ABOUT ICFRE - IFGTB

ICFRE - Institute of Forest Genetics and Tree Breeding (ICFRE - IFGTB), Coimbatore is a National Research Institute under the Indian Council of Forestry Research and Education. ICFRE - IFGTB envisions a wood secure society. The Institute primarily aims to carry out research to improve productivity of forest tree species through conventional breeding programmes and biotechnological interventions. The major areas of research include tree improvement, breeding, planting stock improvement, marker assisted selection, genomics, clonal propagation, agroforestry systems, climate change research, integrated disease and pest management, seed handling and testing, eco restoration and conservation.

ABOUT EIACP

EIACP (erstwhile ENVIS) established by the Government of India, in 1982 has been providing environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. all over the country. It is a comprehensive decentralized information system on environment involving effective participation of institutions / organisations in the country actively engaged in work relating to different subject areas of environment. A large number of nodes, known as EIACP PC RP (erstwhile ENVIS Centres), have been established in the network to cover the broad subject areas of environment with a Focal Point in the Ministry of Environment, Forest and Climate Change.

INSTRUCTIONS TO CONTRIBUTORS

Dear Author/ Subscriber/ Contributor,

We invite contributions to the EIACP Newsletter issues! The EIACP Resource Partner at ICFRE-IFGTB focuses on Forest Genetic Resources and Tree Improvement. It aims to act as a window for quality scientific publications and a forum for presenting your thinking on the challenges in the fields of FGRs and tree improvement. The EIACP Newsletter, Van Vigyan, a quarterly publication, publishes original research articles, reviews, reports, research highlights, news-scan etc., related to the thematic area of the EIACP Resource Partner. Original research and review articles, notes, research and meeting reports are invited for the newsletter. Details of forthcoming conferences / seminars / symposia / trainings / workshops also will be considered for publication in the newsletter. Articles may be sent in Times New Roman (with font size 12) in double spacing with a maximum of 5-6 typed pages. Photographs/line drawings and graphs need to be of good quality with clarity for reproduction in the newsletter. Only electronic submission will be accepted.

Details may be sent to: ifgtb@envis.nic.in.

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In this issue

From the Director's Desk

I am pleased to connect with you through this edition of our newsletter, which serves as a platform to disseminate knowledge, foster awareness, and encourage participation in tree conservation and improvement initiatives. Our commitment to enhancing forest genetic resources (FGRs) remains steadfast, as we continue to work on species-specific breeding programs and tree improvement research.

One such important species under focus is *Madhuca longifolia*, commonly known as Mahua, which holds immense ecological, economic, and cultural significance. Its flowers, seeds, and oil are widely utilized by indigenous communities, and its resilience to harsh conditions makes it a valuable tree for afforestation and land restoration efforts. Our research aims to improve its genetic diversity, productivity, and adaptability to ensure sustainable utilization and conservation.

Beyond research, we strongly believe in engaging young minds in our conservation efforts. The ENVIS Resource Partner (ENVIS RP) at the Institute of Forest Genetics and Tree Breeding is reaching out to students through plantation programs and awareness sessions that emphasize the crucial role of trees in sustaining biodiversity and ecosystem services. These initiatives not only instill a sense of responsibility toward the environment but also inspire future generations to contribute meaningfully to conservation science.

Our continuous appeal to research organizations, state forest departments, universities, and wood-based industries is to collaborate with us and utilize the ENVIS RP platform for sharing their valuable research and findings.

Dr C. Kunhikannan
Director, ICFRE - IFGTB

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Know your trees - *Madhuca longifolia* var. latifolia

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Introduction

Madhuca longifolia, belonging to the Sapotaceae family, is a highly versatile forest tree valued for its multiple benefits, including food, fodder, and fuel. It holds immense significance in India's tribal economy and is extensively utilized for its wood, flowers, fruits, leaves, and seeds (Anon, 2018). Commonly referred to as Mahua in Hindi, Honey Tree or Butter Tree in English, Iluppai in Tamil, Vippa in Telugu, Mahua in Marathi, and Illipe in French, this species plays an essential role in traditional medicine, agriculture, and industry. The edible flowers and fruits of *M. longifolia* have been traditionally used to treat ailments such as cough, biliousness, and heart conditions. Additionally, the fruit is believed to be beneficial in addressing tuberculosis and blood disorders due to its rich vitamin content (Singh *et al*., 2020). *M. longifolia* seeds yield an oil that is widely used for cooking, lighting lamps, and medicinal applications. The oil is also a crucial component in biodiesel production, as well as in the manufacture of laundry soaps and detergents, showcasing its industrial importance (Singh *et al*., 2020). Beyond its economic and medicinal value, *M. longifolia* carries deep cultural and religious significance. Since the Sangam period, this tree has been revered in temple worship and devotional practices. Many South Indian temples consider the tree sacred, including Irumbai Mahaleswarar Temple, Iluppaipattu Neelakandeswarar Temple, and Tirukkodimaada Senkundrur at Tiruchengode in Tamil Nadu, as well as in Thiruvananthapuram, Kerala. According to legend, the renowned Tamil saint-philosopher Valluvar was born beneath a *M. longifolia* tree at the Ekambareshwarar Temple in Mylapore, Tamil Nadu, further cementing its sanctity in the temple premises (Aiyangar, 2017). The tree is frequently mentioned in classical Tamil literature, including texts such as Akananuru, Purananuru, and Natrinai, emphasizing its historical and literary relevance (Subramanian, 2019).

Ecologically, the *M. longifolia* tree plays a critical role in sustaining biodiversity, as its flowers and fruits serve as a food source for various animals and bats. However, due to evolving human needs and lifestyle changes, its utilization has declined, leading to a significant reduction in its population. In 1950, Tamil Nadu was home to approximately 30,000 *M. longifolia* trees, but by 2015, the number had decreased to just 10,000, underscoring the urgent need for conservation initiatives (Forest Department of Tamil Nadu, 2016).

Distribution and habitat

M. longifolia is an evergreen tree commonly found in dry mixed deciduous forests, thriving in regions that receive annual rainfall between 550-1500 mm. It can tolerate a wide range of temperatures, from as low as 2°C to as high as 46°C, and grows at elevations of up to 1200 meters (Abraham *et al*., 2010). The tree can reach an impressive height of 70 feet, making it a dominant species in many forested areas. Madhuca longifolia holds significant economic importance in the forests of Central and North India. It is commonly found in forests, revenue lands, and private properties, making it a well-integrated species within both natural and cultivated landscapes. Indigenous to the Indian subcontinent, *M. longifolia* has a vast geographical range, extending across Andhra Pradesh, Gujarat, Chhattisgarh, Jharkhand, West Bengal, Odisha, Madhya Pradesh, Uttar Pradesh, Tamil Nadu, Bihar, and Punjab. It is also present in the sub-mountainous regions of the Himalayas, further highlighting its adaptability to diverse environmental conditions (Kishore & Sharma, 2018). The species prefers dry, sandy, and well-drained soils but can also thrive in loamy and lateritic soils.

Botanical description

Medium-sized to large much-branched deciduous trees. Leaves crowded at apex of year's growth, 6-15 x 1.5-4 cm, narrowly oblong, elliptic, oblanceolate or obovate, rounded to acuminate at the apex, cuneate at the base, glabrous when mature, midrib and petiole silky hairy at first; lateral nerves about 10-12 pairs; venation reticulate; petioles slender, 1-2.5 cm long. Flowers solitary in axils of small deciduous bracts; pedicels slender, 3-5 cm long, somewhat thickened toward apex, glabrous, at first erect then drooping. Sepals ovate, 8 x 6 mm, acuminate, the outer pair usually nearly glabrous and darker, the inner finely tometose and paler. Corolla yellowish, whitish or yellowish green, fleshy; tube inflated, 8 mm long; lobes 8-12, oblong, about as long as tube, obtuse, erose. Anthers 16-24, those of the upper whorl sessile, hairy. Style exserted 2 cm. Fruit yellow, oblong or oblong-ellipsoid, 33.5 x 1.7-2.3 cm; seeds ochraceous, ovoid, slightly compressed, one edge straight, the other curved, with short curved beak at both ends, shining.

Reproductive biology and breeding system

M. latifolia is a long-lived species that begins to bear flowers and fruits from its tenth year. A mature tree is capable of producing up to 90 kg of flowers annually. The leaf shedding period occurs between February and April, with the tree often remaining leafless during its flowering season, which typically falls between March and April. However, the flowering time can vary depending on local environmental conditions. Research indicates that the peak flowering and fruiting season occurs in March and April across different genotypes (Singh & Patel, 2015).

The complete development of a flower bud, from its initial appearance to anthesis, takes approximately

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20-30 days. The corolla falls off either before or simultaneously with the emergence of new leaves. The flowers exhibit unique characteristics, with stamens that are relatively short and adhered to the inner corolla surface, while the pistil is elongated and prominently protruding. The floral structures, including pedicel length (4.20-5.50 cm), pedicel thickness (2.00-3.00 mm), bud dimensions (1.30-1.80 cm in length and 1.00-1.20 cm in width), and ovary and style lengths (4.50-6.25 mm and 25.00-35.00 mm, respectively), show variation among different genotypes (Sharma *et al*., 2017).

Anthesis primarily occurs from midnight to early morning, with anther dehiscence taking place 2-4 days before anthesis. Floral biology studies indicate that the flower anthesis pattern is concentrated during midday (5:00-12:00), while pollen release occurs between 6:00-15:00 hours. The pollen grains are classified as 4 - 5 colporate, and the stigma exhibits its highest receptivity on the first day post-anthesis. Pollen viability ranges from 90.00-98.50%, while pollen germination rates vary between 26.50 - 40.20% (Verma & Rao, 2016).

M. latifolia exhibits strong self-incompatibility, displaying traits characteristic of both sporophytic and gametophytic systems. The tree produces trinucleate pollen that requires controlled hydration to germinate, a characteristic feature of the sporophytic system. The pollen remains viable for approximately 5-6 days, indicating a gametophytic nature. Additionally, the stigma is covered with a significant amount of exudates at its receptive stage,

a trait linked to gametophytic compatibility. However, despite hydration, pollen germination is often inhibited on the stigma surface, suggesting sporophytic influences (Kumar *et al*., 2020).

Fruit collection and processing

The seed collection process of *M. longifolia* is crucial for propagation and conservation, as the natural seed-setting rate of the species remains relatively low under normal environmental conditions. The fruits mature and fall naturally between May and July in North India and between August and September in South India (Rao & Menon, 2019). These mature fruits, which are ovoid-shaped berries, turn yellowish-green when they reach full ripeness, marking the optimal stage for harvesting. Traditionally, seed collection is carried out by gathering fallen fruits from the ground rather than

plucking them from the tree, as naturally fallen fruits tend to have fully developed seeds with better viability (Patel & Singh, 2017). The seeds are enclosed in a fleshy mesocarp, which must be removed to facilitate drying and storage. The standard practice involves manual extraction, where the outer mesocarp and exocarp are separated, and the seeds are washed thoroughly to remove any residual pulp that may cause fungal infections during storage.

Collected seeds are typically brown in color, 3-4 cm in length, and contain a hard seed coat, which can pose challenges to germination. The freshly collected seeds are often sun-dried for a short period (2-3 days) to reduce moisture content and prevent microbial spoilage, ensuring longer storage viability (Sharma *et al*., 2018). For conservation and large-scale propagation, seeds should be stored in a cool, dry place in airtight containers or gunny bags, though their viability naturally declines over time.

To enhance germination, pre-sowing treatments such as scarification or soaking the seeds in water for 24 hours are commonly recommended (Verma & Rao, 2016). Germination is typically observed within 10-15 days under optimal soil moisture and temperature conditions.

The sustainable collection of Madhuca longifolia seeds is essential for ensuring long-term propagation and preventing population decline. Community-based conservation efforts, such as controlled seed harvesting and afforestation

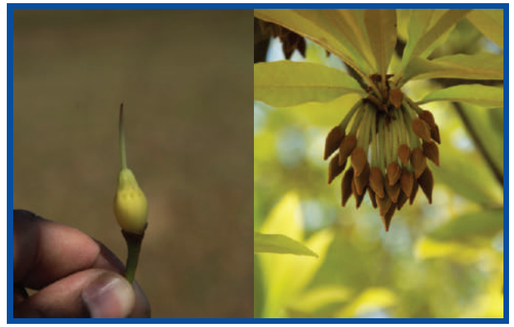
projects, play a key role in preserving this valuable species (Kumar *et al*., 2020).

Germination

The germination success of *M. longifolia* seeds is influenced by various pre-sowing treatments, including the application of Gibberellic Acid (GA_3), Potassium Nitrate (KNO_3), distilled water (DW), and mechanical scarification, in addition to a control group without any treatment. Studies have shown that mechanical scarification significantly enhances germination rates under *ex vitro* conditions, with higher germination percentages recorded after 28 days. Under light conditions, 90.00% of the seeds germinated, whereas under dark conditions, the germination rate was slightly lower at 85.45% (Rao & Menon, 2019). Notably, dark conditions were found to stimulate early germination within the first seven days of sowing, highlighting their potential role in accelerating the germination process.

Among the various pre-treatments, the application of GA_3, KNO_3, and treatments resulted in the highest shoot growth, suggesting that these treatments not only enhance germination but also promote early seedling development (Patel & Singh, 2017). The use of Gibberellic Acid (GA_3) in particular has been widely recognized for breaking seed dormancy and stimulating uniform seedling emergence.

In vitro germination studies on *M. longifolia* have demonstrated improved germination rates using Murashige and Skoog (MS) medium. When de-



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coated and surface-sterilized seeds were cultured on half-strength liquid Murashige and Skoog (½ MS) media supplemented with benzylaminopurine (BAP) at 0.5 mg/L, a 77.71% germination rate was recorded (Verma & Rao, 2016).

A unique reproductive characteristic observed in *M. longifolia* is polyembryony, where multiple embryos develop from a single seed. Out of a total 91% germination rate (546 seedlings) observed in a controlled study, 4.76% (26 seedlings) exhibited polyembryony. Among these, 12 twin seedlings, 9 triplet seedlings, and 5 seedlings with multiple shoots were recorded (Kumar *et al*., 2020).

Vegetative propagation

Stem cuttings measuring 1-3 cm in thickness and 13-15 cm in length have been found to be suitable for vegetative propagation of *M. longifolia* (Patel & Singh, 2017). However, the success rate of rooting in stem cuttings is relatively low. The application of indole-3-butyric acid (IBA) at 2000 ppm has been tested to enhance root formation, but even under optimal conditions, the rooting success rate remains around 35% (Kumar *et al*., 2020).

A more effective method for propagating *M. longifolia* is cleft grafting, a technique that is not only cost-effective but also has a higher success rate compared to stem cuttings (Rao & Menon, 2019).

***In vitro* propagation**

The Woody Plant Medium (WPM) supplemented with 2 mg/L thidiazuron (TDZ) has been identified as an effective medium for callus induction in *M. longifolia* (Patel & Sharma, 2019).

For the successful development of somatic embryos, the Murashige and Skoog (MS) medium supplemented with 6 mg/L benzylaminopurine (BAP) and 0.5 mg/L naphthaleneacetic acid (NAA) has proven to be highly effective (Kumar *et al*., 2021). The combination of BAP (a cytokinin) and

NAA (an auxin) stimulates embryogenic callus differentiation, leading to the formation of somatic embryos capable of developing into complete plantlets.

Insect pests and diseases

M. longifolia is affected by several pests and diseases that can negatively impact its growth, seed production, and timber quality. Among the most significant threats is *Stathmopoda basiplectra*, a major seed pest that reduces germination rates by feeding on seeds, thereby limiting natural regeneration (Kumar *et al*., 2018). Defoliators such as *Achaea janata, Anuga multiplicatns, Bombotelia nugatrix, Metanastria hyrtaca*, and the larvae of *Acrocercops euthycolona* and *A. phaeomorphia* cause severe leaf damage, leading to defoliation, reduced photosynthetic efficiency, and overall decline in tree vigor (Sharma & Verma, 2020). These pests weaken the tree, making it more vulnerable to environmental stress and secondary infections.

Sap-sucking insects such as *Unaspis acuminata* further stress the tree by depleting essential nutrients, which results in stunted growth and reduced flowering (Rao *et al*., 2019). Bark borers like *Indarbella quadrinotata* infest the trunk, compromising structural integrity and making the tree more susceptible to fungal infections. Several fungal pathogens also cause significant damage to *M. longifolia*. *Polystictus steinheilianus* leads to decay in felled timber, rendering it unsuitable for commercial use, while *Fomes caryophylli* causes heart rot, which gradually weakens the tree from within (Patel & Singh, 2017). Foliar diseases, including *Cercospora haticola* (leaf spot), *Scopella echimulata* (leaf rust), and *Pestalotiopsis dichaeta* (leaf blight), further deteriorate tree health by causing premature leaf drop, reducing nutrient availability, and limiting growth potential (Verma *et al*., 2021).

Additionally, *Loranthus*, a parasitic plant, is a serious problem in some regions, attaching itself to the tree and competing for nutrients and water. If left unmanaged, *Loranthus* infestations can lead to branch dieback and, in severe cases, complete tree mortality (Sharma *et al*., 2018). Integrated pest and disease management strategies are necessary to minimize these threats. Seed pests can be managed through neem-based seed treatments and biological pesticides. Defoliators and sap-sucking insects can be controlled using biocontrol agents such as parasitoid wasps and entomopathogenic fungi, while eco-friendly botanical insecticides offer sustainable pest management solutions. For fungal infections, preventive measures such as proper timber storage, timely application of fungicides, and maintaining optimal moisture levels can help mitigate decay and disease spread. The removal of *Loranthus* before seed dispersal and the application of systemic herbicides in severe cases can effectively control its spread (Kumar & Rao, 2022).

Planting techniques and post planting operation

The ideal planting distance varies between 3 × 3 m and 8 × 8 m, depending on soil fertility, moisture availability, and management goals. A well-maintained plantation can be worked on a 25-30 year coppice cycle, yielding an average annual increment of 3.5 m^3/ha (Kumar et al., 2020). Fire protection measures such as fire trenching are critical in the early years to prevent damage to young saplings. Fencing is also recommended to protect the plantation from grazing and browsing by livestock (Sharma & Verma, 2019). Regular weeding and soil working around seedlings enhance growth and ensure better establishment. The tree is highly light-demanding and exhibits strong drought resistance, making it well-suited for semi-arid and dry tropical regions. It is also frost-hardy, allowing it to withstand extreme climatic variations. When felled in the hot season, *M. longifolia* coppices well, ensuring sustainable regeneration and growth in managed plantations (Rao & Menon, 2019).

Agroforestry practices

M. longifolia is well-suited for agroforestry systems due to its ability to thrive under varied climatic and soil conditions. It is commonly integrated into farming systems along the bunds of paddy fields, where it benefits from irrigation, fertilizers, and organic manure, resulting in improved growth and productivity (Patel & Singh, 2017). The species provides multiple benefits in agroforestry, including soil conservation, nutrient cycling, and an additional source of income for farmers through the collection of flowers, seeds, and timber (Sharma *et al*., 2018).

Its deep-rooted system minimizes competition with agricultural crops while improving soil structure and moisture retention. Additionally, *M. longifolia* plantations in agroforestry settings have been reported to enhance biodiversity by supporting pollinators and other beneficial organisms (Kumar *et al*., 2020). Its integration into silvopastoral systems has also been explored, where it provides shade for livestock while contributing to fodder and fuelwood needs (Rao & Menon, 2019).

Tree improvement

Recent studies have significantly advanced our understanding of *Madhuca longifolia* (Mahua) germplasm evaluation and conservation. Suthanthirapandian et al. (2023) utilized Random Amplified Polymorphic DNA (RAPD) markers to assess genetic diversity among five different accessions of *M. longifolia* collected from the Pachamalai Hills in Tamil Nadu, India. Their research

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revealed a high level of polymorphism (94.90%), indicating substantial genetic variation among accessions. Similarly, Patel *et al*. (2023) analyzed genetic diversity among *M. longifolia* genotypes from the semi-arid ecosystem of Gujarat, finding significant variability within natural populations through RAPD profiling of ten accessions. Furthermore, Wang *et al*. (2023) conducted a comprehensive genomic and transcriptomic analysis, providing high-quality chromosome-level insights into the molecular responses of *M. longifolia* to low-temperature stress.

The State Forest Research Institute (SFRI), Jabalpur, has played a crucial role in assessing and conserving Mahua germplasm, while the Tropical Forest Research Institute (TFRI), Jabalpur, has conducted extensive studies on germination, chemical composition, and the establishment of demonstration plots (Sharma *et al*., 2013). A systematic survey and collection of Mahua germplasm from Maharashtra were carried out to evaluate its genetic variability and adaptability to different environmental conditions. One of the significant findings was the variation in chlorophyll content observed across 23 distinct families of Mahua, indicating genetic diversity and potential adaptability to different agroclimatic regions (Rao *et al*., 2015).

Further experiments were conducted to assess variability in seed characteristics, including seed length, seed breadth, seed length-to-breadth ratio, hundred-seed weight, and oil content. In addition to seed parameters, morphological variations in leaf number and total dry weight were observed among the studied families (Kumar & Reddy, 2017). The assessment of 23 one-parent families of Mahua across different agroclimatic zones of Tamil Nadu revealed that TNAU and Paiyur-1 were the most suitable for short-rotation forestry practices, offering promising prospects for afforestation and commercial cultivation (Prakash *et al*., 2019).

Utilization

M. longifolia is a highly valuable tree species with a wide range of uses in food, medicine, agriculture, and industry. The most significant importance of *M. longifolia* lies in its fleshy corollas, which are succulent and rich in sugars and vitamins. These flowers are consumed raw or cooked and are commonly used in the preparation of sweets. Additionally, they serve as a primary raw material for producing country liquor, portable spirits, and vinegar, which hold economic and cultural significance in tribal and rural communities (Singh *et al*., 2011).

The outer part of the fruit is also edible and can be consumed raw, cooked, or added to refreshing drinks. However, the most valuable component of the tree is its seed kernel, which contains 30-40% fatty oil known as Mahua oil or butter of commerce. This oil is widely used by tribal communities for cooking and as a fuel for burning. It is also commercially exploited for the production of margarine, soap, glycerin, lubricating grease, and as a batching oil in the jute industry. Additionally, Mahua oil is used for adulterating ghee and in various chemical industries (Nagar *et al*., 2016).

The residual seed cake obtained after oil extraction serves as a valuable organic manure and biopesticide for different crops. After detoxification, the seed cake can be used as a concentrate feed for cattle and fish, making it an important byproduct in agriculture. Furthermore, *M. longifolia* leaves are used as fodder for cattle and as green leaf manure to enhance soil fertility (Dwivedi *et al*., 2010).

Beyond its agricultural applications, the bark of *M. longifolia* has multiple uses. It contains latex that yields a rubber-like compound similar to gutta-percha, which has industrial significance. Additionally, bark tannins are employed in medicine, dyeing, and tanning industries (Rao *et al*., 2014). The tree is also known for its high tolerance to smoke and dust, making it suitable for afforestation in polluted urban areas (Kumar & Gupta, 2015).

Pharmacologically, various extracts of *M. longifolia* exhibit significant medicinal properties. The ethanolic extract of the bark possesses antioxidant, antimicrobial, wound-healing, anti-inflammatory, and hypoglycemic properties (Roy *et al*., 2005). Similarly, the ethanolic extract of the stem has demonstrated strong antimicrobial activity. Methanolic extracts of flowers, leaves, stems, and bark have been found to exhibit antimicrobial effects, reinforcing their importance in traditional medicine. The methanolic extract of the bark has also shown antihyperglycemic (Dahake *et al*., 2010) and anti-diabetic activity (Ghosh *et al*., 2008; Walallawita *et al*., 2016). Furthermore, aqueous leaf extracts have been reported to have antidiabetic and antiulcer properties (Roy *et al*., 2005; Yadav *et al*., 2012; Akshatha *et al*., 2013b).

Safety studies on *M. longifolia* indicate minimal toxicity compared to modern pharmaceutical drugs, with no significant cholinergic activity observed even at higher concentrations. This makes it a promising candidate for medicinal applications with a lower risk of adverse effects (Patel *et al*., 2012). The diverse applications of *M. longifolia* in food, agriculture, industry, and medicine highlight its economic and ecological importance, making it a valuable species for sustainable utilization.

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EIACP ACTIVITIES

Wildlife Week 2024

As part of Mission LiFE and Wildlife Week 2024, EIACP (Environmental Information, Awareness, Capacity Building and Livelihood Programme) Programme Centre (erstwhile IFGTB ENVIS) RP at the ICFRE - Institute of Forest Genetics and Tree Breeding, Coimbatore organized an awareness campaign for the students of the Zoology Department at Avinashilingam Institute for Home Science & Higher Education for Women, Coimbatore. The main focus of the campaign is to foster understanding and responsibility towards wildlife conservation, digital innovation, cleanliness, and their interconnected impact on health and the environment. spreading knowledge and fostering a sense of responsibility for nature.In addition, lectures on Mission LiFE and Cleanliness & Its Impact on Health were delivered as part of Swachh Bharat Abhiyan 4.0 and Mission LiFE initiatives.. Additionally, drawing competition on the theme significance of wildlife was conducted to people of different walks of life. E-Certificate was awarded to all the participants. Awareness poster highlighting the importance of Wildlife was released during the campaign. The poster and handouts were disseminated widely.

PRAKRITI Programme

As part of the Ministry of Environment, Forest and Climate Change (MoEFCC)'s PRAKRITI Programme, an awareness campaign was conducted for the students of Government Girls Higher Secondary School, Singanallur on 09.10.2024, Girls Higher Secondary School, Ondipudur on 29.10.2024 and 22. Corporation Higher Secondary School, Siddhapudur on 04.12.2024. The campaign aimed to educate students about environmental conservation, sustainable practices, and the role of individuals in protecting nature. Various interactive sessions, presentations, and activities were organized to engage students and instill a sense of responsibility towards the environment. The initiative also emphasized the importance of adopting eco-friendly habits in daily life to contribute to a greener and healthier planet.

National Seminar on SDGs

During the National Seminar on Building the Future: Sustainable Solutions for a Changing World at Kumaraguru School of Business, KG Chavadi, Coimbatore, the ICFRE-IFGTB EIACP PC RP delivered a lecture on the topic Building the Future: Sustainable Solutions for a Changing World.

Green Diwali Awareness Campaign

As part of the Green Diwali Awareness Campaign conducted by ICFRE-IFGTB EIACP PC RP on 30.10.2024, various outreach activities were organized to educate the public on reducing pollution and minimizing environmental impact during the festival. A Green Greeting, highlighting practical tips for celebrating Diwali in an eco-friendly manner, was released and widely disseminated. The campaign encouraged individuals to opt for sustainable alternatives such as using biodegradable decorations, lighting diyas instead of firecrackers, and promoting a cleaner, greener celebration.

World Soil Day 2024

As part of Mission LiFE and in connection with World Soil Day 2024 EIACP (Environmental Information, Awareness, Capacity Building and Livelihood Programme) Programme Centre (erstwhile IFGTB ENVIS) Resource Partner on Forest Genetic Resources and Tree Improvement at the ICFRE-Institute of Forest Genetics and Tree Breeding, Coimbatore organized various awareness campaigns covering school and college students, general public and other stakeholders. These campaigns' main focus is to make everyone understand the importance of soils. Awareness lecture on the theme "Caring for Soils: Measure, Monitor, Manage" was delivered by ICFRE-IFGTB EIACP PC during the campaigns. An Awareness poster highlighting the significance of soil was released during the campaign. In addition, an Awareness Quiz on soil was also organized for students and the general public from 18.11.2024 to 05.12.2024. People from all walks of life have participated and E Certificates were awarded to all.

International Mountain Day 2024

As part of Mission LiFE and in connection with International Mountain Day 2024 EIACP (Environmental Information, Awareness, Capacity Building and Livelihood Programme) Programme Centre (erstwhile IFGTB ENVIS) Resource Partner on Forest Genetic Resources and Tree Improvement at the ICFRE-Institute of Forest

Genetics and Tree Breeding, Coimbatore organized an awareness campaign to the students of PSGR Krishnammal College for Women, Coimbatore. The campaign highlighted the distinctive features, ecological importance, and the pressing challenges confronting mountain ecosystems. The campaign was organized as part of the BharathiyarVizha organized in collaboration with Dinamalar, a leading Tamil Regional Daily. Lectures on themes and actions of mission LiFE and environmental awareness were delivered. An awareness poster on the significance of mountains conceived by ICFRE IFGTB EIACP CP RP was released by Shri V. Balakrishanan, I.P.S., Police Commissioner of Coimbatore. The copies of the awareness poster and handouts were disseminated widely.

Work Shop on Biodiversity Conservation and Nature Education for Government School Teachers of Tamil Nadu

During the Workshop on Biodiversity Conservation and Nature Education for Government School Teachers of Tamil Nadu, ICFRE-IFGTB EIACP PC RP played a key role in sensitizing 71 school teachers on Mission LiFE (Lifestyle for Environment). The workshop aimed to equip educators with the knowledge and tools necessary to integrate environmental conservation principles into school curricula and daily teaching practices.

Through interactive sessions, expert talks, and hands-on activities, teachers were introduced to the core objectives of Mission LiFE, emphasizing the importance of sustainable living, biodiversity conservation, and eco-friendly habits. The initiative also highlighted practical steps that teachers can adopt and impart to students, fostering a culture of environmental responsibility among young learners.

By engaging with this program, teachers committed to incorporating LiFE action points into their educational approaches, ensuring that future generations are well-informed and actively involved in environmental conservation efforts.

LiFE Mission Activities

ICFRE-IFGTB EIACP PC RP successfully conducted 39 LiFE Mission campaigns, engaging students and individuals from diverse backgrounds through comprehensive awareness initiatives. These campaigns employed a multifaceted approach, combining informative lectures, interactive activities, and engaging games to effectively connect with participants. Through these dynamic sessions, attendees developed a deeper understanding of the LiFE Mission's objectives and were motivated to actively contribute to its implementation. As a key highlight, each participant took the LiFE Mission pledge, committing to sustainable practices and integrating LiFE action points into their daily lives.

ICFRE - IFGTB PRODUCTS

ICFRE - INSTITUTE OF FOREST GENETICS AND TREE BREEDING

(Indian Council of Forestry Research and Education)

(An autonomous body of Ministry of Environment Forest & Climate Change, Govt. of India)
P.B. No. 1061, R.S. Puram, Coimbatore - 641 002. Tamil Nadu, India

The following Services are provided at ICFRE - IFGTB for various stakeholders. Please contact us for details as below.

	Services	Cost per unit		Contact Number with Email ID
Clonal Seedling: For Sale & Booking				
1.	Clones of Casuarina Hybrids (CH-1, CH-2 & CH-5)	Rs. 4.50 per plant		**Smt. K. Shanthi, CTO,** Division of Plant Biotechnology, Phone : 0422 2484122 E-mail : shanthik@icfre.org
	Eucalyptus clones (EC-4, EC-6, EC-9 & EC-11)	Rs. 4.00 per plant		
2.	Tissue Culture Teak and Bamboo Plants	Rs. 55.00 per plant Rs. 25.00 per plant		**Dr Rekha R. Warrier,** Scientist - G & Head, Division of Chemistry & Bioprospecting Phone : 0422 2484167 E-mail : rekha@icfre.org
3.	Windbreak Clones (WBC-1, WBC-2, WBC-3 & WBC-4)	Rs. 4 per plant		**Dr. C. Buvaneswaran,** Scientist - G, Sliviculture & Forest Management Division, Phone : 0422 2484198, 94422 45047 E-mail : buvanesc@icfre.org
4.	ArborEasy® DNA Isolation Kit **Pack Size**	**Price Rs.**	**Packaging & Transportation Rs.**	**Dr. Modhumita Dasgupta,** Scientist - G, Division of Plant Biotechnology Phone : 0422 2484115 E-mail : ghoshm@icfre.org gmodhumita@gmail.com
	10 Reactions	950.00	150.00	
	20 Reactions	1900.00	200.00	
	50 Reactions	4750.00	300.00	
5.	Soil Testing (pH, EC, OC, Micro and Macro Nutrients)	Rs. 4750.00		**Dr. A.C. Surya Prabha,** Scientist - D, Sliviculture & Forest Management Division, Phone : 0422 2484150 E-mail : acsuryaprabha@icfre.org
Products of IFGTB: For Sale & Booking				
7.	Hy-Act (Natural and Seed Oil Based Biopesticide)	Rs. 80.00 per bottle		**Dr. N. Senthilkumar,** Scientist - F Phone : 0422 2484193 Mobile : 9629160703 E-mail : senthilnk@icfre.org (or) **Smt. R. Sumathi,** CTO Division of Chemistry & Bioprospecting, Phone : 0422 2484144 Mobile : 9942245542 E-mail : sumathir@icfre.org
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