



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

I am happy to connect with stakeholders of ICFRE-IFGTB once again through this latest issue of our newsletter. We had several important events during the last quarter of the financial year 2023-24 reported in this issue. Our flagship outreach programme that connects us directly with the farmers, the Tree Growers Mela was held in the Union Territory of Puducherry this year. Puducherry is a unique region in terms of administration, culture and environment and ICFRE-IFGTB looks forward to working with the forest and agricultural departments through its newly inaugurated Van Vigyan Kendra-Puducherry. We could initiate research collaboration with new partners like National Centre for Biological Sciences and move forward with existing partnership with industries like Andhra Paper Limited. Committed to the approach of 'think globally and act locally' ICFRE-IFGTB observed the International Day of Forests and the annual Dr. Kedharnath Memorial Lecture with the student community of Coimbatore. We look forward to yet another eventful financial year to fast-track our research projects and extension activities and remain committed to the needs of our stakeholders.

Dr. C. Kunhikannan
Director, ICFRE-IFGTB



Silvicultural and Biocontrol Interventions Ensure Realizing Genetic Gain in Casuarina Clonal Plantations

A. Nicodemus*, C. Buvaneswaran, A. Mayavel and A. Karthikeyan

The high-yielding hybrid clone of Casuarina, IFGTB-CH5 has made a tremendous impact on the cultivation and profitability of this short rotation tree crop. Popularly called by farmers as 'speed variety' in Tamil Nadu and 'high speed variety' in Andhra Pradesh, it is estimated to be under cultivation over a lakh hectares. This clone has doubled pulpwood yield from 30-40 tonnes to 70-80 tonnes per acre and ensured a net additional income of around one lakh rupees per acre to the farmers. The estimated cumulative additional earnings by the farmers since 2017 is around Rs.1000 crores. The IPR of clone CH5 is protected through registration under the PPVFR Act, 2001 and it is licensed to industries and nurseries for commercial propagation and supply.

A major problem faced in farmland plantations of this clone was wilting and drying of young saplings and lodging of adult trees which resulted in 20-50% loss of wood production. A team of Scientists from the Genetics, Silviculture and Pathology disciplines investigated the causes for this occurrence both in the field and through lab tests. It was found that the trees were affected by bacterial wilt and collar rot diseases which caused yellowing of leaves and subsequent drying of young plants. Since the collar regions was damaged by the pathogen, the root development is hampered leading to poor anchorage and lodging. This problem was severe when the trees were planted at close spacing (less than 1.5 m) and more prevalent in clayey soils experiencing prolonged water logging.

Rapid testing of the clone under different spacing showed that 2000 to 2400 trees per acre is the suitable stocking for clone CH5. Through extensive awareness programmes, farmers were advised to follow the recommended stocking and ensure leaving a minimum of 1.5 m between rows. A drying-wetting-drying approach of irrigation has been found effective in preventing disease infection. Simultaneously strains of symbionts like Frankia and Micromonospora and biocontrol agents like *Trichoderma viride* and *Bacillus* sp. which promoted plant growth and suppressed the proliferation of pathogen were identified and cultured. The mother cultures of these strains were transferred to the nurseries for inoculating the clonal plants before supplying to the farmers. The inoculated plants showed better growth, shoot-root ratio, nodule development and were free from disease infection when out planted in the field. Large scale producers of clonal plants like the Tamil Nadu Newsprint and Papers Limited were provided with the technical know-how for mass multiplication of microbial cultures. Due to the combined effect of clone-specific silvicultural practices and effective growth promoting and biocontrol microbial strains there has been no report of disease incidence from the farmers during the planting season of 2023-24.

This success story is an example of removing the bottleneck in realizing the genetic gain from a high-yielding variety through an inter-disciplinary approach and an effective extension strategy involving all stakeholders of farm forestry.

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Standing Volume Estimation in Teak Plantation Using Image Data and Artificial Neural Networks

Ani A. Elias

Standing volume estimation in commercial plantations is an essential element for management and decision making. The estimation process, however, demands time and human power. With the funding support of Kerala Forest Department (KFD), ICFRE - IFGTB has been conducting a research project to develop an artificial intelligence (AI) tool using image data to save the time, human effort and reduce the

experimental error in the standing volume estimation.

The tool is developing specifically for teak plantations in Kerala. The existing practice is to measure GBH of all trees in a 20 x 20 m sample plot for every two ha of plantation and estimate the volume using volume tables. Six to ten trees are expected in a sample plot and it takes 3 to 5



minutes for two efficient field workers to measure GBH of all the trees as time taken is proportional to the number of trees present in the plot. In the proposed method, after plot demarcation, images of trees are taken in four to eight frames. These images are then processed using three different convolutional neural network (CNN) frameworks. In the first framework, the teak trees are identified from the image (Fig.). In the second framework, the distance from the camera to each tree is identified from the 2D image, and finally in the third framework, diameter of the tree is detected for GBH calculation. The time taken for the whole process starting from image taking is ~4 seconds per plot and this duration is independent of the number of trees present in the plot. The models in the frameworks are undergoing updates and testing accuracy $\geq 98\%$ is observed. Teak trees are identified from the image. The accuracy of identification (1.00 being the most accurate) are given in decimal values. This AI tool is expected to

be 60 times faster than the existing approach. The models and methodologies developed on successful completion of this project can be extended to plantations of other trees species and can also be trained to estimate the volume of harvested log wood.



Teak trees are identified from the image. The accuracy of identification (1.00 being the most accurate) are given in decimal values.

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DST-funded Project for Tribal Development Activities of ICFRE-IFGTB

N. Senthilkumar* and R. Sumathi

ICFRE-IFGTB has been involved in transfer of technologies for livelihood improvement of tribal people and create opportunity for alternate source of income for over a decade. These societal outreach activities are taken up with the support of Tamil Nadu State Rural Livelihood Mission (TNSRLM) and Tamil Nadu Forest Department. Recently, the Department of Science and Technology, Government of India has sanctioned a three year (2023-25) project on “Science, Technology and Innovation Hub in Senguttai Tribal hamlet in Tholampalayam, Panchayat Village, Karamadai Block, Mettupalayam Taluk, Coimbatore District, Tamil Nadu State: Transfer of

technology on the development of natural colourant from red Tamarind *Tamarindus indica* L. (red variety) for use in food and cosmetic industries to Irular tribes in Coimbatore district, Tamil Nadu: A tribal development initiative. The main objective of the project is to transfer ICFRE-IFTGB's technology on value addition to red tamarind with special reference to food and cosmetic preparations and commercialization thereof. This is an attempt to empower rural /tribal women through employment opportunity / entrepreneurship for their financial independency.

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Taking Forward the Research Collaboration between NCBS-TIFR and ICFRE-IFGTB

R. Yasodha

The National Centre for Biological Sciences – Tata Institute of Fundamental Research (NCBS-TIFR), Bengaluru and ICFRE-IFGTB have entered into an understanding on research collaboration during August 2023. In order to carry forward the process of mutual collaboration, a three member team from NCBS-TIFR consisting Prof. L.S. Shashidhara,

Director and Dr. Ankita J. Hiremath, Plant Ecologist and Shri Bharat Jyoti, Chairperson, Bihar State Biodiversity Board visited ICFRE-IFGTB on 26.03.2024.

Through discussion between two groups, potential research areas for further action were identified. They include genomics based monitoring of



ecosystems, biocontrol of invasive plant species including phenomics, epigenetic studies and abiotic tolerance, soil metagenome and nutrient dynamics, chemotyping of medicinal trees, entomopathology for biological control and product development from forest origin plants /microbiome. Prof. Shashidhara suggested that collaboration with other research organisations

located in Bengaluru can also be considered for expertise in areas like chemotyping and soil metagenome analysis. Dr. C. Kunhikannan, Director ICFRE-IFGTB proposed to include joint monitoring of preservation plots for long term studies. It was mutually accepted to conduct lecture series, joint guidance of MSc and PhD dissertations for immediate action.

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Tree Growers Mela @ Puducherry

S. Saravanan* and P. Chandrasekaran

ICFRE-IFGTB organized a Tree Growers Mela (TGM) on 17th February, 2024 at Puducherry in association with the Department of Forest and Wildlife of Government of Puducherry with the theme “Tree Cultivation in Coastal areas”. About 575 tree growers, frontline staff of Puducherry, Tamil Nadu forest department, representatives of wood based industries and NGOs participated in the mela. Dr. C. Kunhikannan, Director presided over the inaugural session and Shri. C. Jayakumar, Hon'ble Minister for Agriculture, Forests and Wildlife, Government of Puducherry was the Chief Guest and inaugurated the mela. The Scientists of ICFRE-IFGTB made presentations on high yielding varieties and modern cultivation practices for trees suitable for coastal areas like Casuarina, Teak, Melia and Mahogany and legal and policy aspects related to tree cultivation. The managers of Tamil Nadu Newsprint and Papers Limited explained the farm forestry programme and pulpwood procurement procedure of the Company.

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The Hon'ble Minister released the Documentary film on 'Bio-products of ICFRE – IFGTB' and declared open ICFRE-IFGTB`s new Van Vigyan Kendra (VVK) in Puducherry. The new VVK will provide the latest tree growing techniques to farmers, conduct training to various stakeholders and establish demo plots with released clones/varieties with the support of Puducherry Forest Department. An Exhibition was arranged for the benefit of farmers to display various technologies in clonal forestry, package of practices recommended for major tree species etc. The exhibition also promoted popularization of the Mobile App “TreeGenie” – digital interactive platform for tree growers developed by ICFRE-IFGTB. Stalls of forest departments, wood-based industries, private nurseries and farmers producer companies provided literature on tree cultivation and demonstration of various technologies. The exhibition provided an opportunity to farmers / tree growers to directly interact with the experts and clarified their doubts on different aspects of growing trees profitably.

Dr. S. Kedharnath Memorial Lecture 2024

B. Nagarajan

Dr. S. Kedharnath Annual Memorial Lecture 2024, the tenth edition in the series was conducted at ICFRE-IFGTB on 15th March, 2024. Following the welcome address by Dr. C. Kunhikannan, Director, Dr. B. Nagarajan, Organizing Secretary paid a tribute to the memory of Dr. Kedharnath. Dr. Mohan Varghese, former Scientist, ICFRE and ITC Life Sciences and Technology Centre delivered the memorial lecture on **Domesticating Trees for Sustainable Pulpwood Production**. He traced the initiatives of Dr. Kedharnath for increasing the productivity of short rotation trees and presented the implementation and outcome of breeding programmes in the past three

decades. The lecture also covered the recent knowledge on the biology and genetic diversity of the tropical trees and their application in domesticating and breeding eucalyptus and other pulp wood species. The lecture was attended by students, research scholars, scientists, faculty members and R&D managers of industries. Family members of Dr Kedharnath spanning three generations lead by his son Shri K.Rajnath also attended the memorial lecture.



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International Day of Forests 2024 - Awareness Walk Rally

Kannan Chandrasekara Warriar

A Mega Walkathon – An Awareness Walk Rally was organized on the International Day of Forests (21.03.2024) by IFGTB's EIACP (Environmental Information, Awareness, Capacity Building and Livelihood Programme) Programme Centre (erstwhile ENVIS). It was aimed to raise awareness about the importance of forests and encourage individuals to engage in LiFE Mission initiatives. Dr C. Kunhikannan, Director, ICFRE-IFGTB, inaugurated the programme and released an awareness poster highlighting the significance of forests. Around 600 people comprising students and staff from Government Arts College, Kongunadu Arts and Science College, PSG Arts and Science College and IFGTB staff participated in the awareness rally displaying awareness signboards.

Awareness handouts were disseminated to school children and the general public. Group Coordinator Research, Dr. R. Yasodha, EIACP Coordinator, Dr. Kannan C.S. Warriar and Senior Programme Officer Dr. S. Vigneswaran spoke during the event.



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ICFRE-IFGTB and Andhra Paper Limited Sign MoU for Collaborative Project on Pulpwood Trees

A. Nicodemus

ICFRE-IFGTB and Andhra Paper Limited (APL) implemented a collaborative project to increase wood production in Andhra Pradesh during 2018-24. Two high yielding Casuarina clones (CH1 & CH5) were deployed in APL's farm forestry programme and planted in 12,800 acres resulting in an additional wood production of around 2.60 lakh tonnes. New clones and seed production areas of Leucaena were developed to make available genetically improved planting material. Paired-row and windbreak agroforestry models developed with pulpwood species for balanced and profitable production of food and wood crops. A second phase of the project entitled "Productivity enhancement of pulpwood trees through breeding and silvicultural intervention in

catchment areas of APL" has been sanctioned by the Company for a five year period (2024-29) with a total budget of Rs.62.73 lakhs. The project agreement was signed by Dr. C. Kunhikannan, Director, ICFRE-IFGTB and Shri Mukesh Jain, Executive Director of APL on 12.02.2024. This continued collaboration indicates the successful partnership between institute, industry and farmers.



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EVENTS : JANUARY - MARCH 2024

- ◆ **TRAINING** : Seed Technology and Clonal Propagation (08-09 Jan); Basic Techniques in Plant Molecular Biology (29 Jan – 02 Feb); Induction training of 38 newly recruited Scientists of ICFRE (05 -07 Feb); Characterization of Forest Genetic Resources and its Conservation (16 Feb); Junior Ranger – Connecting Students with Nature (20-22 Feb); Environment and Nature Conservation (26 Feb); Cultivation Techniques of Commercially Important Tree Species (29 Feb); Quality Planting Material Production in Nursery (QPMPN) (01 & 26 Mar); Data analysis of multi-location trials (11-16 Mar); Exposure Visit and Training on Agroforestry Models (06 Mar); Red Sanders – Lord's Own Tree (27 Mar).



- ◆ **MEETINGS / CONFERENCE / WORKSHOP** : Practical Problems and Solutions in Usage of Official Language Hindi in Office (22 Jan); IUCN Meeting with Western Ghats Plant Specialist Group and Keystone Foundation (05 Feb); Stakeholder Consultation Workshop on Pongamia Cultivation for Biofuel Utility (16 Feb).
- ◆ **OTHER EVENTS** : World Wetland Day - Participation in Mega Exhibition at Sirpur Lake, Indore, Madhya Pradesh (02 Feb); National Exhibition cum Awareness Programme on Mission LiFE - Lifestyle for Environment (09.02.2024). Under LiFE Mission 57 LiFE Mission campaigns to students and people from different walks of life were conducted. These campaigns targeted students and individuals from diverse backgrounds, collectively engaging 30,578 participants in comprehensive awareness initiatives. Release of Soil Health Cards (19 Feb).
- ◆ **PRAKRITI PROGRAMME** : Seeds to Trees (03 Jan); Importance of Seeds (05 Jan); Waste Management (08 Jan); Seed Ball and Technology (09 Jan); Conservation of Seeds (24 Jan); Conservation of *Ficus racemosa* (31 Jan); Wildlife Conservation (05 Feb); Plant Diversity of India and its Importance (07 Feb); Orchids of Anamalai Hills and their Significance (09 Feb); Recycling and Waste Management (14 Feb); Conservation of Water (19 Feb); Environmental Conservation (01 Mar); Ozone Layer (06 Mar); Human Animal Co-existence (16 Mar); Tree Planting and its Importance (13 Mar); Environmental Protection (15 Mar).
- ◆ **APPOINTMENTS / POSTTINGS** : B. Kartheek, TA (Jan), T. Rajasekar, MTS (Jan), J. Kishore, LDC (Feb), N. Pavithra, MTS (Feb), K.V. Manikandan, MTS (Mar).
- ◆ **RETIREMENTS** : Dr. John Prasanth Jacob, Scientist G (Jan)
Shri C.K. Jagannath, ACTO (Feb)
Shri M. Shanmugaiah, PS (Mar)



About ICFRE-IFGTB

The ICFRE - Institute of Forest Genetics and Tree Breeding (ICFRE - IFGTB), Coimbatore, is a national institution of the Indian Council of Forestry Research and Education (ICFRE), an autonomous body under the Ministry of Environment, Forest and Climate Change, Government of India. ICFRE - 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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