



IFGTB NEWS



Quarterly Newsletter on societal applications of research **Interventions in Forestry, Genetics and Tree Breeding** from the Institute of Forest Genetics and Tree Breeding, Coimbatore.

(A national institute of the Indian Council of Forestry Research and Education,
Ministry of Environment, Forest & Climate Change, GOI)

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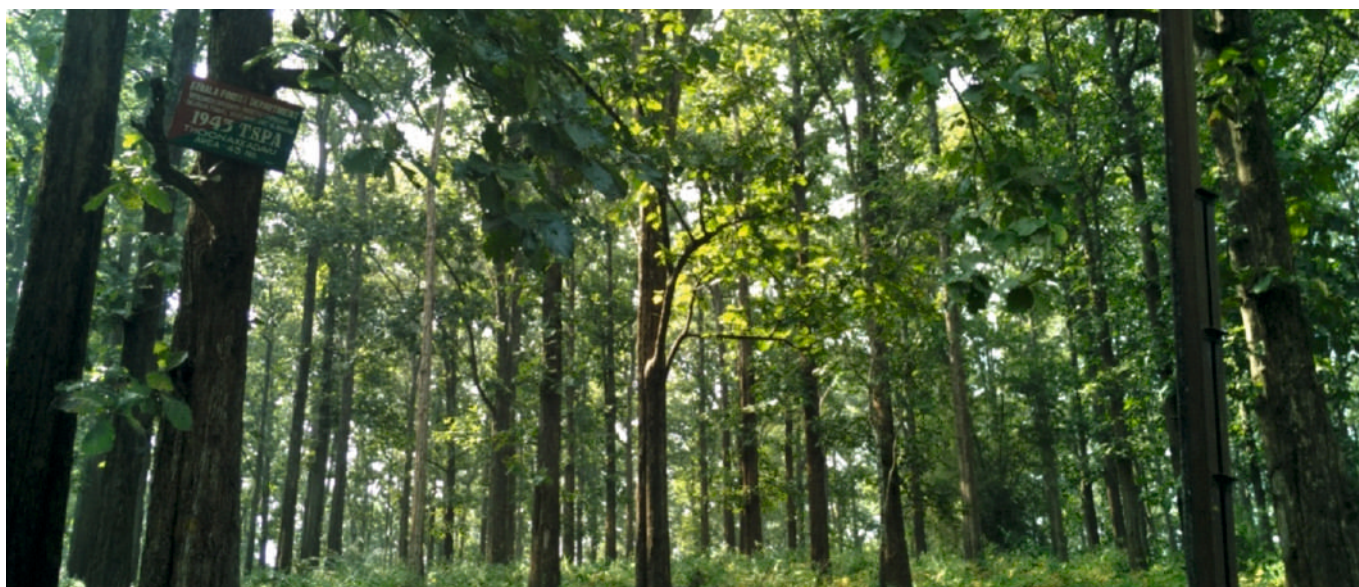
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From the Director's Desk

I am happy that this issue of IFGTB News has a focus on teak (*Tectona grandis*). It is the most important timber tree species prized for its aesthetic and durable wood. Decades of use in furniture making, ship building and railways has resulted in dwindling genetic resources necessitating urgent measures for conservation as well as meeting the wood demands of the growing population. This issue of IFGTB News has a feature on the efforts made at IFGTB in identifying germplasm sites in Tamil Nadu and Kerala that needs to be conserved by the forest departments. In a recently conducted international webinar hosted by IFGTB, researchers from different countries shared the success stories of short-rotation teak cultivation using high-quality planting stock. Promising results have been obtained in IFGTB's ongoing research in evaluation of tissue cultured teak using identified superior germplasm. This together with an innovative intercropping of teak with fast-growing short-rotation casuarina would enable development of a remunerative package for teak growing farmers. This issue also features an article on optimum seed handling techniques for ensuring better teak seed germination. The article on the lesser known wound-healing properties of teak leaf-buds may interest the researchers to prod further. This issue may thus be of value to the various stakeholders of teak.

Dr. C. Kunhikannan
Director, IFGTB



Evaluation, Documentation and Conservation of Genetic Resources of Teak in Tamil Nadu and Kerala

Palanisamy K., Thangamani D., Mutharaian V.N., Krishnamoorthi M. and Subramani S.P.

Conservation of teak genetic resources is important to maintain the genetic variability essential for the species to evolve and adapt to changing environmental conditions, and required for development of improved varieties. IFGTB has evaluated and documented the genetic resources of teak available as natural populations, plantations, seed productions areas, seed orchards, provenance stands, permanent preservation plots and germplasm bank in Tamil Nadu and Kerala, and identified potential resources for conservation.

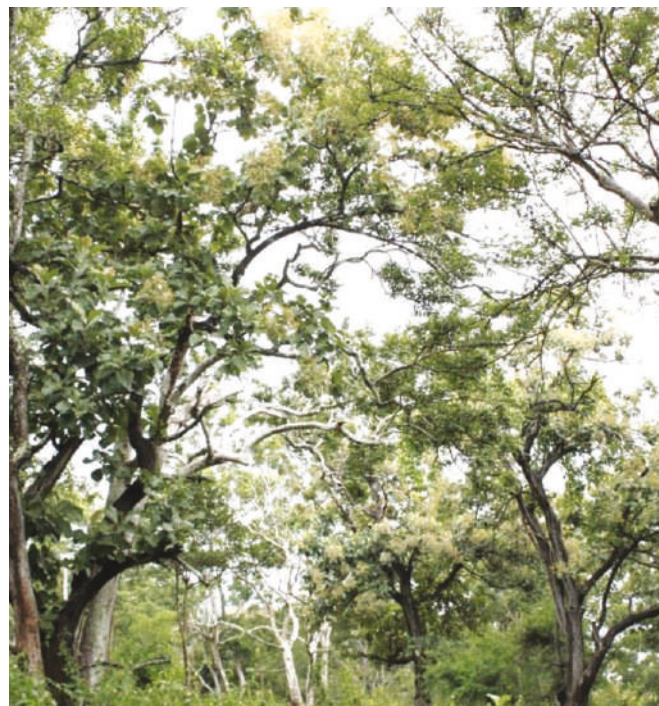
In Tamil Nadu, 109 teak plantations and 38 natural populations were evaluated in Coimbatore, Erode, Salem, Nilgiris, Tirunelveli, Kanyakumari and Thanjavur districts. The growth characteristics, tree form, bark texture, GPS data and soil type showed significant variation. The plantations at Polampatty range showed better growth performance with a height of 17-27 m, GBH > 100 cm and straight and cylindrical boles compared to other locations. A total of 23 plantations in Polampatty, Kutralam, Kanyakumari, Kalakkad Mundanthurai Tiger Reserve (KMTR) and Mudumalai Tiger Reserve (MTR), which showed better growth characteristics and tree form, have been selected for conservation. The canal teak in delta region exhibited outstanding growth and attain the harvestable size at the age of 20 years. The natural populations in Tamil Nadu occurred in Sathyamangalam Tiger Reserve, MTR, KMTR and Yercaud.

In Kerala, a total of 144 teak plantations and 2 natural populations at Trichur, Chalakudy, Nilambur, Vazhikadavu, Ranni and Konni area have been evaluated and documented. Significant variation on growth characteristics, tree form and bark texture have been noticed. The teak trees in Trichur and Chalakudy exhibited a height of 17-30 m, >100 cm GBH and mostly straight trees, while majority of the trees in Nilambur showed 17-25 m height with straight tree form. A total of 29

Teak genetic resources for conservation were identified after survey of teak germplasm sites in Tamil Nadu and Kerala.

plantations in Chalakudy, Trichur, South Nilambur, Vazhikadavu, Ranni and Konni have been selected for conservation. The natural populations covered in the study in Tamil Nadu and Kerala showed poor growth, mostly 8-18 m height, with forked and crooked trees with heavy branching (see figure). The selected 52 plantations and 40 natural populations in Tamil Nadu and Kerala need to be conserved in collaboration with TNFD and KFD. Forty outstanding teak trees in Kerala, which were felled after rotation period by KFD, have been multiplied through coppice shoots and are being maintained in the *ex-situ* conservation stand.

The *ex-situ* and *in-situ* conservation stands like CSO, SSO, SPA, clone bank, provenance stands and permanent preservation plots of teak in both the states have been evaluated and documented. Eleven genetic resources of teak in Tamil Nadu, and 12 in Kerala have been marked as active germplasm sites for further maintenance and effective utilization.



Teak Cultivation: Genetic Resources and Technologies

Yasodha R.

A webinar on "Advancements in Teak Cultivation: Genetic Resources and Technologies" was organised by IFGTB, Coimbatore on 16th July 2021 to explore the current development in teak cultivation. State forest departments, farmers and nursery entrepreneurs, participated to understand the latest technologies in short rotation teak production. In the inaugural address, Shri. Sanjay Kumar, Director General (Forests) & Special Secretary, MoEF & CC, New Delhi, highlighted India's wood-production aspects and emphasised the need for increased wood output and tree-cultivation prospects. Invited speaker, Dr. Hwan-ok Ma, Projects Manager from International Tropical Timber Organization (ITTO), informed about the good silviculture practices, and shared the experiences on the use of biotechnological tools like DNA fingerprinting and wood chemistry for teak plantations in Brazil, Ghana, Cambodia and Indonesia. The novelty of ITTO project in the Greater Mekong region on legal and sustainable supply by small farmers was brought out. Dr. Doreen Goh, another speaker from YSG

Short rotation teak cultivation is possible with high quality clonal planting stock

BioscapeSdnBhd, Malaysia, shared her experience on production, cultivation and conservation of teak resources. She informed that clonal teak as planting materials selected for fast growth, shorter rotation and better wood quality are now widely accepted as alternate option. Scientists from IFGTB, Coimbatore, IWST, Bengaluru, and TFRI, Jabalpur, shared their experiences on teak genetic improvement, wood technology and clonal propagation. Shri. A.S. Rawat, Director General ICFRE highlighted the importance of clonal production by ICFRE institutes and national and international collaborations on teak based agroforestry.



Clonal Plantations

Early Evaluation of Tissue Culture Raised Plantations of Teak

Rekha R. Warriar, Mahalakshmi R., Shanthi K. and Yasodha R.

Teak is an important forest plantation species. It is planted extensively by small holders to cater to the wood demands of the domestic and international markets. Clonal plantations can significantly enhance productivity of teak. However, it is not widely practised in India due to the lack of large-scale production of identified superior clones. Tissue culture offers a viable option to revive juvenility of selected trees, and deploy the clones in operational planting programmes.

Tissue culture raised clonal plantations of identified superior clones increases teak productivity.

At IFGTB, selected trees were multiplied through tissue culture, and planted in farm land at Raipur

(Chhattisgarh), Tindivanam (Tamil Nadu) and Puducherry. These clones are being evaluated for their growth performance. Early evaluation of five clones at 36 months showed that most clones exhibited better growth performance than local seed sources. Among the five clones tested across locations, Clone 1 showed the maximum height (7.5 m) and GBH (26.07 cm). Among the locations, Raipur recorded the maximum height of 8.4 m and GBH of 29.9 cm, while the seedlings recorded an average height of 5.5 m and GBH of 15 cm. These farmers practised intensive cultivation including irrigation

and application of fertilisers leading to improved performance. Growth data are being recorded to assess the stability of the clones tested across multiple locations.



Commercial plantations using tissue culture raised teak are being widely practised in Latin America, Thailand and Malaysia. In India, most teak plantations continue to be raised through stumps. Suitable clones selected through systematic tree improvement and multiplied through tissue culture, combined with intensive cultivation practices appear to be the best option for large-scale plantations and agroforestry systems.



Mixed Plantation of Teak and Casuarina Promises Increased Farm Income

Mayavel A., Vipin P., Prabakaran S., Gopinath K. and Nicodemus A.

Farmers prefer to grow teak for long term income generation. Poor quality planting material and inefficient silvicultural practices result in low productivity of farmland teak. High density plantations not subjected to periodic thinning result in low diameter increment whereas wide spacing causes heavy branching and poor bole quality. Growing teak clones in combination with short rotation trees like casuarina is an option to overcome these problems.

A mixed clonal plantation of teak and casuarina increased clear bole height of teak and provided an interim income through harvest of casuarina trees.

Since 2019, IFGTB is conducting a field trial with the objective of selecting the best teak clone(s) for growing in combination with a high-yielding casuarina clone (IFGTB-CH5). Twenty teak clones were planted at a spacing of 3 x 3 m and a casuarina tree was planted in between two teak



trees. At two years' age, the five top-ranking teak clones showed high survival (91%) and fast growth of 8.5 m height, 7.5 m clear bole, 17.6 cm GBH and a low score

of 1.2 for suppression by casuarina trees (15-41% superior over trial mean). The 749 casuarina trees yielded 19.2 tonnes of pulpwood valued at Rs. 57,600/-.

The early trends from the trial are useful to develop a farmer-friendly model for growing teak in farmlands. Mixed planting of teak and casuarina promoted maximum vertical growth and clear bole length with limited branching in teak. Close spacing helped in controlling weeds and the fast growing CH clone provided interim income to the farmer. The enrichment of soil fertility by the nitrogen-fixing casuarina will further benefit the growth of teak. More testing will be conducted to identify the most suitable clonal combinations of the two species, and the optimal age of harvesting casuarina trees so as to prevent them suppressing the teak trees.



Research Gaps

An Empirical Observation on the Lesser Known Wound-Healing Properties of Teak Leaf Buds

Kunhikannan C.

Teak is one of the most popular and highly valued timbers in the world due to its texture, durability and resistance to termites. Besides the timber value, the root, bark, leaves and seeds have medicinal properties. Herein, an observation on the traditional use of teak for wound healing at Pilicode village in Kasargode district, Kerala state, is described, so that this aspect may get the due attention from researchers for further study.

The author, during his elementary schooling in 1971, had sustained severe burn injury on the feet. Based on traditional knowledge, a medicinal oil was prepared by the author's father, late Sh. P.V. Ambadi, using tender, reddish leaf buds of teak

A medicinal oil prepared using tender leaf buds of teak has been traditionally used for treating burn injuries in Pilicode village in Kerala.

(photo) that was boiled in coconut oil, and then ground. On cooling, the oil mix was applied on the injury using a feather. After a week's treatment, the burns had healed without leaving any scar. Wound healing property of young leaves of teak has also been reported by Manjundar and co-workers during 2007. This wound healing property of teak need to be prospected further for beneficial use.



Farmer's Corner

Production of Quality Teak Seedlings

Anandalakshmi R., Geetha S., Suresh Kumar K. and Sathish A.

Teak is commonly propagated through seeds. There are several factors that limit seed germination viz., emptiness of drupes, seed source variation, time of collection, delayed germination and dormancy. To improve seed germination for production of quality planting stock, the following guidelines are suggested.

Collection of drupes and pretreatment: Drupes are to be collected during the peak fruiting season, viz., March-April, from identified seed sources. Collected fresh drupes are to be stored for atleast six months at ambient conditions. Drupes of 12 mm diameter and above should be separated from seed bulk, and pretreated for 6 cycles of alternate soaking in water (12 h) and sun drying (8 h) for enhancing germination from 5 % to 35 %.

Nursery: Treated drupes are to be sown in nursery beds under direct sunlight at the rate of 3-5 kg for a bed of 12 x 1.2 m size, with dibbling space of 2.5 cm between seeds. The nursery bed should be watered regularly once in a day.

Optimized teak seed handling techniques to produce quality seedlings

Transplantation: After 45 days at 4-leaf stage, seedlings can be transplanted to poly bags of size 13 x 25 cm filled with potting mixture of red earth: sand: farm yard manure in the ratio of 2:1:1. The transplanted seedlings is to be watered once a day and maintained under shade for minimum of 4 weeks and further hardened by direct exposure to sun light for 2 more weeks before outplanting.



Events : July - Sept 2021

- ◆ **MEETINGS AND SEMINARS** : “SARS CoV2 of Yesterday, Today and Tomorrow: Are we moving from Strategic to Tactic solution?” (15th Jul), “Advancements in Teak Cultivation: Genetic Resources and Technologies” (16th Jul), “Evolution and basic structure of the Indian Constitution” (18th Aug), “Creation of Manmade Forest for Environment Protection” (27th Aug), “Sensitization of Researchers on Bio-safety and Chemical Safety Guidelines” (28th Sep), “Ayush Aapke Dwar” (03rd Sep), Tree Growers Mela-2021: “High Yielding Tree Varieties for Agroforestry systems in Erode district, Tamil Nadu” (17th Sep), (29th Sep).
- ◆ **TRAININGS AND WORKSHOPS** : “GCMS : Instrument, Principle and Function” (9th Jul), “Kadamba Based Agro Forestry System” (19th Jul), “Prevention, Control and Management of Invasive Alien Species” (05th Aug), “Plant Tissue Culture” (10 - 12th Aug), “Characterization of Forest Genetic Resources and Utilization” (11th Aug), “Windbreak Clones based Agroforestry systems” (14th Aug), “Mangroves” for frontline field staff (12th Aug), “Noting-drafting in Hindi” (28th Sep).
- ◆ **PRAKRITI “TALK TO THE SCIENTIST” PROGRAMME** : Forests and Climate Change (23rd July), Beneficial Microbes” (14th Aug), Variation in Plants and its Importance” (21st Aug), Promotion of Kitchen Garden from Waste” (28th Aug), “Sacred Groves and their incomparable Values (04th Sep), “Seeds to Trees” (11th Sep), Quality Planting Material for successful planting (25th Sep).
- ◆ **DAYS CELEBRATED** : Van Mahotsav Day (06th Jul), International Day for the Conservation of Mangrove Ecosystem (26th Jul), Empowerment of Women in Science (13th Aug), 75th Independence Day (15th Aug), Hindi Day (14th Sep), World Ozone Day (16th Sep), : IUFRO World Day: “Population Genetics and Genomics Research for Conservation, Climate Adaptation, Sustainable Management and Breeding of Tropical Trees” (29th Sep).
- ◆ **NEW RECRUITS** : Multi Tasking Staff : Monisha A.U., Arunkumar M.S.
- ◆ **REPATRIATION** : Sh. S. Senthil Kumar, IFS, Former - GCR, IFGTB, repatriated to J & K cadre.

About IFGTB

The Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore, is a national institution of the Indian Council of Forestry Research and Education (ICFRE), an autonomous council under the Ministry of Environment, Forest and Climate Change, Government of India. IFGTB has a mandate to develop new varieties, management and silvicultural techniques to maximize productivity of natural and planted forests under different ecological considerations and changing environment.

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Cover Photo : Teak Seed Production Area of Kerala
Forest Department by **Dr. R. Yasodha**, Scientist G.

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