and others. A total of 200 farmers participated in the workshop.



VVK and Demo Village

A model nursery has been established at Kuthiran, Kerala. A shade house with polytunnels has been erected to facilitate raising of seedlings and distribution to farmers.



Displayed info panel related to package of practices in tree cultivation of important tree species, plantation technologies, advancement made in Genetics and Tree breeding, biotechnology, Biofertilizers and biomanures, seed handling techniques, Sacred Groves, Biodiversity of Western Ghats particularly at Silent Valley, etc. maintained the medicinal plants assembled at the centre.



Trainings

Five training programmes were organised through VVK, Port Blair from 1.6.2010 to 4.6.2010 at Port Blair, Baratang, Rangat, Mayabunder and Diglipur on issues ranging from Quality planting stock production, plantation management, Climate Change and Forestry, Biofertilizers and Biomanures, Mangrove management, Floral biology, etc.



Shri T.P. Raghunath, Group Coordinator Research, Shri R.S.C. Jayaraj, Head, FLUCC, Dr. B. Nagarajan, Head, PBT, Shri K. Ravichandran, Extension Officer and Dr. A. Karthikeyan Scientist D were involved in the training programmes. A total of 250 Front line staff of the department got benefited out of the training programme.





An exhibition on 100 Medicinal Plants was organised in association with Coimbatore District Tree Growers Association.



The Institute participated along with Tamilnadu Forest Department in the exhibition organised as part of the **World Classical Tamil Conference** at Coimbatore from 21-30 June 2010. In recognition of the services rendered as volunteers, eight staff of IFGTB were honoured by the Hon'ble Minister for Education, Tamil Nadu, Shri Thangam Thennarasu.



Exhibited bows, arrows, axes, implements and ornaments used by the ancient and Medieval Tamil people.



The World Environment Day 2010 was celebrated in the institute with a planting programme involving Farmers, Foresters, Officer Trainees and public at the institute. A total of 400 trees were planted in the campus. The tree Planting programme was inaugurated by Dr. G. Kumaravelu, IFS (retd) Member, Tamil Nadu State Planning Commission.



Services

IFGTB has recently upgraded Soil and Water testing lab with equipments such as Fully Automatic Nitrogen analyzer, Atomic Absorption Spectrophotometer, Processor based Flame Photometer and Bench top pH meter. At present, The lab has facilities to carry out analysis of physical parameters of soil such as Electrical Conductivity, pH, Bulk density, texture, and chemical properties such as Nitrogen, Phosphorous, Potassium, Calcium, Magnesium, Organic carbon. Lab is also equipped for micronutrient analysis using Atomic Absorption spectrophotometer. The Director, IFGTB is pleased to extent this lab facilities for farmers, state forest departments and other stakeholders for monitoring of soil health in plantations and forest ecosystems.



FIELD FORESTERS' COLUMN

The forest officials are requested to contribute their important observations in the field related to the forest management and express the problems encountered in management of forest resources which can be addressed through research/training. Please send rare photographs of events for publication.

Forthcoming Events

Trainings to be conducted

1. Quality Planting Stock Production for farmers for farmers and field forestry officials
2. Agroforestry systems for farmers
3. Integrated Pests and Diseases Management (IPDM) for field forest officials
4. Biofertilizers and Biomanures for field forest officials
5. Charcoal making from bamboos for farmers
6. Vegetative propagation from farmers
7. ABC of DNA for school students
8. Introduction to Biodiversity Conservation and Sustainable Utilization of Bioresources for school students.

Trainings on payment basis:

1. Instrumentation methods and chemical analysis for Students, Researchers and Teachers @ Rs. 5000/- per head
2. Big 'B' s of Biology for Teachers & students of Biotechnology/ Biology @ Rs.500/- per head

Workshop / Seminar:

1. Forestry Phytochemicals for Novel Product Discovery
2. Bio-prospecting the renewable forest resources

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