



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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From the Director's Desk

Since its inception in 1988, the Institute of Forest Genetics and Tree Breeding, Coimbatore, has undertaken research on several aspects of tree improvement and conservation. This issue has a focus on the efforts made in extending these research to the stakeholders through raising demo-cum clonal trial of *Neolamarckia cadamba*, community plantations of tamarind and by production of documentary films showcasing IFGTB's achievements and ongoing research.

This issue also features research insights in understanding cell wall formation in Eucalyptus, initiatives taken up for Leucaena improvement, and the need to take up conservation and genetic improvement research in *Chloroxylon swietenia*. It is hoped that the articles will be of interest to various stakeholders.

Dr. C. Kunhikannan
Director, IFGTB



Research Extension

The making of Documentary Films on IFGTB

Chandrasekaran P. and Anithaa R.G.

IFGTB produced a documentary film titled **“Walking tall with trees”**. The film narrates in brief, the policy initiatives of Ministry of Environment, Forest and Climate Change in tandem with the vision, mission & forestry research strategies of Indian Council of Forestry Research and Education for providing scientific solutions to forestry related critical issues. The short film visualises the scientific competence of IFGTB in development of new varieties to increase productivity of planted and natural forests and in conservation of forest genetic resources. The institute's scientific prowess in tree improvement, development of bio products and research dissemination strategies are showcased in the film. The film recounts the scientific interventions of IFGTB for addressing the needs of various stakeholders and the society at large.

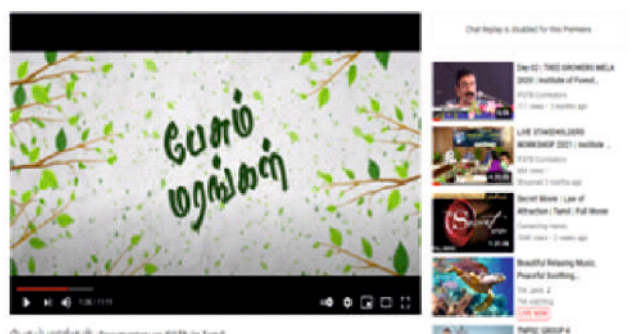
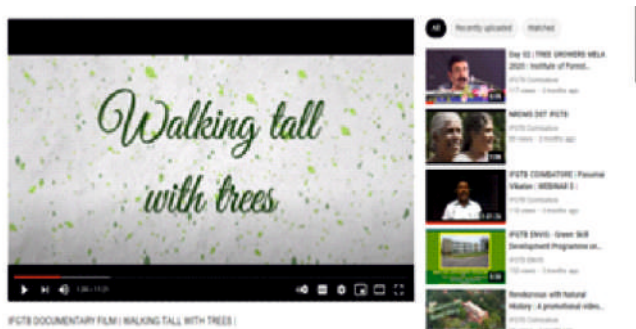
This film marks a pioneer initiative on comprehensive documentation of the institute's scientific work. It was produced with funding support from CAMPA-FES-Extension Action Plan 2020-21. The English version of the Film was released by the Director General, ICFRE, in the stakeholder's workshop on the theme “Developing

and Popularizing Digital Interactive Platform for Tree Growers and other Stakeholders of Tamil Nadu” held on 26th March 2021 at IFGTB, Coimbatore. This film has so far garnered more than 1,85,000 views in the IFGTB YouTube channel, primarily among school (Kendriya Vidyalaya and Navodaya Vidyalaya across the country) and college students. The film (in English) can be accessed at <https://www.youtube.com/watch?v=9A7O5FFnC7U&t=11s>

Films showcase IFGTB's scientific interventions for addressing the needs of various stakeholders and the society.

Tamil Version:

“Pesum Marangal” (translated as Talking Trees): To cater to the wider network of the farmers / tree growers of Tamil Nadu, a translated version in Tamil was made with funding support from CAMPA-FES-Extension Action Plan 2020-21. The film was released on 11th June 2021 by the Deputy Director General (Research), ICFRE, Dehradun in the workshop organised under Bharat Ka Amrut Mahotsav - “Science to the Society (Series I)” for target audience of tree growers / farmers on the theme “Popularisation of Eucalyptus clones of IFGTB”. The film is hosted in IFGTB Youtube Channel and can be accessed at https://www.youtube.com/watch?v=85SSY5rD0_s



Transforming Rural Livelihood through Tamarind

Chitra P., Dharani M., Mayavel A., and Nagarajan B.

Harmonizing sustainable development and conservation goals are most times challenging.

The SAFRUIT program in the Sahel region of Africa is an example of a successful initiative in this direction. On similar lines, the Institute of Forest Genetics and Tree Breeding, Coimbatore has initiated a nationwide project on tamarind conservation, domestication and livelihood amelioration. Tamarind, a magnificent tree with large array of utilities, has gained significant importance in research across the globe. The project envisages establishing tamarind plantations on community lands to create green assets towards sustainable development and rural livelihood empowerment. Hence, the institute has joined hands with the CSR arm of TVS Motor Company, Hosur, viz., Srinivasan Services Trust (SST), a lead organization in transforming rural communities and urban slums for achieving sustainable development. The project has facilitated the institute to implement domestication and replenishment of high quality red and sour tamarind in the villages of Bothakkadu (11.908 N, 78.282 E) and Mullai Nagar

Plantation of red and sour tamarind were established in community lands with people's participation and industry support.

(11.924 N, 78.283 E) at Pappireddypatti, Dharmapuri District. A plantation of 4 acres with high yielding

tamarind seedlings (red and sour) has been established. This is a pioneering initiative in Tamil Nadu, where in the government and private trust have come together to establish tamarind plantation in a community land with people's participation. Awareness among the rural people on the need, benefit sharing and maintenance of these plantations to empower livelihood sustenance was initiated.



Demo-cum-Clonal Trials for Popularisation of *Neolamarckia cadamba*: A Networking Initiative with Krishi Vigyan Kendra (ICAR-KVK)

Vijayaraghavan A., Suresh G., and Rukesh A.G.

The Memorandum of Understanding between ICFRE and ICAR aims to promote and accelerate aggressive extension of the progress made in various disciplines of agricultural and forestry research. Based on the biennial action plan, IFGTB's Van Vigyan Kendra (VVK), Coimbatore, in collaboration with ICAR-KVK, MYRADA, Gobichettipalayam, Erode established a clonal-demo trial of *N. cadamba* in Aarepalaym near Dhimbam, Erode District. The demonstration trial based on the mandate of the NFRP project "Evaluation and Popularization of *N. cadamba* (Roxb.) Bosser in Tamil Nadu and Kerala" was

Tree growers had a first hand experience of the field demonstration trials laid by IFGTB using 35 best performing clones of *N. cadamba* intercropped with rosemary at Erode.

taken up with funding support of VVK programme of IFGTB.

Tree improvement works in *N. cadamba* was initiated in 2010, and seed collections from Kerala, Andaman, Tamil Nadu and Assam served the foundation for the progeny trial establishment. The subsequent growth evaluation of the trials led to selection of 40 best performing individuals for clonal selections. The demo-cum-clonal trial established in August 2020 using 35 clones (comprising 220 clonal saplings) of *N. cadamba* was planted in 0.6 ha at a spacing of 4 m x 4 m (Cover Photo). The establishment and



maintenance was taken up in 2021 and intercropping with rosemary was carried out in 2021 with support of KVK, MYRADA.

A training-cum-demonstration programme for popularising kadamba based agroforestry system was organized at Arepalayam station of ICAR KVK MYRADA, Gobichettipalayam. The demonstration trial and training programmes had good reception from the stakeholders. Besides 50 tree growers from Erode district of Tamil Nadu, field supervisors and officials of ICAR KVKs participated in the training. Demo-cum-clonal trials together with training programmes would serve in popularising *N. cadamba* based agroforestry models.

Research Advances

Understanding cell wall biogenesis in *Eucalyptus* using gene co-expression networks

Veeramuthu Dharanishanthi and Modhumita Ghosh Dasgupta

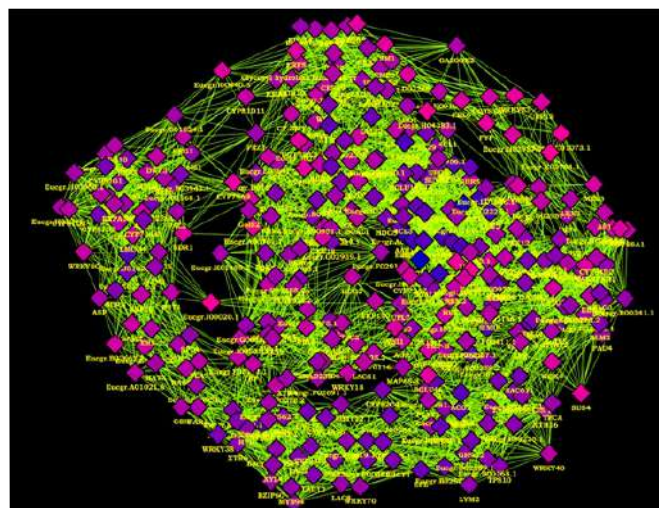
Plant cell wall is composed of polysaccharides which determine its structural and functional properties. The composition of secondary cell wall determines the industrially relevant wood properties in tree species.

Critical regulators and novel transcripts that potentially govern cell wall biogenesis in *E. tereticornis* have been identified.

(*BGAL8*), pectin methyl esterase (*PME*), ubiquitin (*UBQ9*), ascorbate peroxidase (*APX*) and eukaryotic aspartyl protease (*ASP*). The study highlighted

With the aim to identify the major genes regulating secondary cell wall biogenesis in *Eucalyptus tereticornis*, natural variation in expression patterns of 2651 transcripts expressed in the developing xylem tissues were documented across four phenotypes with distinct holocellulose / klason lignin content. The fold expression ranged from 10.42 to -8.9, and 394 transcripts differentially expressed across all genotypes. A co-expression network was constructed using 330 transcripts and the network was enriched with transcripts involved in cell wall biogenesis, glucosyl transferase activity, starch and sucrose metabolism and phenylpropanoid metabolic process (Photo). Secondary wall associated NAC domain protein 2 (*SND2*) was the major hub transcript in the network with 53 interactions and co-expressed with cellulose synthase (*CesA*), 4-coumarate: CoA ligase (*4CL*), fasciclin-like arabinogalactan (*FLA12*), beta-galactosidase

that the key genes regulating secondary growth are conserved among angiosperms. The network developed in the study enabled identification of critical regulators and novel transcripts whose expression patterns could potentially govern the variation in cell wall composition in *E. tereticornis*. The results of the study were published in *Silvae Genetica* (2018).



Increasing productivity of *Leucaena* plantations through clonal selection

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

Leucaena (*Leucaena leucocephala* (Lam.) de Wit) is a multipurpose tree planted extensively for food, fodder, fuelwood and pulpwood. In India, it is grown in around 100,000 ha, and is the third major source of pulpwood next to *Eucalyptus* and *Casuarina* with annual pulpwood production of over 300,000 tonnes.

Despite the high socio-economic importance of this nitrogen-fixing tree, it has undergone only a limited tree improvement. IFGTB initiated *Leucaena* improvement programme in 2014, with testing of 29 seed sources in three locations. They were converted into seed production areas, and the seeds collected were supplied to tree growers. Twenty five individuals with outstanding growth and stem form were clonally propagated and

Fast growing clones have been selected and propagation methods being optimized.

deployed in multilocation testing. Significant clonal variation was observed for growth, and the best five clones

showed an average height



of 9.8 m and DBH of 8.3 cm at the age of two years. Low and inconsistent rooting of shoot cuttings is the major problem faced in *Leucaena* clonal development programme. The average rooting was around 50 %, which varied highly among clones and across seasons. Further research is in progress to improve rooting percentage for efficient utilization of *Leucaena* clones.

Research Gaps

Chloroxylon swietenia DC: A threatened native, timber-yielding and pharmaceutically useful tree species

Archana R., and Sivakumar V.

Chloroxylon swietenia (East Indian satinwood or Ceylon satinwood or Mamarai in Tamil) belongs to the family Rutaceae. It is native to India and Sri Lanka, and is commonly distributed in dry deciduous forests of southern parts of India. It is small to medium sized tree growing to a height of about 18 m. It can survive better under well-drained, sandy or rocky soils with a pH in the range 6 - 7, at low to medium altitudes. It occurs in regions with an annual rainfall of 750-1500 mm, and are reported to be drought tolerant.

It produces a decorative wood that fetches high prices in the international market. Wood is heavy, strong, yellowish brown with a satiny luster. It has a pleasant fragrance when freshly cut. Wood is used for fine cabinetwork, heavy construction, railway sleepers, boat building, farming tools, pattern making, interior trim, interior joinery, carvings, toys and musical instruments.

In India and Sri Lanka, most plant parts are used in traditional medicine to treat wounds, snakebites

Efforts to conserve and genetically improve *C. swietenia* needs to be augmented.

and rheumatism, fever, chest pain, asthma, and headache. It is reported to have anti-hyperlipidemic, insecticidal, antifeedant,

oviposition deterrent, anti-microbial, anti-oxidant, hepatoprotective, anti-bacterial, anthelmintic, anti-arthritic, anti-diabetic and anti-inflammatory properties.

Despite these manifold uses, there are very few reports of systematic studies on conservation and genetic improvement. The tree has been greatly over exploited in the wild and has become scarce in many areas, leading to it becoming listed as 'Vulnerable' in the IUCN Red list of threatened species. Therefore, there is an urgent need to protect and genetically improve this species by scientific interventions.



Events : April - June 2021

- ◆ **Training:** Seed ball technology (22nd June),
- ◆ **Seminar:** Stakeholder webinar “Popularization of Eucalyptus Clones of IFGTB” (11th June)
- ◆ **Other Events:** 130th Birth anniversary of Dr. B.R. Ambedkar (Photo) (15th Apr), Earth day (22nd Apr), International day for Biological Diversity (22nd May), International Museum day (18th May), World Environment day (05th June), International Rain Forest day (22nd June)
- ◆ **New Recruits:** *Scientist-B:* Noushad M. A., Ashrith K. N. (Jan); Archana R. (Feb). *LDC:* Vidya Sagar P., Kavin J. (May). *Multi Tasking Staff:* Ajay P., Ajay S., Govindaraj T., Avinash M., Pushparaj A., Vignesh P., Vishnu M., Vivek L., Manikandan M., Remya T. R., Suresh C. K. (May); Nadesh N., Pushparaj A., Vikas K. (Jun).
- ◆ **Superannuation :** Dr. V. Mohan, Scientist G (30th April), Sh. K. Soundararajan, Technical Officer (31st May), Smt. M. Nagalakshme, Assistant (31st May), Dr. K.R. Sasidharan, Scientist F (30th June), Smt. R. Tamilarasi, ACTO (30th June), Sh. A. Palanisamy, MTS (30th June).



Dr. V. Mohan



Sh. K. Soundararajan



Smt. M. Nagalakshme



Dr. K.R. Sasidharan



Smt. R. Tamilarasi



Sh. A. Palanisamy

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: Demo-cum-clonal trial of *Neolamarckia cadamba* by **Dr. A. Vijayaraghavan**, Scientist E.

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